ABSTRACTS OF ACC CONFERENCE PROCEEDINGS

Platform Presentations

The use of PROMIS to measure the quality of life of pregnant patients presenting for care in a chiropractic practice-based research network

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Introduction: From a biopsychosocial perspective, maternal stress has been linked to adverse health outcomes for both the mother and fetus. We examined the quality of life (QoL) of pregnant patients presenting in a practice-based research network (PBRN). **Methods:** This study received institutional review board approval from Life University. We examined patient sociodemographics, visit-specific satisfaction with RAND VSQ9, and QoL with PROMIS-29 (Patient-Reported Outcomes Measurement Information System-29). The instruments were pilot tested and implemented as paper-and-pencil questionnaires without difficulty. **Results:** A total of 356 patients participated in this study. Patient's average age was 30.9 years, they were highly educated, and they presented, on average, in their 25th week of gestation with mean parity at 0.91. The VSQ9 scores indicated high satisfaction with care whereas the PROMIS-29 scores found poorer QoL on presentation for chiropractic care. **Discussion:** PROMIS provides validated, common, and accessible PRO measures that are applicable to a range of conditions in clinical trials and practice. It has been successfully implemented in chiropractic research and practice. The PROMIS measures provide a basis for comparison to gauge the effectiveness of interventions in future studies within and outside chiropractic. **Conclusions:** We encourage further use of PROMIS to examine the impact of chiropractic care to health outcomes. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Clinical outcomes using the Boot Camp for Lumbar Spinal Stenosis Program: a retrospective study

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Introduction: Lumbar spinal stenosis is a leading cause of pain, disability, and loss of independence in older adults. The effectiveness of nonoperative treatments for lumbar spinal stenosis is unknown. The Boot Camp for Lumbar Spinal Stenosis Program addresses the multifaceted aspects of lumbar spinal stenosis. The purpose of this study was to assess the effectiveness of the Boot Camp Program. **Methods:** This was a retrospective study. Two researchers independently extracted the data from the charts of consecutive eligible patients who completed the 6-week Boot Camp Program. A paired *t* test was used to compare differences in outcomes from baseline to 6 week. **Results:** A total of 49 patients were enrolled, with a mean age of 70 years. The mean difference in the Oswestry Disability Index was 15.2, 95% CI (11.39, 18.92), and for the functional and symptoms scales of the Swiss Spinal Stenosis Questionnaire, it was 0.41, 95% CI (0.26, 0.56) and 0.74, 95% CI (0.55, 0.93), respectively. Numeric pain scores for both leg and back showed statistically significant improvements. Improvements in all outcomes were clinically important. **Conclusions:** This study provides preliminary evidence of the effectiveness of the Boot Camp for Lumbar Spinal Stenosis Program. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Leading curricular change by restructuring a female care course at a chiropractic college: where evidence-based clinical practice and evidence-based teaching meet

Ayla Azad, Loretta Howard, Canadian Memorial Chiropractic College

Introduction: This case study explores a curriculum change process successfully led by the lead author to intersect clinical evidence-based practice (EBP) with evidence-based teaching (EBT) methodologies in a female care course at a chiropractic college. **The Problem:** While much is known about EBP and significant work in health science institutions has gone into ensuring that EBP is embedded in clinical practice and curriculum content, the notion of 21st century EBT is largely unheard of by chiropractic educators. This

creates a disturbing paradox because, while faculty's curriculum content is increasingly evidence-based, their teaching practice is not. **The Intervention:** A 3rd-year female course, the focus of this case study, is redeveloped by applying EBP processes and EBT strategies. These include a case-based and flipped classroom approach grounded in experiential and collaborative learning and driven by current research. **The Outcome:** Support for the strategies applied to effectively unite and create meaningful student learning and success is strongly demonstrated. Secondary use of data indicated an overwhelmingly positive student response, and course performance increased by 1 full letter grade. **Implications:** Further leadership in faculty development as well as EBT curricular change processes are required to meet 21st century health science needs. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Barriers to full-text publication of abstracts presented at the 2008 Association of Chiropractic Colleges/Research Agenda Conference meeting

Barclay Bakkum, Illinois College of Optometry, Cynthia Chapman, Occoquan Family Chiropractic

Introduction: The purpose of this study was to investigate the self-reported barriers to publication for authors of abstracts presented at the 2008 Association of Chiropractic Colleges/Research Agenda Conference (ACC/RAC) meeting through the use of a survey. **Methods:** One of the authors of each of the presentations at the 2008 ACC/RAC meeting, who were believed to have not published their studies, were contacted by email and asked to fill out an institutional review board–approved 4-question survey. **Results:** Of the 41 surveys, 23 were completed, for a return rate of 56%. Most of the respondents were chiropractors who were faculty members at chiropractic educational institutions. Even though two-thirds of the authors had not submitted a manuscript for publication, nearly one-third of the meeting abstracts had actually been published or were still in the publishing process. The most frequent barrier to publishing cited by those who had not submitted a manuscript for publication was lack of time to prepare a manuscript, followed by pursuit of publishing being a low priority. **Conclusions:** The main barriers to publishing in this chiropractic population appear to be institutional. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Reliability of the Goutallier classification in quantifying lumbar multifidus fat using MRI

Patrick Battaglia, Logan University, Yumi Maeda, Athinoula A. Martinos, Center for Biomedical Imaging, Massachusetts General Hospital, Aaron Welk, Brad Hough, Norman Kettner, Logan University

Introduction: We investigated the reliability of the Goutallier grading system (GCS) for muscle fatty degeneration in the lumbar multifidus (LM) using magnetic resonance imaging (MRI) exams. **Methods:** After institutional review board approval, a sample of 25 lumbar spine 1.5-T MRI scans were obtained retrospectively from the radiology department PACS. Two observers independently graded each LM at the L4/L5 and L5/S1 intervertebral level. ImageJ pixel analysis software was used independently by 2 observers to quantify the percent fat of the LM. Intraclass correlation coefficient and Pearson correlation coefficient analysis were performed. **Results:** Intraobserver reliability grading LM fat ranged from 0.833 to 0.963. Mean interobserver reliability grading LM fat was 0.886 to 0.942. Interobserver reliability in determining percent fat was between 0.725 and 0.904. There was a significant ($p < .001$) correlation between LM percent fat and GCS grade. **Discussion:** The GCS appears to be reliable in grading LM fatty degeneration. Future studies with larger sample sizes and multiple raters are warranted to validate these results. **Conclusions:** The establishment of a reliable scale of grading LM fatty degeneration will facilitate future clinical research evaluating the relationship between LM fat and low back pain. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Can flipped learning work? Access of online content and relationship to course performance

Thomas Bergmann, Glori Hinck, Northwestern Health Sciences University

Introduction: Is flipped learning a viable model of instruction? This research investigated the degree to which students accessed required online content in a flipped chiropractic philosophy course. **Methods:** Computerized LMS logs were used to determine specific course content accessed by each of the 104 students enrolled in Principles and Philosophies 3. The study design was approved by the university's institutional review board process. **Results:** Students accessed 67% of the overall online course content related to the midterm examination—54% of the required video content and 80% of the required written content. They accessed 72% of the overall online course content related to the final examination—51% of the video content and 86% of the written content. Average score on the midterm examination was 84%, and on the final examination, 78%. **Discussion:** While a majority of students accessed at least 1 of the required learning objects, many viewed either the written content or the video content only, with fewer (approximately half) viewing the video content. **Conclusions:** Results suggest that flipped learning is a viable model of instruction for a chiropractic principles and philosophy course. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Assessment of organizational culture in chiropractic education and its influence on the implementation of revised accreditation standards

Karen Bobak, New York Chiropractic College

Developing and implementing a change process to demonstrate alignment with updated accreditation standards is a challenge that is currently facing all the Council on Chiropractic Education (CCE)–accredited institutions across the United States. The purpose of this study was to identify the current organizational cultures within the CCE-accredited doctor of chiropractic institutions and to assess if the organizational cultures support or resist the implementation of change. Following institutional review board approval, this study gathered quantitative data through the Organizational Culture Assessment Instrument (OCAI) survey delivered to faculty and administrators of CCE-accredited institutions. Qualitative data were collected through faculty and administrator focus group interviews. The quantitative findings of this study identified the most prevalent organizational culture type as a structured hierarchy culture. The results of the qualitative analysis indicated that elements of both support and resistance to change could be identified within these institutions. These finding provide useful information to the leaders within chiropractic education. Culture is found to be a modifying factor in the implementation of change. Identifying and understanding organizational culture allows leadership the opportunity to build change processes that are grounded in the practices and values that have supported the institution. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Student understanding and attitudes toward proper documentation, billing practices, and medico-legal concepts in chiropractic clinical education

Heather Bowyer, Melissa Ferranti, Michelle Gingras, Philip Afghani, Palmer College of Chiropractic, Florida Campus

Introduction: Chiropractic educators are involved in developing diverse and inventive methods of learning to prepare students for contemporary practice. A research exercise was developed to explore chiropractic interns' understanding and awareness of the deposition process and their attitudes toward proper documentation. **Methods:** An institutional review board application was submitted, and exemption was granted. Investigators selected students based on patient records that showed errors in documentation, patient management, and/or billing. Informed consent was obtained from all students. Pseudo-subpoenas were delivered, and a mock deposition was conducted. Presurveys and postsurveys were used to analyze impact. **Results:** Analysis of *t* tests shows significant change in students' understanding and confidence in medico-legal ramifications of documentation and billing practices. **Discussion:** Student interns clearly understand the importance of correct documentation, but they lack the confidence in how it applies to the medico-legal system and billing practices. **Conclusions:** With such high rates of improper documentation in our profession, this exercise provides educators with a powerful tool to expose students to proper documentation and billing so that these errors, along with potential fraud and abuse, are avoided. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Feasibility of using the Patient Reported Outcomes Measurement Information System (PROMIS) in academic health centers: case series design on pain reduction after chiropractic care

Jeanmarie Burke, New York Chiropractic College

Objective: The research objectives are to (1) establish Patient Reported Outcomes Measurement Information System (PROMIS) as a resource for collecting data on patient outcomes within academic health centers at a chiropractic college and (2) describe treatment effects of pragmatic chiropractic care incorporating instrument-assisted soft tissue mobilization (IASTM) on pain symptoms in patients with musculoskeletal disorders related to the spine. **Methods:** This is a prospective case series ($n = 15$). There are 2 assessment time points: (1) baseline and (2) at completion of care. The inclusion criteria are patients aged 20–70 years, regardless of gender and ethnicity, who have had a diagnosis of musculoskeletal disorder of the spine and who have a treatment plan that includes IASTM. The outcomes are 3 PROMIS electronic surveys: Pain Behavior, Pain Interference, and Pain Intensity. **Results:** PROMIS was successfully implemented as a resource for collecting data within academic health centers at a chiropractic college. There were reductions in pain following a pragmatic intervention of chiropractic care incorporating IASTM as evidenced by data from PROMIS survey instruments. **Conclusions:** Within the limitations of a case series design, these data provide encouraging initial evidence on the utility of PROMIS instruments for clinical and research outcomes in chiropractic patients. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Learning preferences of 1st-year chiropractic students

Kara Burnham, University of Western States

Introduction: Chiropractic education is undergoing constant change. Students must be prepared to leap into new learning environments and have the necessary skills and perspective to do so. Different surveys have been developed to assess learning style. One of the often-used instruments is the VARK survey developed by Neil Fleming. **Methods:** The VARK survey was distributed to 78 1st-year students in 2013. The paper surveys were scored using the VARK questionnaire-

scoring chart. After all questions were scored, the number of Vs, As, Rs, or Ks circled were counted to create a profile for each student. **Results:** All students in this study were multimodal. Only 1 student (1.3%) preferred a bimodal mode of instruction. Nineteen of the students (25.3%) surveyed preferred a trimodal mode of instruction. The largest group, 55 students (73.3%), preferred a quadrimodal mode of presentation. **Discussion:** This information may encourage the instructor to incorporate multiple types of learning into the learning experience. If learning preferences are taken into consideration, student satisfaction may be positively impacted. As higher education moves into different learning environments, reaching the students in a way that they may prefer may ease the transition to novel environments. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

The chiropractic scope of practice update and what the law allows: a cross-sectional survey

Mabel Chang, National University of Health Sciences

Introduction: This survey is meant to clarify the scope of chiropractic practice as defined by law in the United States, Canada, Australia, and New Zealand. **Methods:** Licensure officials were asked to evaluate 97 services. Percentage totals were calculated for each item by jurisdiction. **Results:** Partial or complete responses were received from Australia, New Zealand, 4 of 9 jurisdictions e-mailed in Canada, and 51 of 53 jurisdictions e-mailed in the United States. Of these, British Columbia and Indiana provided demographic information only. Maryland, Puerto Rico, Manitoba, British Columbia, Quebec, Ontario, and Alberta did not respond to our requests. **Discussion:** Limitations to this study include respondents who were not health care professionals or who may not be familiar with the services that were surveyed, licensure boards that change in composition, and interpretation of the statutes that vary. **Conclusions:** Scope of practice is dynamic; it evolves based on changes in advances in technology, societal pressures, skyrocketing health care costs, new research that affects practice, and many other influencers. Because of the evolving nature of scope of practice, it is recommended that this survey be repeated after health care reform has been implemented. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Assessing the change in attitudes, knowledge, and perspectives of medical students to chiropractic after a core clerkship rotation in family medicine

Ngai Chow, Canadian Memorial Chiropractic College, Jessica Wong, Canadian Memorial Chiropractic College/University of Ontario Institute of Technology, Sarah Lee, Kara Hayes, Dan Moore, Canadian Memorial Chiropractic College, Deborah Kopansky-Giles, St. Michael's Hospital/Canadian Memorial Chiropractic College, Karen Weyman, St. Michael's Hospital/University of Toronto

Background: An educational session on chiropractic for medical students was previously shown to improve their views toward chiropractic. However, its long-term effects and impact on clinical practice remains unknown. **Objective:** The purpose was to assess the attitudes, knowledge, and perspectives of 4th-year medical students toward chiropractic after a core clerkship rotation in family medicine. These views were compared with their views in their 2nd and 3rd years. **Methods:** A 54-item survey was used to obtain overall attitude, knowledge, and perspective scores on chiropractic among 4th-year medical students. Analysis of variance (ANOVA) was used to assess attitude-response survey totals over grouping variables and to compare results with views found in second and third year. **Results:** The survey was completed by 151 students (67% response rate). We found a significant increase in knowledge about chiropractic from 2nd to 4th year, but a significant decrease in attitudes from 3rd to 4th year. There were no differences in views between students with formal clinical exposure to chiropractic compared to those without. **Conclusions:** Current medical curricula may need to incorporate longitudinal didactic and clinical exposures to chiropractic to improve and sustain the views of medical students toward chiropractic and enhance interprofessional collaboration between these two professions. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

A survey analysis of the public's perception of the chiropractic profession

Chadwick Chung, Rikki Johnson, Aaron Jager, Canadian Memorial Chiropractic College

Introduction: Musculoskeletal disorders and back pain are leading causes of disabilities and significantly burden the health care system. With over 150 treatment options being provided by various health care providers, chiropractors struggle with cultural authority and professional identity. Understanding the public's perception of chiropractic is important in order to determine the role of chiropractic within an evolving and complex health system. **Methods:** A survey was developed and administered to individuals in a public setting following approval by the research ethics board. The survey categorized terms as being associated with chiropractic or naturopathy. Percent associations were calculated to determine which terms were associated with the respective professions. **Results:** Chiropractic was associated with "Neck," "Back," and "Spine" by more than 80% of responders and with the terms "Adjustment," "Joint," "Ligament," "Musculoskeletal," and "Posture" by between 70% and 80% of the responders. **Discussion:** There is a strong association between the public's perception of the chiropractic profession and what chiropractors have historically held as central tenants. Chiropractors could be facing

an opportunity to embrace cultural authority over nonsurgical spine care. **Conclusions:** The public associates chiropractors with the back, neck, and spine. Further research is required to identify how chiropractors can embrace cultural authority as spine care experts. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Implementing a peer review process for course level student learning outcomes in a chiropractic program

Alena Coleman, Karen Numeroff, Jerry Hochman, Life University

Introduction: Programs in higher education are identifying, through development of student learning outcomes, what students should learn, and they are assessing whether students are learning and retaining this knowledge. This report is a retrospective study of a faculty peer review process of course level student learning outcomes performed within a chiropractic program. **Methods:** Faculty members were assigned to groups based on expertise and content of courses taught to conduct a peer review process. This process was conducted using the institutions' learning management system in a course specifically developed for this process. **Results:** There was an 81.02% response rate from all faculty members who were invited to participate in the peer review process. There was an overall tendency for peer reviewers to assign the highest score to their colleagues. **Discussion:** It is important to develop a structured review process to identify those outcomes that support or may be disruptive to student learning or the overall curriculum. **Conclusions:** While instruction and assessment is a faculty-driven process, the implementation of a peer review process can present challenges. Even those most critical of learning outcomes consider that their use can add value to the educational process. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Are there differences between trait and situation-specific scores on central elements of the fear avoidance model?

Stephan Cooper, Mark Pfefer, Cleveland Chiropractic College

Introduction: The Fear-Avoidance Model (FAM) is a leading concept in our understanding of chronic pain. **Objective:** This study was designed to investigate the differences between psychosocial survey scores obtained in trait (no pain) and situation-specific (pain) conditions. **Methods:** A psychosocial survey battery (trait) was administered to all participants (n = 76), who were then randomized into either a test or control group. Central sensitization was induced (45°C heat + capsaicin) in the C5 dermatome (ipsi) of the test group. A placebo gel was used in place of capsaicin in the control group. Another psychosocial survey battery (situation-specific) was administered at the 10-minute time point. **Results**: There was a significant decrease (Wilcoxon) between trait and situation-specific mPCS ($p = .019$), PVAQ ($p = .050$), and PASS-20 ($p = .034$) scores in the control group. **Conclusions:** This study demonstrated lower scores in the situation-specific condition compared to the trait condition for catastrophizing, hypervigilance, and pain-related anxiety. This result was unexpected and novel. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

The location of the upright inferior angle of the scapula in relation to the spine: a systematic review of the literature

Robert Cooperstein, Morgan Young, Palmer College of Chiropractic San Jose

Introduction: Chiropractors and others palpate the upright inferior angle of the scapula (IAS) as an anatomical landmark to identify, diagnose, and treat spinal levels. Most authoritative sources state the upright IAS aligns with the spinous process (SP) of T7. This systematic review of the literature addresses this landmark association. **Methods:** Electronic searching retrieved primary studies relating the IAS to a spinal level, using combinations of these search terms: scapula, location, landmark, spinous process, thoracic vertebrae, vertebral level, palpation, and spine. **Results:** From the search, 879 articles of interest were identified, 43 abstracts were read, 22 full-text articles were inspected, and 5 survived the final cut. Each was rated for quality using QUADAS. Pooling data from 5 studies resulted in a very symmetrical bell curve showing upright IAS aligns with T8 SP on average, with range T4–T11. **Discussion:** The conventional wisdom that the IAS aligns with the T7 SP is incorrect. Manual therapists who use this incorrect landmark rule may achieve suboptimal outcomes. **Conclusions:** Manual therapists, acupuncturists, anesthesiologists, nurses, and surgeons should reconsider usual procedures for identifying spine sites in light of this revised information. Inaccurate landmark benchmark rules will add to patient variation and examiner errors in producing targeting errors. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Manual therapy approaches to overactive bladder: a narrative literature review

Robert Cooperstein, Palmer College of Chiropractic, Anthony Lisi, VA Connecticut Healthcare System, Andrew Burd, Palmer College of Chiropractic

Introduction: Overactive bladder (OAB) is often idiopathic, but it may result from either anatomical weakness involving the urinary sphincter or from proprioceptive insult to the bladder smooth muscle resulting in inappropriate micturition reflexes. Anec-

dotal evidence suggests some cases of OAB respond to manual therapy approaches. **Methods:** A qualitative narrative review of the literature was conducted, inclusion criteria for articles being that they reported a manual therapy approach to ameliorating OAB by reducing subluxations or somatic dysfunction. **Results:** Approximately 3 dozen articles were retrieved and their findings discussed, mostly case report and series. These articles were clustered in categories: basic science suggesting a possible somatovesical reflex, clinical science suggesting low back injuries are commonly associated with OAB, osteopathic/medical outcome studies, and chiropractic outcome studies. **Discussion:** Substantial support exists for manual therapy approaches to OAB. A number of different chiropractic and osteopathic methods have been used, including manipulation, instrument adjusting, blocking, and adjunctive soft-tissue work. The stage is set for more rigorous study designs. **Conclusions:** With many cases of OAB being idiopathic and nonresponsive to usual medical care, manual therapy should be considered as a viable alternative treatment approach. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Transformations abroad: transformative learning captured within a chiropractic humanitarian program

Dustin Derby, Amy Everetts, Julie Schrad, Charles Davis, Palmer College of Chiropractic

Background: Humanitarian trips abroad can provide needed services as well as a powerfully transformative experience for interns and doctors. Cross-cultural training activities for interns, as suggested by the Institute of Medicine, can increase cultural awareness when dealing with US minority populations. Few studies evidence the transformational growth experienced by interns during medical mission trips abroad. This is especially true within the field of chiropractic. The aim of this study is to illustrate the transformational experience of chiropractic interns during a chiropractic humanitarian trip abroad. **Methods:** This study was a mixed-method investigation of student interns' experiences on a chiropractic humanitarian trip to Fiji during the 2013 summer term. Data for the current study are a post-trip evaluation and qualitative data from video journals submitted by interns during the trip. **Results/Discussion:** Quantitative and qualitative data analysis indicated intern development in both clinical and cultural awareness competencies, as well as transformative learning in both areas. **Conclusions:** The transformations presented within the current study underscore the value of such programs for increasing the clinical skills and cultural awareness of health care professionals, which may help to mitigate US cultural barriers in practice. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Effects of whole body vibration on patients with cerebral palsy—a literature review

Sean Duquette, Megan McDonald, Brittany Moran, Pamela Wilson, David Starmer, Anthony Giuliano, Canadian Memorial Chiropractic College, University of Waterloo

Introduction: Cerebral palsy (CP) is a developmental disorder affecting posture and motor control, creating difficultly in dynamic mechanical loading of the skeleton. This can result in reduced bone mineral density (BMD), muscle weakness, pain, deformity, and functional loss. Whole body vibration (WBV) has been suggested as a possible intervention to improve these issues. **Methods:** We used a systematic search of different medical databases to look for the use of WBV in patients with CP. **Results:** Six articles ranging from low quality to high quality were located that met the inclusion criteria. The articles reported improvements in spasticity, muscle strength, and coordination, with no adverse reactions reported; however, the effects on BDM were contradictory. **Conclusions:** Based on the low level of evidence, WBV is a promising treatment modality in patients with CP for increasing muscle strength, decreasing pain, increasing functional capacity, and possibly increasing BMD. This level of evidence provides reason for cautious optimism; however, higher quality research is recommended. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Musculoskeletal disorders in combat fighter aircrew: a pilot study

Christine East, Adrian Hunnisett, Christina Cunliffe, McTimoney College of Chiropractic

Introduction: Combat fighter aircrews are exposed to high levels of gravitational force (+Gz force) and musculoskeletal conditions are common; however, treatments offered by the UK military are variable. This study aims to investigate the incidence of musculoskeletal conditions in combat aircrew and the treatments used to resolve the problems. **Method:** Following ethical approval, a cross-sectional survey was undertaken using a questionnaire designed to examine the prevalence of musculoskeletal pain in fast jet aircrew, the characteristics of the pain, and the treatments they sought compared with a control group. The questionnaire also investigated use and attitudes to chiropractic. **Results:** Neck, upper back, and lower back pain were all more commonly reported among the aircrew than among the control group. Satisfaction scores given to chiropractors and osteopaths were found to be significantly higher than those given to general practitioners or physiotherapists in both groups. All of those aircrew affected by musculoskeletal pain stated that they would use a chiropractor if one was available on base. **Conclusions:** Although respondent numbers were small, there is a high incidence of musculoskeletal pain in fast jet aircrew. Also, there is a wide acceptance and enthusiasm for chiropractic treatment in the group. (This is an abstract from a

conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Biomechanics of osteoarthritic cartilage in the sacroiliac joint

Dennis Enix, Logan University, Douglas Smith, Balyor University

Introduction: Osteoarthritis is the most common degenerative condition, affecting cartilage, synovial fluid, and bone. The resultant change in its viscoelastic properties alters its ability to absorb and distribute the shearing forces that cross the sacroiliac joint. **Methods:** Finite element analysis examined the compressive shearing forces on normal, fibrillated, and osteoarthritic sacral and iliac cartilage under loading and angular rotation. University ethics committee approval and donor consent was obtained for this study. **Results:** Normal cartilage under high loads causes fibers to lose their stiffness, becoming fibrillated. A joint with fibrillated cartilage at a 0 degree orientation can handle less stress than the normal joint. As the pelvis rotates anteriorly, sacral cartilage contact stresses decrease and iliac cartilage increases. The von Mises stresses, however, increase on both sacral and iliac cartilage during rotation. **Conclusions:** The kinematics of the sacroiliac joint are dependent on the material properties of the cartilage that lines the joint. The loss of the viscoelastic properties in osteoarthritic cartilage affects its ability to resist tensile and shearing under loading conditions. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Chiropractic Observation and Analysis STudy (COAST): providing an understanding of Australian chiropractic practice

Simon French, Melanie Charity, Kirsty Forsdike, Jane Gunn, University of Melbourne, Barbara Polus, RMIT University, Bruce Walker, Murdoch University, Patty Chondros, University of Melbourne, Helena Britt, University of Sydney

Introduction: COAST (Chiropractic Observational and Analysis STudy) aimed to describe the clinical practices of chiropractors in Victoria, Australia. **Methods:** This was a cross-sectional study of chiropractic practice in Victoria, Australia. For each chiropractic–patient encounter, information collected included a patient health profile, patient reasons for encounter, problems/diagnoses, and chiropractic care. **Results:** Data were collected on 4467 chiropractic–patient encounters from 52 chiropractors between December 2010 and August 2012. In the majority (79%) of encounters, patients were aged 25–64 years; 1% were infants (<1 year, 95% confidence interval [CI]: 0.3, 3). Musculoskeletal reasons for the encounter were described by patients at a rate of 60 (95% CI: 54, 67) per 100 encounters, and "maintenance/wellness" or checkup was described at a rate of 39 (95% CI: 33, 47) per 100. Back problems were managed at a rate of 62 out of every 100 encounters (95% CI: 55, 71). The most frequent care provided by the chiropractors was spinal manipulative therapy and massage. **Discussion/Conclusions:** A range of conditions is managed by chiropractors in Victoria, Australia, but most commonly, these conditions are musculoskeletal related. These results can be used by stakeholders of the chiropractic profession in workforce development, education, and health care policy. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Who uses chiropractic services in Australia?

Simon French, Konstancja Densley, Melanie Charity, Jane Gunn, University of Melbourne

Introduction: The use of chiropractic services is widespread; however, little is known about the characteristics of people who seek chiropractic care in Australia. **Methods** This is a secondary analysis of baseline screening data from a prospective adult cohort study beginning in 2005. Differences were examined between chiropractic users and others and between chiropractic users who reported a back problem and those who did not. **Results:** Of 7519 respondents, 15% indicated they had visited a chiropractor in the last 12 months. Chiropractic users were more likely to have a back problem, use complementary or alternative medication, and visit another type of complementary health practitioner or a physiotherapist. They were less likely to take medication for certain health problems. People who visited a chiropractor and reported a back problem were more likely to be a current smoker; have a number of other chronic conditions; and report taking medications, including antidepressants, analgesics (painkillers and arthritis medication), and complementary or alternative medications. **Conclusions:** This large cross-sectional study of general medical practice attendees suggests that chiropractors are the most commonly consulted complementary health profession. Chiropractic patients with a back problem are more likely to have other chronic health problems. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

A survey of 4th-year chiropractic students' experiences learning and using an electronic health record system

Matthew Funk, University of Bridgeport College of Chiropractic

Introduction: How an electronic health record (EHR) system is introduced to first-time users, how one learns to use it, and which features are favored are important issues to address. **Methods:** A survey was designed to assess interns' relative agreement to statements regarding how they learn to use the EHR in our outpatient clinic and how they feel about its ease of use and features. Since perceptions of EHR have been shown to change from preimplementation to postimplementation

and with increased time using it, the questionnaire sought to compare more experienced users to novices. **Results:** There was a 51% response rate to questions in 10 different domains. Data are presented as relative agreement to statements pertaining to each domain. Interns also wrote many other comments. **Discussion:** Interns generally concurred that they were adept at using the current EHR; as expected, interns with more experience responded they were more adept than those with less experience. Most indicated they learned the EHR with help from upper semester interns and by trial and error. **Conclusions:** This information regarding interns' preferences or dislikes should be analyzed and discussed by administrators and educators. This may lead to improvements in intern EHR education. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Functional connectivity changes following manipulative and body-based interventions: a preliminary report

Charles Gay, Mark Bishop, University of Florida

Mechanisms by which spinal manipulation (SM) improves lower back pain (LBP) remain ambiguous. To investigate if one mechanism may be through altering brain circuitry involved in the pain experience, we estimated the functional connectivity (FC) across 8 brain regions bilaterally. A subset of enrolled subjects in a larger study underwent an additional resting state functional magnetic resonance imaging scan before and after receiving 1 of 3 manual therapy interventions. Primary outcome measures were FC across brain regions and immediate reduction in LBP. FC was estimated using the time course of low-frequency BOLD fluctuations within each region and calculating the correlations between regions. Differences were found in the direction of effects when comparing the changes in FC between the SM and therapeutic touch groups. SM showed larger reductions in the correlation between the anterior insula and the PAG and larger increases between the S1 and PAG. No significant main effects were found for time or group*time interaction for LBP. We demonstrate that discrete changes in functional connectivity are differentially induced by manual therapy interventions. Further research needs to explore the extent to which these changes correlate with measures of the pain experience. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Characterization of chiropractor hand movements during spinal manipulative therapy

Geoffrey Gelley, Steven Passmore, Brian MacNeil, University of Manitoba

Introduction: This study examined the kinematics of spinal manipulative therapy by determining the acceleration characteristics of the manipulative input at the cervical, thoracic, and lumbar regions. Studies of spinal manipulative therapy (SMT) have been restricted to measuring the forces that result from SMT. However, the movement strategies employed during SMT, including acceleration, have not been directly measured. **Methods:** Participants (n = 29) with mechanical spinal pain were recruited. Signed consent and research ethics board approval were obtained. A wireless accelerometer attached to the chiropractor's hand was used to measure the thrust phase of SMT. **Results:** Significant differences were found across spinal regions for the acceleration amplitude ($p < .0001$) and temporal ($p < .0005$) parameters of hand acceleration. Post-hoc analysis indicated amplitudes significantly increased from thoracic to cervical to lumbar regions ($p < .0001$), whereas latencies decreased across spinal levels in a similar pattern ($p <. 0001$). SMT amplitudes and latencies were not correlated within spinal regions. **Conclusions:** Consistent with reported SMT forces, acceleration amplitudes varied significantly across spinal regions with relatively small differences in acceleration latencies. Acceleration amplitudes and latencies were not associated with each other within spinal regions, indicating that changes in acceleration amplitude, rather than latency, are used to modify SMT to individual patients. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

A first anatomy course may predict future academic success in a chiropractic program

Gene Giggleman, Karen Farmer, Ron Rupert, Rita He, Parker University

Prior to initiating this research, the protocol was submitted, reviewed, and approved by the university's institutional review board. Entering demographic information for 2 groups of students (those who earned an A grade in Developmental and Applied Anatomy [DAA] course taught in the first trimester and those who earned an F grade) were compared to determine whether entering demographic information could be used as accurate predictors of success in DAA. Student success in DAA was then compared with success in the curriculum and success on Part I of the National Board of Chiropractic Examiners (NBCE) test scores. Analysis of entering grade point average (GPA), science GPA, and the most recent 45-hour GPA showed significant differences between the two groups, suggesting that these can be used to predict success in DAA. Successful students in DAA were shown to be more likely to complete the curriculum and pass Part I NBCE on their first attempt. Students at risk of failure in the curriculum can be identified and enrolled in remediation programs in an attempt at early rescue of these students. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Training doctors of chiropractic in delivering manual cervical traction forces

Maruti Ram Gudavalli, Robert Vining, Stacie Salsbury, Christine Goertz, Palmer Center for Chiropractic Research

Objective: Manual cervical distraction (MCD) is a procedure used by doctors of chiropractic (DCs) to treat neck pain patients. The DC gently moves the head and neck in a cephalic direction while holding gentle, broad manual contact over the posterior neck. We report on training and monthly certification using bioengineering technology for standardizing cervical traction forces applied during MCD to asymptomatic volunteers. **Methods:** The Cox flexion-distraction chiropractic table includes a moveable headpiece allowing for long-axis horizontal movement of the patient's head and neck while the trunk and legs rest on fixed sections. We modified this table with three-dimensional force transducers to measure the traction forces applied by the doctor. Computer software visually displays the magnitude of traction forces graphically as a function of time. Real-time audible feedback produces different tonal qualities preset for specific traction force ranges. **Results/Conclusions:** We trained and certified two DCs and recertified over 8 consecutive months using audible/visual and graphical feedback of traction forces. No certification required more than 3 attempts at any contact level or force range. This study demonstrates the feasibility of bioengineering technology for training DCs to deliver MCD within specified traction force ranges. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Student confidence level of preparedness and alumni performance level of preparedness for business success

Marsha Hardacre, Palmer College of Chiropractic

Introduction: Chiropractic care is being used by more people than ever before. Most clinics have a solo practitioner. Small businesses fuel the US economy; however, small businesses have a high failure rate. It is imperative that students be prepared for the business aspect of running a practice. **Methods:** Current students and recent graduates were surveyed about their involvement in elements that contribute to business success. Participants were also asked to rank their self-perceived level of preparedness for business success. **Results:** This study hoped to explore the predictive power of 3 kinds of business involvement: previous business ownership, previous business experience, and number of undergraduate business classes. Students ($N = 254$) reported an average of 3.95 level of preparedness on a 10-point scale; graduates ($N = 55$) reported an average of 3.47. An analysis of variance (ANOVA) was used to compare the current students to the recent graduates. Significant difference was found in the number of business courses taken at undergraduate level ($p = .027$). **Discussion/Conclusions:** The results suggest a very limited readiness to run a chiropractic practice. Students need to be made aware of their need for business skills. A variety of strategies to build awareness and skills are offered. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Longitudinal excursion of the sciatic nerve in the thigh during passive ankle motion measured with ultrasonography in asymptomatic subjects

Daniel Haun, Douglass Andrews, Mitchell Nielsen, John Keefe, Logan University

Objective: The purpose of this study was to determine normative values for sciatic nerve excursion measured in the posterior thigh during ankle motion in asymptomatic subjects. **Methods:** The sciatic nerve was imaged in the posterior thigh of both lower extremities of 36 subjects in the prone position with passive ankle motion. Speckle tracking was performed in order to calculate the distance of the longitudinal glide of the sciatic nerve. Institutional review board approval was obtained prior to study initiation. **Results:** The average net distal excursion of the left and right sciatic nerves was 3.1 ± 1.2 mm and 3.1 ± 1.1 mm, respectively. Proximal excursion of the sciatic nerve was seen in most subjects as the ankle went from plantar flexion toward neutral, averaging about 0.5 ± 0.3 mm. Right to left differences were found but did not reach statistical significance. Differences between males and females were also found but did not reach statistical significance. **Conclusions:** This study demonstrated normative data for net sciatic nerve excursion during ankle motion. Proximal excursion of the sciatic nerve was seen as the ankle was moved from plantar flexion to the neutral range, but not in all subjects. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

The comparison of the validity and reliability between digital radiographic imaging system and manual method in measuring the Cobb's angle

Shawn He, Palmer College of Chiropractic

Background: The Cobb's angle is an important clinical parameter in assessing scoliosis. The purpose of the current study was to quantify scoliotic deformity with Cobb's angle to assess the intraobserver and interobserver variability using manual and digital techniques. **Methods:** Twenty scoliotic X-ray films were measured by 6 trained examiners to estimate intraobserver and interobserver variations. Each image was measured 3 times at 1-week intervals. Digital measurements were carried out using x-maru viewer software; for manual measurements, traditional Cobb's angle measurement was used. For comparisons between manual and computer measurements, Student t test was used. For the manual measurement of Cobb's angle, a mean intraclass correlation coefficient (ICC) of 0.97 was

determined for intraobserver and interobserver reliability. For the digital measurements, a mean ICC value of .93 was determined for interobserver reliability, and a mean ICC value of .96 for intraobserver reliability. **Results:** The mean angle was 36.97 ± 2.96 for manual and 37.13 ± 2.92 for digital ($P > .05$) measurements. Interobserver ICC was .926 for manual and .974 for digital method. Digital measures indicated excellent correlation with the absolute values obtained with manual measurement for many parameters. **Conclusions:** Digital measurement showed improved measurement precision and good correlation with manual measurements for the majority of adolescent scoliosis parameters. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

A descriptive analysis of the Journal of Manipulative and Physiological Therapeutics, 1997–2007

Andrea Herold, private practice, Katherine Van Wagenen, John Taylor, D'Youville College

Introduction: Since its initial publication in 1978, the *Journal of Manipulative and Physiological Therapeutics* (JMPT) has become the leading journal in chiropractic. The goal of this study was to provide a descriptive analysis of the contents of the JMPT from 1997 to 2007. **Methods:** Every issue published from 1997 to 2007 was reviewed by the primary author. Articles were classified as data reports or nondata reports and then were subclassified. Academic background, affiliation, funding sources, gender, and nation(s) of origin were also recorded. Percentages were calculated for each category and compared with previous studies to assess the trends in publication. **Results/Discussion:** The analysis showed an increase in the number of published data reports. More chiropractic institutions have been mentioned as author affiliations. While degrees in chiropractic are still the majority, nonchiropractic degrees have become more prevalent in the JMPT. More articles are listing the funding source, and female authorship has increased. The United States continues to be the leading nation of origin in publication; however there has been a trend for an increase in international and collaborative publications. **Conclusions:** This review revealed interesting trends in the JMPT's content. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Barriers in completion of an online faculty development course on iPad integration

Glori Hinck, Stacy Peterson, Northwestern Health Sciences University

Introduction: Our university has recommended iPads to incoming chiropractic students since 2011 and has provided select faculty with an iPad. However, little integration of this technology into the classroom has occurred to date. To help address this, a 4-week online faculty development course called "Intro to Teaching with iPads" was offered during the summer of 2013. **Methods:** Course participants completed precourse and postcourse surveys regarding their use of iPads for teaching and learning and their experiences in this course. The study design was approved by the university institutional review board process. **Results:** Time constraints and lack of technical skills were rated as the greatest barriers to the integration of iPads into the curriculum. Twenty-six faculty members enrolled in the faculty development course, but only 1 person completed all required content. "Time constraints" were reported as the greatest barrier to participation followed by "extra work with little benefit." **Discussion:** While expanded training programs are needed to support university technology integration, faculty feel that they do not have adequate time to participate in such programs. **Conclusions:** Shorter training modules and faculty incentives for participation are important considerations when designing an online faculty development program related to technology integration. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Improving the quality of student learning using focus group discussions: "active learning—how is it working?"

Kathryn Hoiriis, Alena Coleman, Life University

Introduction: Focus groups have been used to collect accurate, useful, and believable data. This paper describes the use of student focus groups and surveys on the student learning environment to determine student impressions of the overall quality of a program implementing active learning strategies. **Methods:** Meeting notes from 2011–2012, were categorized by themes. A survey collected student perceptions of three components: physical space, classroom climate, and attitudes of instructors and students. Data were collected in 2012 for three academic terms. **Outcomes:** There were 204 focus group comments, and 6 major themes were identified. The most important concern was teaching style. The survey results were reported using percentages. Using winter 2012 as baseline comparison to spring 2012 and summer 2012 surveys, effect sizes (ES) were small ($d = 0.20$ or less) except for 2 items where a moderate effect ($d = 0.37$) and a small-to-moderate effect size ($d = 0.28$) were found. **Discussion:** Gathering frequent student feedback using 2 methods helped determine modifications needed in the plan to incorporate new teaching methods (e.g., using "clickers" and/or group activities). **Conclusions:** Focus group discussions and student surveys were used to identify strengths and weaknesses in a program to implement active learning strategies in the classroom. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

The effectiveness of chiropractic care in improving sensorimotor function that is related to fall risk in community-dwelling older adults over a 12-week period

Kelly Holt, New Zealand College of Chiropractic, University of Auckland, Heidi Haavik, New Zealand College of Chiropractic, C. Raina Elley, University of Auckland

Objective: In this study we investigated the effectiveness of chiropractic care in improving sensorimotor function that is related to fall risk in community-dwelling older adults over a 12-week period. **Methods:** A pragmatic randomized controlled trial compared the effect of 12 weeks of chiropractic care to a "usual care" control on joint position sense, postural stability, choice stepping reaction time, the sound-induced flash illusion, and health-related quality of life in 60 community-dwelling older adults. Outcomes were assessed at 4 weeks and 12 weeks after a baseline assessment. **Results:** Chiropractic care improved ankle joint position sense ($p = .045$, difference = 0.20, 95% CI: 0.01–0.39), and choice stepping reaction time ($p = .01$, difference = 118 ms, 95% CI: 24 to 212 ms), and reduced susceptibility to the sound-induced flash illusion ($p = .01$, difference = 13.5%, 95% CI: 2.9 to 24.0%) compared to the usual care control. The physical component of health-related quality of life also improved with chiropractic care compared to the control between the 4- and 12-week assessments ($p = .047$, difference = 2.4, 95% CI: 0.04 to 4.8). **Conclusions:** These findings support the hypothesis that 12 weeks of chiropractic care improves sensorimotor function and the physical component of health-related quality of life in community-dwelling older adults. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

A biomechanical study of the posterior disc region at lower lumbar disc levels

Mozammil Hussain, Kiran Kanwar, Christopher DeGeer, Logan University

Introduction: Low back pain has been thought to be related to the initiation and progression of degeneration in the posterior disc. The objective of this study is to understand the biomechanics of the posterior disc at lower lumbar levels. **Materials and Methods:** A finite element model of the lumbar spine was developed from the computed tomography (CT) scan of a normal spine. It was validated with literature data. Since the tissue failure of annulus is typically related to its tensile mechanics of the fibers and surrounding matrix, tensile radial stresses and strains in the posterior region of the L4-L5 and L5-S1 discs were computed accordingly. **Results:** In L4-L5 and L5-S1 posterior disc regions, the tensile radial stresses of magnitude 1.80 MPa and 3.46 MPa and the tensile radial strains of magnitude 0.15 and 0.27 were noted, respectively. **Discussion:** This computational study indicated that the tensile stresses and strains in the posterior region of the L5-S1 disc are almost 2 times higher than that of the L4-L5 disc in the radial direction. Our biomechanical findings support the clinical notion that L5-S1 posterior disc are at a higher risk of degeneration and other probable low back injuries. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Preceptor doctors' assessment of the clinical skills of Palmer College externs

Roger Hynes, Alana Callender, Rachelle Hynes, Palmer College of Chiropractic Davenport, Donald Gran, Palmer College of Chiropractic Florida

Introduction: The preceptorship functions as a bridge between the academic world and actual practice. The concept is not unique to chiropractic and is well-documented in other health care fields. Despite many chiropractic colleges sending students out on preceptorships, the activity is not well-documented in the literature. **Methods:** A common web-based survey system called Survey Monkey was used to determine the opinions of participating preceptor doctors. The survey asked doctors about the competence of externs in various skills and asked opened-ended questions about the strengths and weaknesses of their externs. **Results:** A total of 72 doctors participated in the survey. Preceptor doctors had diverse responses as to the capabilities of externs. **Discussion:** Preceptor doctors perceived that their student externs were academically qualified but were weaker in the clinical application of procedures learned. **Conclusions:** Results from this survey suggest that the preceptor program can be beneficial to the Palmer chiropractic extern and may lead to an easier transition from the academic to the practice world. Further studies are necessary in order to establish standardized guidelines for preceptor programs. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

In vivo 3-dimensional morphometric analysis of the lumbar neural foramen

Nozomu Inoue, Issei Senoo, Alejandro Espinoza Orías, Howard An, Gunnar Andersson, Rush University Medical Center, John Triano, Canadian Memorial Chiropractic College

Introduction: Effects of spinal manipulation on alteration of the neural foramen size have been reported; therefore, geometry of the neural foramen is valuable for investigations on the possible mechanisms of spinal manipulation. The purpose of this study was to use a novel 3-dimensional (3D) computed tomography (CT)–based measurement approach to obtain an accurate measurement of the lumbar foramen. **Methods:** Fifty-nine asymptomatic subjects underwent lumbar CT scans, and 3D lumbar models were created (institutional review board approved). The foraminal height (FH) and the least width (FW) were measured in 3D using a novel custom software program. **Results:** Overall, FH and FW decreased with age. Lower lumbar levels had significantly smaller FH than did upper ones,

the exception being L1/L2 and L2/L3. L4/L5 and L5/S1 had significantly smaller FW than did the upper lumbar levels. There was moderate or weak negative correlation between FW and ages. **Conclusions:** Disc height loss associated with disc degeneration may have caused the decreased FH. Decreased FW with age may also be explained by progression of disc degeneration with age. These data measured in an asymptomatic cohort could be used as baseline data for diagnosis of foraminal stenosis and planning of treatment modality. Acknowledgements: NIH, NIAMS/P01AR48152, NCCAM/R01AT006692. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

How blended learning in a radiological anatomy course facilitates learning, student satisfaction, and performance

Fiona Jarrett-Thelwell, Jeanmarie Burke, Kristina Petrocco-Napuli, Jean-Nicolas Poirier, New York Chiropractic College

Introduction: A comparison of 2 educational delivery methods in an introductory radiology course was undertaken. The primary outcome measures were student performance and student satisfaction. **Methods:** Participants were from 2 cohorts, traditional face-to-face (n =184) and integrative (n = 178) instruction. The difference in educational instruction was the integration of computer-aided blended-learning tools. Deidentified grades were used to obtain student performance outcomes. Student satisfaction was measured from an institutional-based course evaluation. **Results/Discussion:** Although overall test scores were slightly higher for the integrative cohort ($p < .05$), the differences were not meaningful as the greatest improvement in correct responses was for 2 questions. Final grades were slightly higher for the integrative cohort, but the difference was not meaningful as final grades were equivalent to an A letter grade. The integrative cohort shifted the distribution of student satisfaction on course evaluations toward strongly agree ($p < .05$): allocated study time; faculty organization; student class participation; class-time supported learning; learning contribution of class resources/instruction; effective management of class time by faculty. **Conclusions:** Student satisfaction with the integrative approach was greater than with the traditional method as student performance was similar. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Perceptions of interprofessional education and practice among constituents of a CAM institution

Gena Kadar, Michael Sackett, Andrew Vosko, Garrett Thompson, Southern California University of Health Sciences

Introduction: A survey was conducted among constituents of a complementary and alternative medicine (CAM) institution to identify existing perceptions of interprofessional education (IPE) and practice and to identify potential obstacles. **Methods:** A 22-question survey was developed and institutional review board permission was granted. The survey was disseminated to chiropractic students, acupuncture and oriental medicine students, faculty, staff, administrators, and alumni. Responses were not individually identifiable and were reported in aggregate form only. Following data capture, all survey records were subject to computer analysis. **Results:** The majority of the 321 respondents demonstrated a positive perception of IPE and practice. Many responders reported a lack of understanding of the distinct role of select health care disciplines. **Discussion:** The overall positive attitude toward IPE and practice implies a willingness to improve collaboration across health care disciplines. A lack of understanding of the role of distinct disciplines must be addressed to support implementation of IPE and prevent the emergence (or continuance) of professional bias. **Conclusions:** The favorable response by the majority of respondents suggests a willingness among constituents of a CAM institution to support IPE and practice. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Didactic versus problem-based learning: is there a difference in student knowledge retention?

Martha Kaeser, Jeffrey Kamper, Cheryl Hawk, Logan University

Objective: Problem-based learning is a strategy commonly used in health care education. Knowledge retention in a clinical science course was assessed among students taught in lecture format with audiovisual enhancement vs those taught in a more active, student-centered learning environment. **Methods:** This comparative study compared scores on a 10-point multiple choice examination given immediately after the learning activity (test 1) and repeated 6 weeks postactivity (test 2) between 2 groups (active versus didactic learners). **Results:** The majority in both groups reported that they would retain information if they were actively involved in the learning process. Overall, the active learning group scored higher on both test 1 and test 2. Questions that had a visual or experiential component demonstrated the largest difference in scores between the two groups, with the active learning group scoring higher. **Discussion:** Case-based teaching includes varying aspects of student participation. Students report higher satisfaction with activities in which they actively participate. There is a paucity of research demonstrating that factual knowledge retention increases when students are actively involved. **Conclusions:** Overall, this research suggested that there may be differences in knowledge retention when instruction is provided actively versus didactically. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Tactile discrimination and adaptation reflect reorganization of primary somatosensory cortex in carpal tunnel syndrome

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Introduction: Carpal tunnel syndrome (CTS) reorganizes the somatosensory cortex (S1).We studied tactile discrimination and adaptation of CTS in S1. **Methods:** Institutional review board approval was obtained. Distances between functional magnetic resonance imaging (fMRI) S1 cluster peaks from stimulation of digits D2, D3, and D5 in CTS (63) and controls (28) were measured for each digit. Tactile discrimination was evaluated using simple and forced-choice reaction time and amplitude discrimination with vibrotactile stimulation and correlated with D2/D3/D5 cortical distances. **Results:** Tactile discrimination tasks differentiated CTS from HC. Tactile activation overlapped in contralateral S1 for CTS, not HC. D2/D3 and D2/D5 separation in CTS were smaller than HC ($p < .05$); D3/D5 distances were not ($p > .05$). Tactile discrimination reactions were greater in CTS than in HC ($p < .05$). Discrimination accuracy in D2 and D3 forced-choice and amplitude discrimination were lower in CTS compared to HC ($p < .05$). Adaptation group differences were not significant ($p > .05$). D2/D3 CTS distances positively correlated with adaptation ($r = 0.44$, $p = .009$), negatively with response time ($r = -0.39$, $p = .023$), tactile discrimination accuracy ($r = -0.43$, $p = .009$), and median NCV ($r = -0.31$, $p = .045$). **Discussion:** S1 reorganization in CTS is maladaptive, with peripheral median nerve pathophysiology and digit-specific deficits. **Conclusions:** Decreased distances between D2/D3 representations correlates with functional tactile discriminative deficits. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Integrating a spinal health promotion module in a national high school health curriculum: a collaboration in health education leadership

Ron Kirk, Life University

Introduction: Inactivity and obesity make up an intersecting global pandemic, afflicting millions with disability and death. The Centers for Disease Control and Prevention (CDC) estimates that 18.4% of US teenagers are obese. Evidence links obesity with spine disorders, a leading cause of global disability. Spine disorders are associated with slumped, hyperkyphotic posture. This study describes the process of integrating an active spinal health promotion module into a national, antiobesity, high school health curriculum. **Methods:** Through extensive e-mail and phone discussions/dialogues, a project coordinator from a chiropractic educational institution collaborated with leaders of an innovative health education organization in order to integrate an active spinal health promotion module into an evidence-based health education curriculum. **Results:** The innovative health education organization enthusiastically embraced the spinal health promotion module, incorporating it in 62 high schools. **Discussion:** Among collaborating parties with divergent perspectives, building trust through extensive discussion/dialogue proved invaluable in developing an active spinal health promotion module. **Conclusions:** Given the burden of spine disorders associated with poor posture and obesity, it is critically important that active spinal health promotion be integrated within national health education curricula. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Perceived stress and sources of stress among doctor of chiropractic students

Anupama Kizhakkeveettil, Andrew Vosko, Southern California University of Health Sciences

Introduction: Because stress perception is modifiable, awareness of one's sensitivity to stress and its sources can promote stress-reducing behaviors. The main objectives of this study were to examine levels of perceived stress, its sources, and related demographic factors among chiropractic students. **Methods:** The Perceived Stress Scale and Undergraduate Source of Stress questionnaires were administered among different levels of chiropractic students in a doctoral program. Data were analyzed with one-way analysis of variance (ANOVA) and linear regression tests. **Results:** Lower levels of stress were observed in men than in women ($p = .035$). Levels of perceived stress were not statistically different based on all other demographic factors. Levels of perceived stress were significantly correlated with stressful events, course expectations, physical health, psychological health, mood, and relationship with peers. **Discussion:** The results of the study helped identify levels and sources of stress among chiropractic students. While there was a significant gender difference, data suggest that students perceive stress at similarly high levels across terms and backgrounds among those in the doctor of chiropractic program. **Conclusions:** Future studies involving multiple chiropractic colleges will be necessary to generalize

these findings. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Acute/subacute neck pain patients are more satisfied with spinal manipulation or self-care compared to medication: secondary analysis of patient satisfaction in a randomized clinical trial

Brent Leininger, Roni Evans, Gert Bronfort, Northwestern Health Sciences University

Introduction: Patient satisfaction is a widely advocated means for measuring patients' preferences and views related to treatment quality. The purpose of this presentation is to provide a more in-depth exploration of patient satisfaction within a randomized clinical trial comparing medication, spinal manipulation, or home exercise for acute neck pain. **Methods:** Satisfaction with care was measured using a previously described instrument with 2 subscales (information, general care) and an overall scale. Differences between groups were assessed at the end of the intervention phase. **Results:** Individuals with acute neck pain receiving either spinal manipulative therapy or home exercise and advice were more satisfied with both the information and general care received from their providers than were those receiving medication. **Discussion:** These findings, coupled with the previously reported results for the primary and other secondary trial outcomes, reaffirm the appropriateness of these patient-centered treatments for acute neck pain sufferers. **Conclusions:** Acute neck pain patients receiving either spinal manipulative therapy or home exercise and advice were more satisfied with the care received than were patients receiving medications. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Comparison of subjective and objective pain sensitivity in a healthy population

Makani Lew, Palmer College of Chiropractic West Campus

Introduction: Pain scales used in clinics are expected to correlate to pain-provoking examination procedures. This study evaluates the correlation between imagined (subjective) pain and actual algometric pressure (objective) pain in healthy participants. **Methods:** A convenience sampling of 39 participants, 31% female, mean age 28 years (range 22–46) rated imagined pain on a 1–10 scale and experienced pain to pressure on the dorsum of the middle finger. **Results:** There was statistical significance in similarity between objective and subjective pain ratings; however, the correlation showed a higher than expected pressure threshold to imagined pain rating. There was no difference between males and females in both objective and subjective pain ratings. **Discussion:** Pressure thresholds appear to be higher than would be expected relative to imagined pain ratings. Imagined pain may be greater than that which the patient will actually feel. **Conclusions:** Clinicians can feel confident pain scales appear to be consistent with actual painful experiences. Numeric scales are proven reliable tools, although qualifying what 10 means may be necessary to normalize the data. Gender does not play a role in variability in pain perception. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Time to numbness in response to 5 different cryotherapy applications

Makani Lew, Palmer College of Chiropractic West Campus

Introduction: Cryotherapy (ice) is used frequently for pain and inflammation control in athletic and manual therapy offices. Consensus of cryotherapy treatment time is inconclusive. This study addresses the time it takes for a human subject to "feel numb" subjectively and to touch. **Methods:** A convenience sampling of 17 participants, 24% female, mean 29 years (range 22–46) had 5 ice types applied to the lateral ankle. The 5 types were dry CorPak, wet CorPak, ice bag, ice immersion, and ice massage. The ice treatment stopped when the participant demonstrated subjective and objective numbness. **Results:** From quickest to longest time to numbness the results were ice immersion, ice massage, wet CorPak, ice bag, and dry CorPak. There was statistical significance between the longest and shortest times of application. **Discussion:** Time to numbness ranges were quite large, suggesting sensation of numbness is participant dependent. The mean times to numbness showed a pattern of shortest times for wet and contact ice and longest time for the dry CorPak. **Conclusions:** Based on this data, clinicians can comfortably recommend 15–20 minutes for ice bag or pack and 10 minutes or less for ice massage or bath, but ultimately until the patient feels numb. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

The student experience of learning radiology implications for future practice

Kathleen (Kat) Linaker, D'Youville College

Methods: This institutional review board–approved phenomenological study examined the student experience of learning radiology by use of semistructured interviews, a research diary, and analysis of syllabi of radiology courses at 2 chiropractic colleges. Analysis was done through transcript coding with trustworthiness addressed by triangulation, member checking, peer review/debriefing, and bias identification. **Results:** Students prefer safe, active-learning environments, anatomical aids, and instruction relating to clinical situations. Students need training in time-management and study skills. Instructor expectations impacted student learning. Instructors were ineffective at making syllabi useful resources. **Conclusions:** Educators should: (1) increase active-learning activities; (2) provide

anatomical models in normal radiographic anatomy laboratories and examples of normal radiographs in pathology laboratories; (3) incorporate radiographic search patterns and appropriate vocabulary use throughout all classes; (4) use challenging examination formats and review examinations with students; (5) use clinical cases as much as possible; (6) establish safe, challenging learning environments; (7) develop syllabi that fulfill all 3 functions of an effective syllabus; (8) increase institutional support of scholarship in teaching and provide faculty development that models the creation of safe, challenging learning experiences; and (9) provide time-management and study skill training in the first term of professional school. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Effects of chiropractic and multidisciplinary approach in nociceptive pain in patients with spinal cord injury

Eduardo Linden Junior, Ranieli Zapelini, Feevale University

Introduction: Pain is a common symptom for patients with spinal cord injury. The objective of this study was to verify the effects of a chiropractic and multidisciplinary approach to control the nociceptive pain in patients with spinal cord injury. **Methods:** This study comprised a randomized controlled clinical trial of patients with complete spinal cord injury. The individuals were randomized in 2 groups, Group Control and Group Intervention. The Group Control received a basic protocol of intervention. The Group Intervention received the basic protocol plus a multidisciplinary approach, including chiropractic, physical therapy, and physical training treatment. This protocol was approved by Research Ethics Committee of the University Feevale under number 221 980. **Results:** There was a statistically significant improvement in pain perception in the intervention group ($P = .026$), as well as the comparison of the variance between groups ($P = .001$). **Discussion:** The results obtained show clearly that the multidisciplinary approach was effective in the control of the nociceptive pain in the group intervention. **Conclusions:** These results show that the multidisciplinary approach included in the study is effective for relief of pain in patients with spinal cord injury. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Factors affecting treatment decisions during the first phase of clinical education

Barbara Mansholt, Robert Vining, Palmer College of Chiropractic

Introduction: Students at one chiropractic college traverse technique skills over 6 terms prior to applying skills in a learning clinic. While consistency in implementing curricular didactic material appears important in easing the student's learning transition from classroom to more practical settings, the varied demands of a patient's presenting condition, patient values, and other influences may necessitate a more flexible approach to care. **Methods:** Students were asked to rate (using a 5-point Likert scale) factors affecting treatment decisions, such as the use and interpretation of specific diagnostic information, patient/student preferences, faculty preferences, available evidence, and other factors unique to the clinical/teaching environment. The results are described using descriptive statistics. **Results:** Data were calculated on 168 surveys of 327 patient-adjusting encounters during that week, a response rate of 56%. The highest rated reasons for choice of technique were student skill set, student technique preference, and experience with patient and/or with similar conditions. The highest rated chiropractic analysis procedures were motion and static palpation. **Conclusions:** This study found some lack of continuity between conceptual clinical decision making as taught in curriculum and reported decision making during students' first clinical experience. Further research examining reasons behind this is needed. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Survey of clinical decision-making rationale for chiropractic analysis procedures among doctors of chiropractic and students

Barbara Mansholt, Robert Vining, Palmer College of Chiropractic

Introduction: The use of evidence-based practice would suggest using available evidence, patient values, and practitioner experience to determine which chiropractic analysis tools to use to render clinical decisions. However, the reliability of many evaluation tools leading to clinical decision making for spinal manipulation has not been irrevocably established, and few have received validity investigation. This study surveyed (1) what chiropractic analysis tools should be used during patient encounters and (2) what chiropractic practitioners think influences their decision. **Methods:** This institutional review board–exempt study was administered both to senior chiropractic students and all DC employees of a chiropractic college. The survey queried what chiropractic analysis tools should be used during patient encounters when evaluating a patient prior to a chiropractic adjustment, including palpation, skin temperature analysis, leg check, and radiographs. **Results:** Seventy-four student and 57 DC surveys were collected. Static palpation was rated highest by both groups; other responses varied. **Conclusions:** Respondents from both groups agreed that static palpation should be used on all patient encounters. The variation in other opinions is likely due to the lack of available research on many procedures, suggesting respondents often rely primarily on other factors such as experience and provider and patient preferences. (This is an abstract from a conference presentation only and does

not represent a full work that has been peer-reviewed and accepted for publication.)

Assessing attitudes, knowledge and perceptions toward manual spinal manipulation: development and pretesting of a survey instrument

Paul Mastragostino, Deborah Kopansky-Giles, Howard Vernon, Hal Huff, Canadian College of Naturopathic Medicine

Objective: Our objective was to develop and evaluate a survey instrument to assess the knowledge, attitudes, and perceptions of manual spinal manipulative therapy in health care professionals and students in Ontario in relevant fields. **Methods:** A systematic approach was taken to construct and evaluate the validity and reliability of a developed survey instrument. This included review by content experts, followed by pretesting with a sample population of chiropractic and naturopathic interns. The final draft of the survey was evaluated for reliability using a test-retest protocol. The results accumulated from the test-retest were analyzed for consistency using an intraclass correlation coefficient (ICC) and Cohen's κ coefficient. **Results:** Sixteen chiropractic and 8 naturopathic students participated in the test-retest procedure. After evaluation, the instrument was established to have good face and content validity. A majority of the items tested demonstrated moderate to high/substantial reliability. Of the 46 items, tested 10 were shown to have modest/fair reliability, and 13 were shown to have moderate reliability. One item was excluded from testing. **Conclusions:** The reliability of this survey instrument must be improved before it can be administered for analysis of psychometric properties of knowledge, attitudes, and perceptions of manual manipulation therapy. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Ultrasound findings of fractures about the ankle: a pictorial essay with cadaveric, radiographic, and ultrasonographic correlation

Stephanie Mussmann, D'Youville College

Objective: The objective of this pictorial review is to depict various ultrasound appearances of fractures about the ankle and provide radiographic and gross anatomical correlation. In addition to the appearances of fractures on diagnostic ultrasound, common findings simulating fractures about the ankle will also be depicted. **Methods:** Ultrasound evaluation of fractures secondary to inversion or eversion stress in cadaveric ankles were used to provide pictorial demonstrations of common findings of fractures on diagnostic ultrasound and are depicted with radiographic and anatomical correlation. Institutional review board approval was obtained. **Discussion:** Ultrasound evaluation is being used more frequently in the field of musculoskeletal imaging because of its ability to simultaneously evaluate the soft tissues, osseous structures, and dynamic function. The ankle is one of the most frequently traumatized regions, the 2 most common injuries being sprains and fractures. Much of the current literature focuses on the ultrasonographic appearance of soft tissue injury and does not fully address osseous injury. This essay focuses on the appearances of osseous injuries about the ankle. **Conclusions:** Accurate utilization of diagnostic ultrasound examination for evaluation of fractures about the ankle requires intimate knowledge of the true positive appearances of fractures, as well as common confounders. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Biomechanical and physiological responses to spinal manipulation: the role of preload forces

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Introduction: Previous studies have identified important features of spinal manipulation therapy (SMT) skillful execution, one of them being preload forces. It has been suggested that applying a gradual force prior to the thrust increases the spinal unit stiffness, minimizing displacement during the thrust. The main objective of this study was to assess the vertebral unit biomechanical and physiological responses to a graded increase of preload forces. **Methods:** Twenty-three participants underwent 4 different SMT force-time profiles varying in their preload forces set to 5 N, 45 N, 90 N, and 135 N, respectively, in one experimental session. Kinematic markers were place on T6, T7, and T8, and EMG electrodes were applied over paraspinal muscles on both sides of the spine. **Results:** EMG responses of thoracic paraspinal muscles and vertebral segmental displacements increased with preload forces, whereas both biomechanical and EMG responses during and following the thrust phase decreased with increasing preload forces. **Conclusions:** Preload forces clearly modify vertebral displacement and paraspinal muscle activity throughout various phases of SMT. Although only healthy participants were tested in this study, preload forces may be an important parameter underlying SMT mechanism of action. Future studies should investigate the clinical implications of varying SMT dosages. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Metabolic changes in the brain and cervical muscles on patients with neck pain following chiropractic spinal manipulation: [18F]FDG PET analysis

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Masatoshi Itoh, Tohoku University, Keiichiro Yamaguchi, Sendai Welfare Hospital, Kazuhiko Yanai, Tohoku University

Introduction: To the best of our knowledge, no study has examined regional cerebral and muscular metabolism using positron emission tomography (PET). The aim of the present study was to investigate the effects of chiropractic spinal manipulation (CSM) on brain and muscular responses in terms of glucose metabolic changes measured by PET analysis. **Methods:** Twelve male volunteers were recruited. PET scanning was performed twice on each subject, after resting and after CSM. Subjective and objective measures were also performed. The present study protocol was approved by the Ethics Committee of Tohoku University Graduate School of Medicine, Sendai, Japan. **Results:** Increased glucose metabolism was observed in the inferior prefrontal cortex and anterior cingulated cortex, whereas decreased glucose metabolism was found in the cerebellar vermis after CSM on PET analysis. The PET analysis also revealed decreased glucose metabolism in the left splenius muscles after CSM. The comparison of subjective and objective measures revealed significantly lower values after CSM. **Conclusions:** The results of this study suggest that 1 CSM treatment may affect regional cerebral glucose metabolism and glucose metabolism in the cervical muscle. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Barriers and benefits to research implementation in a chiropractic teaching clinic

Julie O'Shaughnessy, Geneviève Côté, Michel Loranger, Martin Descarreaux, Université du Québec à Trois-Rivières

Introduction: Since 2006, 4 research projects have been conducted at a university chiropractic teaching clinic. Following the 2nd project implementation, a qualitative evaluation was undertaken to identify and describe the limitations and advantages related to research implementation. The main objective of this project is to analyze the financial and educational barriers and benefits to the implementation of 2 clinical research projects. **Method:** A retrospective files analysis was conducted to quantify the impact of research implementation for the following variables: recruitment of new patients, financial implications, and complex cases seen by interns. **Results:** Overall, both clinical research projects did not increase the clinic expenses. In fact, the recruitment of several new patients generated new revenues. Moreover, both projects led to an increased number of patients with complex conditions seen by the interns. **Discussion:** Recruitment of new patients, increased diversity and complexity in the interns' caseload, as well as the overall research learning experience represent important benefits related to the integration of research in clinical education, while the clinic also benefits from the projects. **Conclusions:** Although it requires concerted efforts, integrating research projects in chiropractic teaching clinics yields benefits for both the research and clinical education teams. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Students' perceptions and experiences of a chiropractic undergraduate educational environment—a qualitative study

Per J. Palmgren, Karolinska Institutet & Scandinavian College of Chiropractic, Klara Bolander Laksov, Karolinska Institutet

Introduction: Educational environment has a significant impact on students' behavior, sense of well-being, and academic advancement. Different research methodologies have been used to explore educational environment. However, there is a scarcity of studies employing qualitative research methods. The purpose of this study was to qualitatively explore areas of strengths and weaknesses of the educational environment as perceived and experienced by chiropractic undergraduate students. **Methods:** Focus group interviews with 27 participants were conducted, and data were analyzed using qualitative content analysis. **Results:** From the discussions, 19 concepts emerged that generated 5 different themes: room for improvement, in need of some faculty development, confident academic progression, a positive atmosphere, and satisfactory social scaffolding. **Conclusions:** This study illuminated some prominent findings regarding how undergraduate students perceive the educational environment, and several measures can be suggested for improving the perceived weaknesses: implementation of the staff development programs and making them compulsory for teaching faculty, reducing preclinical and clinical educational barriers, modification and revision of summative assessments and further enactment of formative assessments, reorganization of work task and work load for time-tabling personnel, and structured personal tutoring systems to create an adequate student support system. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Teaching bedside manner: a preliminary report on a faculty development program using a panel discussion and experiential workshop

Sandra Pannell, Abigail Dahl, Teri Stockwell, Life University

Purpose: This is a preliminary report on a faculty development session focused on the specific need to address some emerging issues related to student learning concerning patient communication and compassion. **Methods:** A faculty focus group developed a panel discussion presentation and an experiential learning activity. **Outcomes:** Qualitative data involved the use of note cards, quizzes, and postsession survey responses. Twelve faculty members attended the session and participated in the discussion, completing the index cards and the quiz. Of those 12, only 7 responded in the postsession survey. The anonymous index cards col-

lected confirmed that there is some confusion about what bedside manner is and where it is and should be taught in the chiropractic curriculum. **Conclusions:** Bedside manner is an important topic in patient-centered care. This is a topic that needs to be further discussed. Plans to develop a formal course in the curriculum for chiropractic education focused on the students' ability and mastery of patient interaction and communication is on the horizon. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Using actors as simulated patients for interprofessional education

Karen Panzarella, Lynn Rivers, Beth Bright, Megan Whelan, Kristen Butterfoss, Linda Russ, Andrew Case, Stephanie Brian, Heather Ferro, Lisa DeMarco, Denise Dunford, Kendra Schmitz, Mary Catherine Kennedy, Donna Brzykcy, Lynn Pownall, D'Youville College

Introduction: Interprofessional education (IPE) in health profession training is recognized as a key to improving patient care in practice settings. Though recognized as extremely important, implementation of IPE remains a challenge for many health profession programs. **Methods:** Despite challenges, the 7 health profession (HP) programs initiated IPE using health care simulation, with professional actors serving as simulated patients. Faculty from chiropractic, dietetics, nursing, occupational therapy, pharmacy, physical therapy, and physician assistant programs collaborated in this year-long implementation process. We provide a description of the planning, delivery, and assessment of this innovative interprofessional simulation. **Discussion:** Students reported enhanced understanding and respect for professional roles and responsibilities and ability to communicate effectively. Faculty reported an ability to encourage interaction and collaboration among HP students. Suggestions for curricular improvements and program sustainability included professional development and compensation. **Conclusions:** This manuscript should assist other health professional programs seeking guidance to implement and evaluate interprofessional education in academic institutions. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Lumbar spinal stenosis and lower limb motor control: the impact of walking-induced strain on a performance-based outcome measure

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Introduction: Activities of daily living create strain in degenerative lumbar spinal stenosis (LSS) patients; does treadmill walking? Replicating a recently established performance-based outcome measure, we explored strain in LSS patients. **Methods:** LSS patients (N = 16) and healthy controls (N = 16) performed 2 blocks of great-toe pointing movements to a series of projected squares. Following pointing movements, block one participants completed a 12-minute progressive exercise treadmill test (PETT). Pointing movements were analyzed using 3D motion analysis. Behavioral and kinematic measures evaluated performance. The Health Research Ethics Board approved all procedures. **Results:** Both groups' reaction times (RT) lengthened as task difficulty increased. An interaction revealed LSS patients were more adversely impacted $F(3,372) = 4.207$; $p = .006$. The PETT facilitated RT for both groups, $F(1,124) = 5.105$; $p = .026$. Control participants were less variable in time to peak velocity poststrain, a benefit not shared by LSS patients, $t(31) = 2.149$; $p = .040$. **Discussion:** Behavioral and kinematic variables replicated previous findings. LSS patients did not experience equal benefits of treadmill walking as controls. Both movement preparation and limb movement initiation variability were impacted in an LSS population poststrain. **Conclusions:** A lower extremity movement task captured differences under strain between healthy and LSS populations. To enhance performance-based outcome measurement, future LSS clinical intervention studies may consider strain induction. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Adolescent idiopathic scoliosis is not only a musculoskeletal disease: abnormal vestibulomotor response is observed

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

Introduction: Adolescent idiopathic scoliosis (AIS) might be caused by various factors, and among these, an important role has been attributed to the vestibular system. It has been demonstrated that the change in body sway during the 800 ms following galvanic vestibular stimulation onset (GVS) is a pure feedforward vestibulomotor response. After this 800 ms period, multisensory feedback control modifies the amplitude of the body sway. Our objective is to verify if AIS patients with abnormal vestibulomotor control show different feedforward vestibulomotor response compared to controls. **Methods:** Forty-nine participants received a 2-second binaural bipolar (1 mA amplitude) GVS while standing on two forces platforms with the eyes closed. Upper body kinematics was collected with an electromagnetic motion tracking system. **Results:** AIS patients with abnormal vestibulomotor control showed larger body sway during the 800 ms window and afterward compared to controls. **Discussion:** Compared to controls, AIS patients have a dysfunction of the feedforward vestibulomotor response and the feedback control mechanisms. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Sonographic evaluation of the normal ulnar nerve in Guyon's tunnel: data on cross-sectional area and anthropometric measurements

Kenneth Reckelhoff, International Medical University, Norman Kettner, Daniel Haun, Martha Kaeser, Jinpu Li, Logan College of Chiropractic

Introduction: The goal of this study is to record normative data of the ulnar nerve (UN) in Guyon's tunnel. This will provide future reference for establishing criteria for sonographic diagnosis of Guyon's tunnel syndrome. **Methods:** Forty-six healthy volunteers were recruited (age = 24.7 ± 3.1 years), and a total 87 wrists (male = 56) were examined. The examinations include anthropometric measurements (wrist width, depth, circumference, palm length, and hand width) and ultrasonographic measurement of the cross-sectional area (CSA) of the UN in Guyon's tunnel. B-mode sonography and power Doppler were employed. **Results:** The UN CSA in Guyon's tunnel for males was 0.06 ± 0.02 cm^2 and 0.05 ± 0.01 cm^2 for females. There was a significant difference between female and male in the measurements of wrist width ($p = .005$), circumference ($p = .007$), hand width ($p = .028$) and UN CSA ($p = .046$). The UN CSA was correlated with wrist width, wrist depth, wrist circumference, palm length, and hand width ($p < .01$). **Conclusions:** There was a significant difference in CSA of UN at Guyon's tunnel between males and females. The wrist width and circumference and hand width had positive correlation with UN CSA. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Spinal manipulation can increase trunk mechanical thresholds of lateral thalamic neurons

William Reed, Randall Sozio, Joel Pickar, Cynthia Long, Palmer Center for Chiropractic Research

Introduction: Spinal manipulation (SM) results in mechanical hypoalgesia in clinical settings. This hypoalgesic effect has been attributed to alterations in peripheral and/or central pain processing. The objective of this study was to determine whether thrust magnitude of a simulated SM alters mechanical trunk response thresholds in wide dynamic range (WDR) and/or nociceptive specific (NS) lateral thalamic neurons. **Methods:** Extracellular recordings were carried out in the thalamus of anesthetized rats. Lateral thalamic neurons having receptive fields, which included the lumbar dorsal-lateral trunk, were characterized as either WDR (n = 22) or NS (n = 25). Response thresholds to electronic von Frey (rigid tip) mechanical trunk stimuli were determined in three directions (dorsal-ventral, 45 degrees caudal, and 45 degrees cranial) prior to and immediately following the delivery of a 100 ms SM at three thrust magnitudes (control, 55%, 85% body weight [BW]). **Results:** There was a significant difference in mechanical threshold between 85% BW manipulation and control thrust magnitudes in the dorsal-ventral direction in NS neurons ($p = .01$). No changes were found in WDR neurons. **Discussion/Conclusions:** Our data suggest that at the single lateral thalamic neuron level there may be a minimal spinal manipulative thrust magnitude required to elicit an increase in trunk mechanical response thresholds. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Diagnosis and management of myofascial pain syndrome: a narrative review of the literature

Christopher Roecker, Palmer College of Chiropractic

Introduction: Accurate diagnosis and management of myofascial pain syndrome (MPS) has been identified as an area in need of increased emphasis among health care providers. **Methods:** A narrative review of the literature was created, synthesizing the findings of literature retrieved from searches of MEDLINE, MANTIS, the Physiotherapy Evidence Database (PEDro), and the Index to Chiropractic Literature (ICL) databases. Hand searches were performed to retrieve authoritative textbooks relevant to MPS. **Results:** The author reviewed the results for relevance to diagnosis and management of MPS with an emphasis on articles published within the previous 10 years. **Discussion:** While various clinical features are used to describe MPS, specific diagnostic criteria are lacking. Diagnostic criteria present in at least 50% of the literature regarding the identification of MPS include (1) a tender nodule within a taut band of myofascial tissue, (2) pain recognition upon palpation, and (3) predictable pain referral from the area of tenderness. Various management strategies for MPS are used and include manual therapies, needling therapies, and self-care strategies. **Conclusions:** Clinicians should recognize common diagnostic criteria for MPS in an attempt standardize MPS diagnosis. Effective management of MPS involves many treatment strategies, including manual therapies, needling therapies, and self-management strategies. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Attitudes and use of evidence-based clinical practice within chiropractic: a survey of doctors of chiropractic with diplomate training in orthopedics

Christopher Roecker, Cynthia Long, Robert Vining, Dana Lawrence, Palmer College of Chiropractic

Introduction: Evidence-based clinical practice (EBCP) is a practice model gaining prominence within health care, including the chiropractic profession, but little is known regarding the attitudes doctors of chiropractic (DCs) hold toward this model of health care. This project examines the attitudes toward EBCP within a specialty discipline of DCs. **Methods:** We identified a survey questionnaire previously used to evaluate EBCP among nonchiropractic complementary and alternative practitioners. We adapted this questionnaire for use among

DCs and pretested it in 5 chiropractic college faculty. The final version was administered to DCs with diplomate-level training in orthopedics. The survey was e-mailed to 299 potential participants; descriptive statistics were calculated. **Results:** Of the surveys sent, 144 surveys were completed, resulting in a 48% response rate. The majority of respondents perceived EBCP as an important aspect of chiropractic practice. Respondents also believed themselves to have an above average skill level in EBCP, reported that training originated from their diplomate education, and based the majority of their practice on clinical research. **Conclusions:** Doctors of chiropractic with an orthopedic diplomate appear to have favorable attitudes toward EBCP. Further study will help understand EBCP perceptions among general field DCs. A logical next step includes validation of this questionnaire. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Implementation and validation of an objective structured practical exam in a chiropractic college internship program

Kevin Rose, Antoinette Nguyen, Jesika Menasaka, Southern California University of Health Sciences

Introduction: Clinical reasoning is a critical skill for all health care providers. To better evaluate this competency, an objective structured practical exam (OSPE) was implemented for our interns. The objective of this paper is to describe the implementation process and the exam's reliability and validity. **Methods:** Each OSPE case has a neuromusculoskeletal and systemic condition. Interns are required to verbally describe how they would diagnose and manage their assigned case. An unfolding case format is used to keep interns on track. This study was approved by the institutional review board. **Results:** The median score was 66.7%. Students did best on the management plan section and struggled with history taking. There was significant correlation between the examiners who tested the same students and between scores and students' cumulative grade point average and grades in most courses where clinical reasoning is taught. Twelve students (13%) failed and were scheduled for remedial workshops and a retake exam. **Discussion:** An OSPE was successfully implemented to evaluate the clinical reasoning skills of interns. Plans are being developed to deal with individual and cohort deficiencies uncovered. **Conclusions:** An OSPE is a useful tool to evaluate the clinical reasoning competency of chiropractic interns. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Impact of volunteer mentors in a chiropractic educational setting

Lisa Rubin, Life University

Introduction: This pilot study looks at the role of university student volunteers and the impact volunteering has on students and the experience of at-risk children who participate in a mentoring experience. **Method:** Student university volunteers and 6th- to 9th-grade children filled out evaluations for feedback of their experience and the impact it had on them. **Results:** According to the university student volunteers, 85.7% reported that they felt that volunteering made an "excellent" impact on the children. Of student volunteers, 42.9% reported they saw a positive change in the children they worked with and 42.9% reported "somewhat." All volunteers (100%) reported that they experienced personal growth through volunteering with the children. Among volunteers, 71.4% reported performing as a better student as a result of the volunteer work, and 85.7% stated that the experience improved their leadership skills. **Discussion**: The volunteer mentoring program that was hosted in a university environment was an empowering experience for volunteers who played a role as leaders and for the children who participated. Overall academic improvement was seen for 50% of children. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

A comparison of chiropractic manipulation methods and usual medical care for low back pain: a randomized clinical trial

Michael Schneider, University of Pittsburgh, Mitchell Haas, University of Western States, Joel Stevans, Doug Landsittel, Ronald Glick, University of Pittsburgh

Introduction: Manual and mechanical manipulation (Activator) are the two most common methods of spinal manipulation used by chiropractors, but there is insufficient evidence regarding their comparative effectiveness. **Methods:** In a randomized comparative effectiveness trial, we randomized 107 participants with acute and subacute low back pain to (1) usual medical care, (2) manual side-posture manipulation, and (3) mechanical manipulation (Activator). The primary outcome was self-reported disability (Oswestry) at 4 weeks. Pain was rated on a 0–10 numerical rating scale. Pain and disability scores were regressed on grouping variables adjusted for baseline covariates. **Results:** Manual manipulation demonstrated a clinically important and statistically significant reduction of disability and pain compared to Activator (adjusted mean difference = 7.9 and 1.3 points, respectively; $P < .05$) and compared to usual medical care (7.0 and 1.8 points, respectively; $P < .05$). There were no significant adjusted mean differences between Activator and usual medical care in disability and pain (0.9 and 0.5 points, respectively; $P > .05$). **Conclusions:** Manual manipulation provided greater short-term reduction in self-reported disability and pain compared to Activator and usual medical care. (This is an abstract from a conference presentation only and does not represent a

full work that has been peer-reviewed and accepted for publication.)

The application of Beers Criteria for potentially inappropriate medication use in older adults receiving care in a chiropractic college outpatient clinic

Edward Smith, Mark Pfefer, Richard Strunk, Cleveland Chiropractic College

Objective: The purpose of this study was to determine the incidence of potentially inappropriate medication use in older adults receiving care in a chiropractic college outpatient clinic. **Methods:** Self-reported medication lists were abstracted from 60 charts randomly chosen from 285 patients over 65 years of age who were participating in a trial exploring functional outcomes in older adults attending a chiropractic university teaching clinic. Institutional review board approval was obtained for this project. **Results:** Medication lists from 60 charts (from 36 females, 24 males), yielded usable data for analysis. Use of 1 prescription medication was reported by 85% of patients, 37% listed 1–3 medications, 22% 4–6, 12% 7–9, 8% 10–12, 2% 13–15, and 5% more than 15 (16, 19, and 20 medications). Medications appearing on the American Geriatric Society 2012 Beers Criteria were listed by 48% of patients. Of patients listing 3 or fewer medications (52%), only 1 reported a potentially inappropriate medication. All patients reporting 6 or more medications (28%) listed at least 1 potentially inappropriate medication. **Conclusions:** The use of potentially inappropriate medications in older adults is common among the older adult patients of a chiropractic teaching clinic. As the number of medications increases, the likelihood of a potentially inappropriate medication increases. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Development of an introductory program for field practitioners on evidence-based clinical practice

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Introduction: Evidence-based clinical practice (EBCP) training occurs at many chiropractic colleges; however, there are few programs for field practitioners. This project was to develop an introductory program in EBCP and examine the attendees' skills and attitudes and their perceptions of the program's relevance. **Methods:** The project was submitted to the institutional review board and was deemed "exempt." An introductory program was developed based on another program presented in 2011. The revised program was presented in the 3 states. A presurvey aimed at assessing attitudes and self-perceived competence and a postsurvey aimed at assessing the program's effectiveness were conducted. **Results:** Of the participants surveyed, 82 indicated that they felt EBCP skills were important and that they gained useful skills from the program. **Discussion:** An introductory program was developed that was understandable and provided easily adopted EBCP skills. The program emphasized the rationale for using EBCP skills more than the skills themselves. The application of EBCP was illustrated with situations in which research could change clinical practice. **Conclusions:** An introductory program on EBCP was developed for field practitioners. Surveys of the participants indicate that EBCP is considered an important element in chiropractic practice and that the session aided the practitioners in developing immediately applicable skills. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Effects of multimodal chiropractic care chronic shoulder pain: a single group, preexperimental feasibility study

Richard Strunk, Mark Pfefer, Cleveland Chiropractic College

Introduction: This study was conducted to further the development of a line of investigation into the potential effects of multimodal chiropractic treatment on chronic shoulder pain. **Methods:** A single group, preexperimental feasibility study was conducted at a chiropractic college health center with a target sample size of 30 patients. Patients were treated by a chiropractic student intern for 6 months. The Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire was the primary outcome measurement with the Numerical Pain Rating Scale (NPRS) used as a secondary measurement. Institutional review board approval was obtained. **Results:** Twenty-five patients were recruited over a period of 13 months: 15 patients enrolled in the study, but because of 8 dropouts, 7 patients completed the treatment. A median DASH change score of 28%, a median NPRS change score of 5 points, and an effect size of 2.8 was calculated for the study completers. **Discussion/Conclusions:** Clinically significant improvements were observed in this study. Implementing protocols in the health center was feasible, but improvements in monitoring patient schedules need to be developed. Recruitment of patients at a chiropractic college health center was difficult in this unfunded project. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Comparison of student satisfaction, perceived learning, and outcome performance: blended instruction versus classroom instruction

Steven Taliaferro, Beverly Harger, Darcy Vavrek, University of Western States

Introduction: The goal of this study is to investigate whether blended online with laboratory instruction

differs from traditional classroom lecture and laboratory with regard to student satisfaction and performance in a radiographic technique class teaching radiation health and physics. **Methods:** Following institutional review board approval, 122 participants were randomized to either an online or classroom environment for the lecture portion of the course. All participants attended laboratory sessions in person. Anonymous surveys given during midterm and final exams assessed satisfaction with learning experience and expected grades. Linear models assessing differences between groups were adjusted for age, gender, prior online class experience, online class preference, self-reported computer skill, and time of year. **Results:** Students in the blended cohort reported overall greater satisfaction ($p = .030$) and found the delivery method more enjoyable ($p = .002$) than did the traditional classroom cohort. No differences in exam scores between groups were observed. **Discussion:** This study demonstrated that a blended format of instruction can improve learner satisfaction as compared to the traditional classroom method. **Conclusions:** Online instruction implemented into a traditional educational program helps students balance schedules, has a positive impact on perceived learning, and provides exam success similar to that of the traditional classroom. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Student perceptions of Web-based cases

Dorrie Talmage, Jeffrey Weiss, John Mrozek, Texas Chiropractic College, Nancy Petersen, Michael E. DeBakey Veterans Affairs Medical Center

Introduction: Case presentations can enhance clinical relevance in the basic sciences. In 2009 we chose a Web-based approach using Design-A-Case (DAC) as our case presentation vehicle in the basic sciences. Students work through 9–12 Web-based cases in their first 2 trimesters. The purpose of the study was to determine if student perceptions of our Web-based cases changed, over time, with increasing clinical exposure. **Methods:** An 11-item survey was administered to trimesters 3–10. Clinical exposure was divided into preclinical (trimesters 3–6) and clinical (trimesters 7–10). Trimester 1–2 students were not surveyed as they had not completed all cases. Item responses were dichotomized into 2 categories (agree/strongly agreed and disagreed/strongly disagreed). A χ^2 analysis performed with statistical significance at $p < .05$. **Results:** All response items showed an increase in percent agreement from preclinical to the clinical trimesters. Four of 11 responses were significant at $p < .05$. Eight items increased by more than 10%. **Discussion:** Survey items were merged into themes of methods of instruction, content relevance, and clinical relevance/reasoning. All themes showed percent increases. **Conclusions:** Student perception of Web-based cases increases with clinical exposure. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Development and psychometric evaluation of an information literacy self-efficacy survey and an information literacy knowledge test

Rodger Tepe, Logan University, Chabha Tepe, Palmer College of Chiropractic

Background: Psychometrically sound instruments are needed to objectively evaluate chiropractic students' information literacy (IL). **Objective:** To develop and evaluate the reliability and validity of an IL self-efficacy survey and an IL knowledge test. **Methods:** A 25-item IL self-efficacy survey and a 50-item IL knowledge test were developed and administered twice to a convenience sample of 53 trimester-7 chiropractic students. Item analyses were performed on all questions. An expert panel found acceptable face and content validity for both instruments. The study received an exemption from the college institutional review board. **Results:** The IL self-efficacy survey demonstrated good reliability (test-retest correlation = 0.807) and good/very good internal consistency (mean $\kappa = .563$ and Cronbach's $\alpha = 0.915$). Twenty-five questions with the best item analysis characteristics were chosen from the 50-item IL knowledge test, resulting in a 25-item IL knowledge test that demonstrated good reliability (test-retest correlation = 0.866), very good internal consistency (mean $\kappa = 0.686$, KR20 = 0.848), and good item discrimination (mean point biserial = 0.485). **Conclusions:** Both the IL self-efficacy survey and the 2- item version of the IL knowledge test provided preliminary evidence of acceptable reliability and validity. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

The relationship between test anxiety and grade point average in chiropractic college students

Rodger Tepe, Jesse Politowski, Megan Porter, Ashley Ingino, Seth Gerlach, Logan University

Background: Academic performance in higher education is influenced by many factors, one of which is test anxiety. Ten percent to 35% of college students report that their test performance is negatively affected by test anxiety. PubMed and Google Scholar searches revealed no published studies of test anxiety and academic performance in chiropractic students. **Purpose:** This study aimed to investigate the relationship between Test Anxiety Inventory (TAI) scores and grade point average (GPA) in chiropractic students. **Design:** The TAI was administered to a convenience sample of 243 consenting volunteer students (58% male, mean age 24 $\pm$ 3.5) recruited from trimesters 3 (n = 102), 6 (n = 71), and 9 (n = 66) in a doctor of chiropractic program. This study received institutional review board approval. **Results:** TAI scores were negatively correlated with GPA ($r = -.39$, $p < .0001$), females had higher TAI scores than males ($p = .003$), and trimester 9 had lower

TAI scores than trimester 3 ($p = .032$). **Conclusions:** Findings of this study were consistent with a consensus of related research. Higher test anxiety was significantly associated with lower academic performance, and females had significantly higher test anxiety than did males. These findings have implications for chiropractic education: Should anxiety-reducing interventions be made available to students with high test anxiety? (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Meta-learning in professional development: a model for faculty development in communities of practice

Noni Threinen, Southern California University of Health Sciences

This study was designed to explore the effectiveness and feasibility of faculty communities of practice (CoP) to improve learning about learning principles and educational research. Faculty chose facilitated CoP learning groups offered in three consecutive terms. A feedback survey was administered to determine perceptions of benefits, challenges, tangible results, and needed changes to the CoP process. Analysis of data included response frequencies to determine themes and open-ended comments for context and understanding. Results demonstrated perceived benefits for professional collegiality and developing educational research projects. The most ubiquitous challenge was availability of time to attend, as well as to follow up and produce meaningful educational research. Faculty reported tangible results in developing research projects and new ideas. Tangible benefits may also be measured by correlating research project implementation, publications, and presentations using scholarly inquiry skills in the future. Results are not generalizable due to the nature of qualitative data and small sample size. Current resources support the program. Additional resources for expert CoP facilitators, variety of program delivery, and personalized development plans may require reallocation of priorities. Institutional review board approval was granted. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

The effect of foot orthotics on lower extremity joint coupling during a functional task

John Triano, Diane Grondin, Steve Tran, Canadian Memorial Chiropractic College

Introduction: Excessive foot pronation is linked with lower extremity injuries, and practitioners prescribe orthotics to improve joint coupling. The purpose of this project was to examine the effect of orthotics on the kinematics of the lower extremity and, secondarily, to determine the validity of commonly used observation methods for assessing pronation. **Methods:** Twenty-five participants performed a squat with and without orthotics. Three-dimensional angular displacements of the foot, knee, and hip were computed using opto-electric markers. Pronation was assessed with visual observation and a criterion ratio measurement. A two-factor repeated measures analysis of variance (ANOVA) and Spearman's correlations were computed. The study was approved by the Research Ethics Board. **Results:** There was a significant effect of orthotics on the angular displacements of the foot in flexion/extension ($p = .0000$) and in axial rotation ($p = .0000$), as well as on the hip in lateral bend ($p = .0066$). There were medium correlations between two observations and the criterion method for assessing pronation. **Discussion/Conclusions:** This study supports the validity of two observation-based methods for assessing pronation as well orthotic-induced kinematic changes to the lower extremity. Future work is required to determine the clinical relevance of the findings. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Do informed consent documents for chiropractic clinical research studies meet readability level recommendations and contain required elements: a descriptive study

Elissa Twist, Palmer Center for Chiropractic Research, Dana Lawrence, Palmer College of Chiropractic, Stacie Salsbury, Palmer Center for Chiropractic Research, Cheryl Hawk, Logan College of Chiropractic

Objective: The aim of this analysis is to determine if informed consent documents from clinical studies conducted at chiropractic colleges meet recommended readability standards and contain all elements required by US law. **Methods:** Consent documents (13) were obtained from 4 chiropractic colleges that had received federal funding for clinical research. These were analyzed using the Flesch-Kincaid measurement. We assigned a grade-level readability score based on the average of the 3 largest uninterrupted blocks of text. Content was assessed using a 13-element checklist. One point was given for every element present, ranging from "0, no elements are present" to "13, all elements are present." **Results:** The mean Flesch-Kincaid grade level readability was 10.8. Our sample had a mean readability score 2.8 grade levels above the generally accepted US average reading level. Content varied greatly between the 13 informed consent forms, ranging from only 10 elements present in 2 documents to all 13 required present in 4 documents. **Conclusions:** Chiropractic clinical study consent documents may not have readability levels congruent with the nationally accepted average. The low number of elements in some consent forms raises concern that not all participants were fully informed, and it suggests that some documents may not comply with federal requirements. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Determinants of responders in a dose-response trial of spinal manipulation for the care of chronic low back pain

Darcy Vavrek, Mitchell Haas, University of Western States, Moni Neradilek, Nayak Polissar, The Mountain-Whisper-Light Statistics

Background: The aim of this secondary analysis is to identify determinants of success of spinal manipulation (SMT) for the treatment of chronic low back pain (cLBP). **Methods:** We randomized 400 cLBP patients to receive 18 sessions of lumbar SMT or a light massage control scheduled over 6 weeks, with SMT at 0, 6, 12, or 18 of the visits. Patients were followed for 52 weeks. Successful response to treatment is defined as a 50% improvement in pain score measured with a modified Von-Korff (MVK) 100-point pain scale. Determinants of successful response are baseline measures of pain, disability, outside care, health status, age, gender, relative confidence in SMT/massage, any previous SMT/massage care, and time point. Three-quarters of the data set is used to develop the predictive models with stepwise logistic regression. Models are validated on the remaining data. Sensitivity and specificity for the predictive model will be reported. **Results:** Preliminary results show that 50% improvement in pain was predicted best by lower number of comorbidities, with an increased count of the number of comorbidities preventing recovery at an OR per 1 comorbidity of 0.84; 95% confidence interval [CI] 0.72, 0.97; $p = .02$. **Conclusions:** These findings will assist with developing models for predicting which cLBP patients would especially benefit from SMT. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Self-reported bladder and bowel symptoms among adults attending an academic chiropractic clinic: a 1-month point-prevalence survey

Anna Walden, Stacie Salsbury, William Reed, Dana Lawrence, Palmer College of Chiropractic

Introduction: The purpose of this survey was to estimate the1-month point prevalence of bowel and bladder symptoms (BBS) among adult chiropractic patients and to evaluate associations between these symptoms and low back pain (LBP). **Methods:** Institutional review board approval was obtained. Patients age 18 years or older presenting to a chiropractic college academic health clinic between March 25 and April 25, 2013, were asked to complete a symptom-screening questionnaire. Descriptive statistics, binary logistic regression, and Fisher's exact probability tests were performed. **Results:** The sample included 140 of 1,300 patients who visited the clinic during the survey period (11%). Mean age was 47.5 (range 18–79) years. LBP was the primary chief complaint in 42%. The 1-month point prevalence of any bladder symptoms was 75%, while the rate for bowel symptoms was 62%; 55% reported both BBS. Binary logistic regression analyses showed no association between a chief complaint of LBP and combined BBS (odds ratio [OR] = 1.67, $p = .164$). **Conclusions:** The prevalence of bowel and bladder symptoms in chiropractic patients was high, yet there was no association between these symptoms and LBP in patients seeking care for this chief complaint. Future surveys of community-based chiropractic patients using probability samples are warranted. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

The effect of teaching general psychomotor skills before specific adjustments on student performance in a lumbar and pelvis chiropractic technique course

Paul Wanlass, Anupama Kizhakkeveettil, Kevin Rose, Southern California University of Health Sciences

Introduction: The sequencing of learning spinal manipulation theory and laboratory exercises plays a major role in the motor learning process. The purpose of this study was to evaluate if changing the sequencing in which students learn a gross motor skill for the adjustment of the pelvis and lumbar spine would improve their performance. **Methods:** The sequencing of class instruction was changed from the traditional teaching of specific adjustments first and then gross motor skills to the reverse. Practical exam scores for the two classes before the experiment were compared to the two classes after. **Results:** The experimental group scored significantly lower in their technique exams than the control group, although the difference was small. A grade point average above the median was a mediating factor. **Discussion:** Changing the sequence of teaching did not improve the practical exam performance of these students. The decrease in student performance observed, although statistically significant, is probably too small to affect their future clinical performance. A limiting factor was that those in the control cohort were better students overall. **Conclusions:** Further research is needed to determine the optimum sequence of teaching to maximize the students' learning experience and clinical performance. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Immediate effects of upper thoracic spine manipulation on hypertensive individuals

John Ward, Ken Tyer, Jesse Coats, Gabbrielle Williams, Kristina Kulcak, Texas College of Chiropractic

Purpose: This study was intended to determine if there were any statistically significant immediate effects of upper thoracic chiropractic manipulative therapy (CMT) on cardiovascular physiology in hypertensive individuals. **Introduction:** Preliminary research suggests CMT to various regions of the spine may be capable of lowering systolic and diastolic blood pressure in hypertensive individuals. Further studies are warranted to corroborate or refute these findings. **Methods:** Fifty

hypertensive participants were equally randomized into a single-blind, controlled trial involving two study groups: anterior thoracic manipulation of T1-T4, or a "no T-spine contact" control. Outcome measures were electrocardiogram, bilateral pulse oximetry, and bilateral blood pressure measurement performed at baseline, after 1-minute intervention, and after 10-minute intervention. A repeated measures analysis of variance (ANOVA) was used to compare within-group changes. This study was institutional review board approved. **Results:** Within-group changes in P-R interval and QRS duration demonstrated that the atria were transiently less active post-CMT and the ventricles were more active post-CMT; however, the changes were clinically minimal. **Conclusions:** The results of this study, and the limited existing normotensive thoracic-specific CMT research in this field, suggest cardiovascular physiology, short term, is not affected by upper thoracic spine CMT in hypertensive individuals to a clinically relevant level. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

The impact of bilateral sacroiliac joint manipulation on walking kinematics among asymptomatic 20- to 45-year-old individuals

John Ward, Jesse Coats, Ken Sorrels, Amir Pourmoghaddam, Stefan Kreuzer, Tiffany Sarmiento Carlos DeLeon, Texas College of Chiropractic

Purpose: The purpose of this study was to determine the impact bilateral sacroiliac joint manipulation has on leg length inequality (LLI) through gait analysis. **Methods:** Forty-one healthy participants engaged in a baseline 90-second walking kinematic analysis using Vicon cameras. Following this, participants underwent a functional LLI test. They were then classified as left short leg, right short leg, or no short leg. Participants in each of the two short-leg branches of this study were then randomized to receive either (1) both chiropractic manipulative therapy (CMT) to the posterior superior iliac spine on the short-limb side and ischial tuberosity CMT to the long-limb side or (2) no CMT. All participants underwent gait testing again. A mixed model multivariate analysis of variance was used to analyze kinematic data. This study was institutional review board approved. **Results:** Statistically significant differences were measured for participants who underwent CMT for step length, double support time, double support percentage, stance time, and stance percentage on the long-limb side. **Conclusions:** Preliminarily, this suggests that CMT in response to a functionally short leg results in small changes in certain gait parameters in 18- to 45-year-old asymptomatic individuals. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Impact of unionization on faculty resistance to change, justice, trust, conflict, and climate for innovation

Dan Weinert, Dustin Derby, Kevin Paustian, Palmer College of Chiropractic

Introduction: This study explored differences in trust, perceptions of justice, perception of conflict, attitudes toward change, and innovation between unionized and nonunionized faculty at chiropractic colleges. **Methods:** This research received institutional review board approval from Palmer College of Chiropractic. Survey respondents for this study were full-time chiropractic college faculty. Data analysis included independent *t* tests and linear regression. Scaled means for resistance to change, justice, trust, conflict, and climate for innovation were used based on the factor structures resulting from factor analysis. **Results:** Independent *t* test found significant differences in resistance to change, trust, and perceptions of conflict. Linear regression showed significant differences in resistance to change (routine seeking), trust in the supervisor, conflict between faculty members, and conflict between faculty and administration. **Discussion:** The results indicate unionized faculty within chiropractic colleges significantly differ in that they are more resistant to change, perceive greater trust in their supervisor, perceive less conflict between faculty members, but perceive more conflict between faculty and administration. **Conclusions:** This study found a significant difference between union and nonunion employees and their appraisal of resistance to change, trust in their supervisor, and conflict. Union status predicted respondents' appraisal of resistance to change, trust, and conflict. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

The most common exercises prescribed by chiropractors to reduce low back and pelvic girdle pain in pregnant patients

Carol Ann Weis, Tamara McDonald, Madelyn Soye, Lauren Scott, Sarah Dennison-Taylor, Canadian Memorial Chiropractic College

Background: Pregnancy-related low back pain is considered a common occurrence. It has been suggested that pregnancy-related low back pain can be alleviated with core muscle strengthening; however, studies specifically examining the effects of core training on pregnancy-related low back pain are relatively scarce and do not specify the most appropriate exercises for this population. **Objective:** This study sought to determine the most commonly prescribed exercises by chiropractors and which have of those have been effective in reducing pregnancy-related low back pain. **Methods:** A 32-question survey was developed using the Web-interface Survey Monkey and distributed to 3540 chiropractors. **Results:** Of the surveys distributed, 230 chiropractors prescribed exercises to their patients. The results indicated that pelvic tilts, bird dog, and the no-crunch crunch (abdominal bracing) are the most commonly prescribed exercises. Almost all chiropractors surveyed were willing to use three evidence-based exercises in practice. **Conclusions:** Although the top 3

exercises were identified, there appeared to be much variation. Respondents indicated that they are interested in incorporating evidence-based exercises into their practice. These results suggest the need for future research in this area so that all chiropractors are armed with knowledge and evidence for successfully treating pregnancy-related back pain. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Attitudes and perceptions of chiropractic students about posture and postural correction

Michael Wiles, Jeffrey Novak, James Hulbert, Northwestern Health Sciences University

Objective: This research examines the attitudes and perceptions of chiropractic students about the importance and clinical value of assessing and correcting posture. **Method:** A survey was presented to three groups of chiropractic students at trimesters T-1, T-4, and T-7 in a 10-trimester chiropractic professional program. The survey included items focusing on concepts of posture and postural correction and solicited degree of agreement with the statements. **Results:** We found (1) substantial disagreement among the three samples that "posture" and "postural correction" are well-defined terms in chiropractic, (2) perceived relevance of posture and postural correction weakens over students' time in training, (3) perceived usefulness of referring to "posture" in conversations with patients weakens over time in training, and (4) consistent agreement across trimesters that chiropractors are experts in posture and postural correction. **Conclusions:** "Posture" and "postural correction" appear to be core organizing concepts in chiropractic practice, yet there appears to be little consensus among chiropractic students at one chiropractic college about these two concepts and their importance to the students' future practices. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Emotional exhaustion: a source of concern for chiropractic practitioners?

Shawn Williams, CUNY - York College

Background: Workplace burnout is emerging as a major concern in many health professions. The purpose of this study was to establish the prevalence of burnout among chiropractors in the United States and compare these results with burnout data in other health care professionals. **Methods:** Using a nonprobability convenience sampling methodology, the Maslach Burnout Inventory-Human Services Survey and a sociodemographic questionnaire were e-mailed to a randomized sample of licensed chiropractors. **Results:** Of those who responded, 21% of the participants had high emotional exhaustion (EE), 8% of the participants had low personal accomplishment (PA), and 8% had high depersonalization (DP). **Discussion:** Significant differences were found in the level of EE, DP, and PA as a function of gender, time dedicated to clinical care and administrative duties, source of reimbursement, the type of practice setting, the nature of practitioners' therapeutic focus, the location of chiropractic college, self-perception of burnout, the of effect of suffering from a work-related injury, the varying chiropractic philosophical perspectives, and the public's opinion of chiropractic. **Conclusions:** Although doctors of chiropractic in the United States had lower levels of burnout compared to other health care professionals, higher levels of emotional exhaustion remain workplace issues for this professional group. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Effects of upper and lower cervical spinal manipulative therapy on blood pressure and heart rate variability in volunteers and patients with neck pain: a randomized controlled, crossover, preliminary study

Ni Ni Win, Anna Maria Jorgensen, Yu Sui Chen, Michael Haneline, International Medical University

Introduction: The aims of this study were to examine the autonomic nervous system (ANS) responses when either upper (C1 and C2) or lower (C6 and C7) cervical segments were adjusted in volunteers and whether such responses would be altered in patients with neck pain after spinal manipulative therapy (SMT). **Methods:** A randomized controlled, crossover, preliminary study approved by the university's clinical ethics committee was conducted on a total of 10 asymptomatic volunteers and 10 patients with acute neck pain. Heart rate variability analysis (HRV), hemodynamic parameters (blood pressure [BP] and heart rate), and the subject's pain measured with visual analog scale (VAS) were recorded before and after SMT. **Results:** The normalized unit of high frequency(nuHF) indicating parasympathetic activity was predominant after upper cervical SMT, with a significant decrease in systolic BP. Low-frequency to high-frequency (LF/HF) ratio demonstrating predominance of sympathetic activity was increased after lower cervical SMT in the volunteer group; however, there was a decrease in LF/HF ratio associated with decreased systolic BP and VAS scores following both upper and lower cervical SMT in the patients' group. **Conclusions:** ANS responses to SMT are different depending on the region of spine and the subject's presence of pain. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Assessing the change in attitudes, knowledge, and perspectives of medical students to chiropractic after an educational intervention

Jessica Wong, Canadian Memorial Chiropractic College, Luciano Di Loreto, Alim Kara, Kavan Yu, private practice, Alicia Mattia, Univeristy of Western Ontario, David Soave, Canadian Memorial Chiropractic College, Karen Weyman, St. Michael's Hospital, Deborah Kopansky-Giles, Canadian Memorial Chiropractic College

Objective: To assess the change in attitudes, knowledge, and perspectives of medical students to chiropractic after a 1-hour educational intervention. **Methods:** We used a mixed-methods approach with a 52-item cross-sectional paper survey and a focus group of 3rd-year medical students. Analysis of variance (ANOVA) and Wilcoxon rank-sum test were used to assess group differences before and after the educational intervention. Constant comparison method was used for thematic analysis. **Results:** The survey was completed by 58 medical students (51.7% response rate), and the focus group consisted of 6 students. The following significantly increased after the educational session: self-reported understanding of chiropractic, number of attitude-positive responses, and average number of correct responses assessing knowledge on chiropractic. Qualitative themes were that medical students: (1) wanted exposure to chiropractic earlier in the formal curriculum and in clinical settings, (2) had negative attitudes toward chiropractic from hidden curriculum, and (3) wanted more information regarding evidence and safety of chiropractic. **Conclusions:** Our results support the use of a 1-hour educational session to improve medical students' views toward chiropractic. Educational reform should consider earlier exposures to chiropractic in the formal medical curriculum and in clinical settings that addresses evidence, safety, and hidden curriculum around chiropractic. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

The combined use of alcohol and energy drinks as a predictor of increased risk for drinking and driving

Conrad Woolsey, Logan University, Bert Jacobson, Oklahoma State University, Adam Barry, University of Florida, Ronald Williams Jr., Texas State University, Robert T. Davidson, Logan University, Will Evans, University of Western States

Objective: The combined-use of alcohol and energy drinks (EDs) is an emerging public health issue. Compared to alcohol-only use, combined use increases motivation to drink, reduces perceptions of impairment, and reduces users' perceived levels of intoxication. These are especially important considerations when placed in a drinking-and-driving context since adults 18 or older who engage in heavy episodic drinking are the most likely to engage in alcohol-impaired driving. Consequently, the current investigation examined differences in drinking-and-driving behaviors between combined users (ED + alcohol) and those who consumed alcohol only. **Methods:** College students (n = 281) from a large Midwestern university completed a Web-based survey assessing drinking and driving as well as ED use behaviors. **Results:** Compared to alcohol-only (AO) drinkers, in the past 30 days combined users (CU) were significantly more likely to drive both over the 0.08 BAC driving limit (CU 53% vs. AO 38%; $p = .009$) and after knowing they were too drunk to drive (CU 57% vs. AO 44%; $p = .025$). Combined users also reported being drunk and binge drinking more frequently. **Conclusions:** The current study suggests combined users exhibit an increased likelihood to drive after drinking, as well as increased odds of driving while knowingly drunk. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

The effect of acupuncture on cervical kinesthetics in subjects without neck pain: A pilot study

Shari Wynd, Texas Chiropractic College, Aladin M. Boriek, Baylor College of Medicine, Brad Koby, Texas Chiropractic College

Background: Evidence suggests that acupuncture may represent an alternative complimentary therapy for the management of acute neck pain. Unfortunately, the use of subjective outcome measures represents a significant limitation in most published studies. **Purpose:** To examine cervical kinesthetics (using head repositioning accuracy [HRA]) and pain threshold (PPT) in subjects without neck pain before and after acupuncture. **Methods:** This study is a single-blinded randomized sham-control pilot trial. Subjects had their active cervical range of motion (ROM), their HRA, and their PPT measured. Descriptive statistics for the subject demographics were determined. Changes in the cervical spine ROM, HRA, and PPT were computed following either sham or acupuncture and significant differences were determined using a Student *t* test. **Results:** In total, 6 female and 10 male subjects (mean age = 29.7 ± 7.2; body mass index [BMI] = 28.1 ± 7.7) were recruited to the study. There were no significant differences between the sham treatment group and the acupuncture treatment group for HRA, PPT, or ROM. **Conclusions:** HRA, PPT, and ROM are not affected by acupuncture in healthy subjects; however, there appears to be a trend toward improved HRA and ROM in both treatment groups, whereas the PPT tended toward a decrease in HRA and ROM for either treatment. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Can formative quizzes improve summative exam performance?

Niu Zhang, Palmer College of Chiropractic Florida, Charles Henderson, Henderson Technical Consulting

Introduction: Despite their wide use, the value of formative exams remains unclear. We evaluated the possible benefits of formative assessments in a physical examination course at our chiropractic college. **Method:** Three hypotheses were examined: (1) Receiving forma-

tive quizzes (FQs) will increase summative exam (SE) scores; (2) writing FQ questions will further increase SE scores; and (3) FQs can predict SE scores. Hypotheses were tested across 3 separate iterations of the class. **Results**: SE scores for the control group (class 3) were significantly less than those of classes 1 and 2, but writing quiz questions and taking FQs (class 1) did not produce significantly higher SE scores than did only taking FQs (class 2). FQ scores were significant predictors of SE scores, accounting for 52% of the SE score. Gender, age, academic degrees, and ethnicity were not significant copredictors. **Discussion:** Our results support the assertion that FQs can improve written SE performance, but students producing quiz questions did not further increase SE scores. We concluded that nonthreatening FQs may be used to enhance student learning and suggest that they may also serve to identify students who, without additional remediation, will perform poorly on subsequent summative written exams. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)

Physiological TNF-α may mediate spinal manipulation therapy: a literature reexamination

Liang Zhang, Palmer College of Chiropractic Florida

Introduction: The molecular mechanisms underlying spinal manipulation therapy (SMT) remain elusive. In the present study, we conducted a literature review on the relationship between TNF-α (tumor necrosis factor alpha) and SMT. **Methods:** We searched several literature databases for relevant articles, and then reexamined the studies from current immunophysiological perspectives. **Results**: Conflicting reports on the relationship between TNF-α and SMT have created confusion. Recent progress in TNF-α physiology was explored and may resolve this confusion. **Discussion:** We first examined published studies with consideration of recent immunophysiological advancements and then proposed a biphasic TNF-α response to SMT. In the early phase, SMT may enhance macrophage TNF-α production in humans, which would boost immune surveillance and increase inner healing ability. This may explain how SMT benefits healthy individuals under wellness management. During the late phase, an initial TNF-α elevation triggered by SMT may activate or sensitize regulatory T cells in a negative feedback mechanism and lower TNF-α levels. This would benefit patients with inflammatory pain. **Conclusions:** The current literature supports a role for physiological TNF-α in mediating SMT effects, which warrants further research. (This is an abstract from a conference presentation only and does not represent a full work that has been peer-reviewed and accepted for publication.)