

ASSOCIATION OF CHIROPRACTIC COLLEGES RESEARCH AGENDA CONFERENCE 2020 ABSTRACTS OF PROCEEDINGS

PLATFORM PRESENTATIONS

A systematic review of complementary and integrative health interventions for patients with chronic musculoskeletal pain and comorbid mental health conditions

Danielle Aslan, Jason Napuli, Sheryl Walters

Objective: To evaluate the use of complementary and integrative health (CIH) interventions compared to usual care for patients with chronic musculoskeletal pain and co-occurring mental health conditions. **Data Sources and Selection:** PubMed, CINAHL, PsychARTICLES, ICL, and AMED were searched for randomized controlled trials and prospective cohort studies describing patients with chronic musculoskeletal pain and treatments consisting of CIH approaches compared with usual care. Two reviewers independently screened abstracts and/or full-text for inclusion, quality was assessed using Grading of Recommendations Assessment, Development and Evaluation (GRADE). This review followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) recommendations. **Results:** A total of 591 articles were initially identified by electronic search, with 23 duplicates. Abstract screening yielded 24 studies for full-text screening, 6 studies met the inclusion criteria. Two studies focused on mindfulness-based stress reduction, two focused on CBT, and two focused on multidisciplinary collaborative approaches. The included studies were high quality. **Conclusions:** CIH practices addressing chronic pain and mental health conditions have not been exhaustively studied and may present opportunity for future development of team-based management. (This is a conference presentation abstract and not a full work that has been published.)

A case series of cervical spondylotic myelopathy diagnosed in a chiropractic clinic

Patrick Battaglia, Chandler Bolles, Catherine Moore

Objective: Clinical features of Cervical Spondylotic Myelopathy (CSM) are protean so knowledge of this topic is important. This report presents cases of CSM and describes up-to-date clinical features of the diagnosis. **Clinical features:** Case 1: 49-year-old male with chronic, atraumatic neck and right arm pain, worsening gait and balance, and bilateral hand dysesthesia. Examination raised suspicion for myelo-radiculopathy, which imaging confirmed. The final diagnosis was CSM with right C5 radiculopathy, and he underwent neurosurgery. Case 2: 38-year-old female with neck pain post recent MVA and chronic extremity paresthesia. Examination was consistent with myelopathy, and imaging confirmed CSM at the C5/6 level. They are awaiting neurosurgery. Case 3: 49-year-old male with chronic pain post lifting injury in 2013 with reported MRI diagnosis of cervical myelomalacia. Now with persistent neuropathic pain along the left thorax and left lower extremity, confirmed at examination. Lumbar examination, including neurodynamic testing, was normal. Updated MRI confirmed severe stenosis at C3/4 with cord compression and myelomalacia. The working diagnosis was CSM with funicular referral. A Physical Medicine consultation was requested. **Conclusion:** As illustrated, CSM is a varied clinical condition that may present with or without neck pain, myelopathy, funicular, and radicular features. (This is a conference presentation abstract and not a full work that has been published.)

Sacro Occipital Technique (SOT) and cranial treatment for hemicranium continua: a case report

Charles Blum

Objective: A 55-year-old female patient presented at this office for treatment of hemicranias continua (HC) of 4-year duration necessitating taking indomethacin daily to control her severe headaches. **Clinical Features:** HC is an indomethacin-responsive primary headache disorder which is currently classified under the heading of

trigeminal autonomic cephalalgias. She sought treatment since she was beginning to notice secondary adverse reactions to her chronic indomethacin use and was concerned since nothing else she tried controlled the pain and subsequent disability. She noted that her pain would start in the right side of her neck that traveled up towards her right eye with a sharp stabbing pain. **Intervention and Outcome:** The patient was treated with SOT protocols and cranial/TMJ therapies. At the three month mark in care (6-office visits) the patient reported that she hadn't had a headache in three-weeks and was no longer taking indomethacin. QVAS and Headache Disability Index scores noted significant improvements between initial office visit and at 6-months later. At one and two-year follow up visits her headaches had not returned. **Conclusion:** Further research is needed to determine if a subset of patients with HC might be responsive to SOT and cranial therapeutic interventions. (This is a conference presentation abstract and not a full work that has been published.)

Effect of spinal manipulative therapy on trunk kinematics in patients with chronic non-specific low back pain: a pilot randomized, controlled trial

Bryan Bond, Chris Kinslow, Adam Yoder

Objective: The goal of our study is to improve the understanding of the biomechanical therapeutic mechanisms associated with SMT. **Methods:** This project involved a pilot randomized, blinded clinical trial of 3-week (six treatments sessions over two weeks with a 1-week follow-up visit) spinal manipulative therapy in individuals with chronic non-specific low back pain. We recruited 29 participants and randomly assigned them into either a spinal manipulative therapy (n=14) or sham spinal manipulative therapy (n=15) group. Pre- and post-intervention, we used a motion capture system to quantify the effect of spinal manipulative therapy on trunk angular displacement and velocity. **Results:** Following a 3-week course of spinal manipulative therapy or sham spinal manipulative therapy, we found no between-group differences in trunk range of motion (RoM) within the sagittal and horizontal planes, while changes in angular velocity appeared dependent upon the spinal region. **Conclusions:** Short-term biomechanical effects of repeated spinal manipulative therapy on chronic non-specific low back pain patients may not include significant, uniform alterations in trunk kinematics, including angular displacement and velocity. (This is a conference presentation abstract and not a full work that has been published.)

The effect of a lumbar chiropractic adjustment on static balance: a randomized control trial feasibility study

Nicholas Borovsky, Ed Feinberg, Robert Cooperstein

Objective: The modified Balance Error Scoring System (mBESS) is a test used to evaluate static balance. The primary objective of this single blind RCT feasibility study was to determine if lumbar manipulation impacts static balance. **Methods:** Following mBESS testing, subjects were randomized using a coin toss to a group receiving lumbar spinal manipulation or to a non-adjusted control group. An assessor unaware as to group assignment then repeated mBESS testing on both the adjusted and non-adjusted subjects. Paired sample T testing analyzed within group pre-post changes, and independent sample T test between-group changes. ANCOVA explored the possible impact of baseline differences. **Results:** A convenience sample of 61 asymptomatic students (n=30 controls) was recruited. Both improved their mBESS scores (3.5 errors in the control group, 3.0 errors in the experimental group). Although both within-group changes were statistically significant, there was no statistically significant between-groups change (p=0.66) in mBESS scores – confirmed by ANCOVA. **Conclusion:** This feasibility study will inform a power analysis for the future study. It suggested that repeating the study using lengthier test times would increase the

likelihood of detecting changes between the groups after the application of a lumbar adjustment or lack thereof. (This is a conference presentation abstract and not a full work that has been published.)

Creating faculty learning communities to foster integration in chiropractic education

Kathryn Brown, Christine Major, Chad Lambert, Jenny Nordeen, Kara Burnham

Objective: Chiropractic education can benefit from creation of faculty learning communities which may improve teaching and learning by interdepartmental and interdisciplinary collaboration. The objective of this submission is to demonstrate the creation of a faculty learning community at a chiropractic college. **Methods:** This faculty learning community was constructed to integrate basic science and clinical content to be delivered in the chiropractic curriculum. Faculty with DC, MD, MS, and PhD degrees were selected based on content expertise including neuroscience, evidence-informed practice, documentation, history taking, physical examination and patient management. **Results:** The first project undertaken by this group was constructing an online learning module instructing the student how to establish a diagnosis and treatment plan for a patient with Bell Palsy. Basic science faculty provided the neuroanatomy foundation for this condition. Clinical faculty provided diagnosis and management information necessary for patient care. Faculty taught one another the various aspects of this condition and together created a successful learning module that was well-received by students. **Conclusion:** Faculty collaboration benefits both educators and students. Together these faculty members learned how to create online content to provide an integrated learning experience for chiropractic students. (This is a conference presentation abstract and not a full work that has been published.)

Systematic review of telerehabilitation for musculoskeletal disorders commonly encountered in clinical chiropractic

Frank Bucki, Michael Clay, Hannah Tobczyk, Allison King

Objective: Systematically review the literature regarding the efficacy, cost, access and patient satisfaction of real-time video based telerehabilitation for musculoskeletal disorders for application to clinical chiropractic. **Secondarily,** evaluate the quality of evidence of this review data. **Data Sources and Selection:** Medline database search used keywords: efficacy, cost, access, patient satisfaction, telerehabilitation, musculoskeletal, tele, therapy, exercise, and ergonomics. **Inclusion criteria;** randomized control trials, common musculoskeletal conditions, and live video. Common musculoskeletal conditions defined as those managed in a conventional chiropractic clinic, i.e. back or neck pain. **Exclusion criteria;** face to face comparisons and non-musculoskeletal conditions. Three reviewers captured data regarding assessment, outcome, patient satisfaction, cost, and access using MECIR standards. **Risk of bias and methodological quality** captured using GRADEpro software. **Results:** Seven-hundred-thirty-seven studies were culled, resulting in eleven RCTs, ($n=559$). Sample sizes ranged from 10 to 205 participants. No data on cost-effectiveness or access data noted. Data quality assessment suggested moderate level evidence for tele-rehabilitation efficacy, and low-quality evidence for telerehabilitation patient satisfaction. **Conclusion:** The literature suggests that telerehabilitation may be an effective intervention for musculoskeletal disorders in Chiropractic practice. Evidence on telerehabilitation cost effectiveness or access is currently unavailable and may need investigation. (This is a conference presentation abstract and not a full work that has been published.)

Trends in veteran population access to Veterans Affairs chiropractic services

Ryan Burdick, Kelsey Corcoran, Anthony Lisi

Objective: To analyze veteran access to Veterans Affairs (VA) chiropractic services, provided on-station at VA facilities and/or purchased from community chiropractors. **Methods:** Cross-sectional analyses of administrative data for fiscal years 2014-18 obtained from VA's Corporate Data Warehouse. Variables extracted included number of unique veterans receiving VA chiropractic care on-station and through various community mechanisms, total veteran population of given VA facilities, size of the VA chiropractic workforce (DC

clinical full-time equivalent effort). Excel was used to calculate descriptive statistics. **Results:** Access to VA chiropractic care increased over the five-year period in both on-station and community care. National average on-station access of the population was 1.267% in FY14 and 1.304% in FY18. Community care was 0.261% and 0.484% for the same years. Access at individual facilities varied widely in each fiscal year. Locally, increasing DC clinician workforce was positively associated with increased on-station access. Nationally, no association was found between increasing on-station access and increasing community access. **Conclusion:** The national veteran population access to VA chiropractic care has increased via both on-station and community mechanisms, yet remains variable at local levels. More work is needed to understand and optimize veteran access to VA chiropractic care. (This is a conference presentation abstract and not a full work that has been published.)

Effectiveness of non-pharmacological interventions on sleep characteristics among adults with musculoskeletal pain: a systematic review

Carol Cancelliere, Efrosini Papaconstantinou, Leslie Verville, Gaelan Connell, Jessica Wong, Heather Shearer, Hainan Yu, Anne Taylor-Vaisey

Objective: To evaluate the effectiveness of non-pharmacological interventions on sleep characteristics among adults with musculoskeletal pain. **Data Sources and Selection:** We systematically searched five databases from inception to January 2019. We screened and critically appraised eligible studies using the Scottish Intercollegiate Guidelines Network criteria. We included low risk of bias articles in our synthesis. We included adults with musculoskeletal pain from Type I injuries (i.e., no significant loss of anatomical alignment or no loss of structural integrity). We excluded adults diagnosed with sleep disorders (as classified by the Diagnostic and Statistical Manual-5 (DSM-V)). Our primary outcome was sleep characteristics (e.g., sleep disturbances and patterns). **Results:** We identified 6,758 citations; 28 studies were relevant and critically appraised. Of those, eight randomized controlled trials (RCTs) had a low risk of bias and were included in our synthesis. Studies examined adults with arthritis pain, neck and chronic back pain, fibromyalgia, and carpal tunnel syndrome. Evidence suggests myofascial release therapy, acupuncture, and cognitive behavioral therapy (CBT) may have a positive effect on sleep characteristics. **Conclusion:** The current literature is limited. High-quality RCTs are needed to assess the effectiveness of broader non-pharmacological interventions on sleep characteristics in individuals with MSK pain. (This is a conference presentation abstract and not a full work that has been published.)

Sonographic evaluation of the degree of medial meniscal extrusion during Thessaly test in healthy knees

John Chinsuk Cho, Lauren Tollefson, Kenneth Reckelhoff

Objective: The study's objective is to evaluate the degree of medial meniscal extrusion during different loading phases of the Thessaly test. **Methods:** Convenience sample of 60 healthy knees (35 participants) were examined. Sonogram measured the degree of physiologic extrusion of the medial meniscus deep to the medial collateral ligament by two examiners at six different loading phases: supine, standing, 5° knee-flexion with internal (IR)/external (ER) rotations and 20° knee-flexion with IR/ER. The difference by knee position were compared with ANOVA. Interrater reliability assessment was analyzed using Intraclass correlation coefficient. **Results:** The mean meniscal extrusion were-supine: 2.3 ± 0.5 mm, standing: 2.8 ± 0.8 mm, 5° IR: 2.3 ± 0.9 mm, 5° ER: 2.4 ± 0.7 mm, 20° IR: 1.9 ± 0.8 mm, 20° ER: 2.3 ± 0.7 mm. Significant increase observed from supine to standing ($p < 0.05$) and from 20° IR to 20° ER ($p = 0.015$). Significant decrease observed from standing to 5° IR ($p < 0.05$), 5° ER ($p < 0.05$), 20° IR ($p < 0.05$) and 20° ER ($p < 0.05$). There is no significant change between 5° IR and 5° ER ($p = 1.0$). Interrater reliability of the measurements across the six positions was poor to moderate (0.350-0.57, $p < 0.05$). **Conclusion:** Our study's novel findings showed clear morphological changes during Thessaly test, which implies increase in compressive force across the medial meniscus and a potential mechanism for pain generation during this test. Further testing is needed to address the poor-moderate reliability and confirm findings. (This is a conference presentation abstract and not a full work that has been published.)

Conservative management of neurogenic claudication secondary to congenital lumbar spinal stenosis: a case series

Ngai Chow, Chadwick Chung, Wenda Dai

Objective: To describe the conservative management of two young patients with neurogenic claudication secondary to congenital lumbar spinal stenosis, as well as the importance of patient education, reassurance and goal setting in the management of chronic conditions. **Clinical features:** Two patients presented to chiropractic offices with MRI-confirmed congenital lumbar spinal stenosis and symptoms of neurogenic claudication. **Intervention and outcomes:** A multimodal approach consisting of soft tissue therapy, spinal mobilization/manipulation, core strengthening, and an emphasis on patient education and reassurance was provided. Both patients reported significant improvements in pain and function, as well as a better understanding of their underlying condition and prognosis. **Conclusion:** As primary contact providers, chiropractors have an important role in providing patient education and empowering patients to play an active role in their own health care, which may lead to improvements in self-efficacy, symptoms, health status, behavior change, and health-related quality of life. (This is a conference presentation abstract and not a full work that has been published.)

Exploring a supervised machine learning approach to predicting Veterans Health Administration chiropractic service utilization

Brian Coleman, Samah Jarad, Anthony Lisi, Joseph Goulet, Kelsey Corcoran, Harini Bathulapalli, Cynthia Brandt

Objective: To predict chiropractic service utilization among Veterans receiving Veterans Affairs (VA) chiropractic care using supervised machine learning. **Methods:** We included 19,946 Veterans who entered the Musculoskeletal Diagnosis Cohort from 2003-2013 and received VA chiropractic care within 365 days of cohort entry. Visits over a 365-day period following the index visit was categorized by quartile ("1 visit", "2-3 visits", "4-6 visits", "7 or more visits"). We compared the performance of four multiclass classification algorithms (stochastic gradient descent classifier, multi-layer perceptron neural network, gradient boosted classifier, and linear support vector classifier) in predicting visit quartile using 158 sociodemographic and clinical features. **Results:** The selected algorithms demonstrated poor prediction capabilities. Precision, recall, and F-score, respectively, were 0.37, 0.38, 0.37 for the stochastic gradient descent classifier; 0.34, 0.35, and 0.35 for the multi-layer perceptron neural network; 0.39, 0.41, and 0.39 for the gradient boosted classifier; and 0.38, 0.41, and 0.38 for the linear support vector classifier. **Conclusions:** Using a machine learning approach to predict chiropractic service utilization remains challenging. Model performance metrics suggest limited clinical utility. Future work should examine mechanisms to improve model performance, including collecting potentially relevant data such as facility and clinic access characteristics. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractic students' attitudes toward orthopedic spine surgeons and physical therapists: before and after a clinical rotation

Jesse Cooper, Gary Tam, Katherine Pohlman

Objective: An essential competency in modern chiropractic education is developing a working knowledge and appreciation for interdisciplinary collaboration. This survey describes the attitudes of chiropractic student interns toward orthopedic spine care and physical therapy before and after interprofessional opportunities. **Methods:** A 25-item survey with a 5-point rating scale was used before and after several possible interprofessional educational opportunities, including a lecture series on evidence-based practice and 4-hour rotations with orthopedic spine surgeons and physical therapists. **Results:** Thirty-four (60.7%) of the 56 potential chiropractic students completed a rotation and the post-survey. Twenty survey items (80.0%) had a positive shift in attitudes with an average 13.9% increase. Positive shifts in students' attitudes were most apparent regarding views on the: use of radiographic imaging, use of overly aggressive marketing, use of only surgeries/exercises, openness to collaborative chiropractic care, safety of neck and back pain therapies, and overuse of opioid pain medications prescriptions. **Conclusion:** Students reported greater positive attitudes toward interprofessional collaborative care following an educational intervention. Understanding the viewpoints of chiropractic students toward interdisciplinary management of spine-

related disorders could potentially lead to curricular development that enhances students' understanding of other healthcare practices. (This is a conference presentation abstract and not a full work that has been published.)

A scoping review to map research capacity and trends of doctors of chiropractic at the Veterans Health Administration

Zachary Cupler, Clinton Daniels, Rachel Perrucci, Mario Roybal, Michael Anderson, Michael Barbato, Sheryl Walters

Objective: To summarize and map the research capacity and trends of chiropractors who have been employed by the Veterans Health Administration. **Data Sources and Selection:** We conducted a scoping review with methods described by Arksey and O'Malley and most recently by Tricco. Our search included papers published in English from 2004 to August 2019, using keywords specific to authors identified from a roster of all current and past Veterans Affairs chiropractors. Databases searched were Pubmed, CINAHL, ICL, and The Cochrane Library. Articles were screened independently by two reviewers for inclusion. **Data extraction** consisted of study design, year of publication, authorship, affiliation, journal, and area of study. **Results:** Search rendered 7343 articles, with 498 duplicates, and 239 full-text articles were screened. Thirty-five chiropractors authored 101 publications in 33 different journals. The three most frequent article type were case report (35), descriptive report (21), and retrospective analysis (13). The five most frequent journals were chiropractic profession specific. **Conclusion:** This scoping review provides a mapping of literature published to date by Veterans Affairs chiropractors and identifies potential gaps and opportunities. These findings could be useful in guiding decision making regarding future VHA chiropractic field research agendas. (This is a conference presentation abstract and not a full work that has been published.)

Evaluating the baseline abilities of second year chiropractic students to identify cardiac and lung sounds at the Canadian Memorial Chiropractic College using high fidelity manikin simulators and standardized human patients: a pilot study

Sophia da Silva-Oolup, Dominic Giuliano, David Starmar, Joshua Thomas

Objective: To assess the ability of second year students to identify normal and abnormal findings during cardiac and lung auscultation using high fidelity manikin simulators and standardized patients. A secondary objective was to assess student's perceived competence and confidence in their ability. **Methods:** This was a controlled descriptive pilot study of randomly selected second year students. Participants were asked to perform cardiac and lung auscultation on high-fidelity manikins (2 stations) and standardized human patients (2 stations) with normal and abnormal auscultation sounds. Upon completion of auscultation an outcome measure was administered. **Descriptive statistics** were calculated for all study variables. **Results:** Thirty-two students (23 females and 9 males) were included. Lung auscultation revealed that 15.6% were incorrect on human patients and 6.3% were incorrect on manikin. Cardiac auscultation revealed that 65.5% were incorrect on human patients and 40.6% were incorrect on manikin. **Confidence mean scores** ranged from 34.8 to 60. **Competence mean scores** ranged from 34.8 to 50. **Conclusion:** Results identified that second year students performed poorly on cardiac and lung auscultation. In addition, students reported low perceived confidence and competence in their abilities to perform auscultation and identify sounds. (This is a conference presentation abstract and not a full work that has been published.)

Manipulative and manual therapies in the management of patients with prior lumbar surgery: a systematic review

Clinton Daniels, Zachary Cupler, Jordan Gliedt, Sheryl Walters, Nathan Hinkeldey, Alec Schielke, Derek Golley, Cheryl Hawk

Objective: The purpose of this study was to identify, summarize, and rate scholarly literature that describes manipulative and manual therapies administered to individuals with a history of lumbar surgical intervention. **Methods:** The review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and was registered with PROSPERO. PubMed, Cochrane Database of Systematic Reviews, ICL, CINAHL, Medline and PEDro were searched through July 2019. Articles were screened

independently by at least two reviewers for inclusion. Articles included described practice, utilization, and/or policy related to post surgical intervention with manipulative and/or manual therapies. Data extraction consisted of principal findings, pain and function/disability, patient satisfaction, opioid/medication consumption, and adverse events. SIGN was utilized to appraise study quality. Results: Search yielded 1564 articles, 242 duplicates were removed, 110 full-text articles were screened and 55 met inclusion criteria. Thirty-six were case reports/case series, 4 randomized controlled trials, 3 pilot studies, 5 systematic/scoping/narrative reviews, 1 cohort study, 3 commentaries and 1 clinical practice guideline. Conclusions: The findings of this review may help inform practitioners who utilize manipulative and/or manual therapies regarding levels of evidence for patients with prior lumbar surgery. (This is a conference presentation abstract and not a full work that has been published.)

A systematic review of observational studies on the prevalence and locations of musculoskeletal pain in residential aged care

Katie de Luca

Objective: More than 2.3 million Americans will be housed in residential aged care facilities (RACF's) by 2030. Musculoskeletal conditions (MSK) in older adults cause severe pain and limitation in activities of daily living. This project will report the prevalence and location of MSK pain in RACF residents. **Methods:** Literature was extracted from 4 databases. Inclusion criteria were: a) participants aged >65 years, b) observational studies in RACF's, c) report of prevalence of MSK conditions, d) MSK pain present for at >3 months, and e) in English. Relevant studies were selected via a PRISMA screening process by blinded reviewers and then assessed for quality the Methodological Evaluation of Observational Research. **Results:** Of 842 publications, 7 studies were included. The prevalence of MSK pain in residential aged care was estimated as 60.3%. MSK pain by body location was: upper extremities (25.9%), lower extremities (21.6%), back (17.5%), chest (15%), hips (10.2%), and upper extremities (9.6%), head and neck (8.5%) and abdomen (7.4%). **Conclusions:** MSK pain was very common. The most prevalent locations were the lower extremities, back and chest regions. This information provides an opportunity to further research where chiropractors can work within RACF's to manage MSK conditions. (This is a conference presentation abstract and not a full work that has been published.)

Conditions and management of the older chiropractic patient: a secondary analysis of 6,927 adult-patient encounters from Australian (COAST) and Canadian (O-COAST) studies

Katie de Luca, Sheilah Hogg-Johnson, Martha Funabashi, Silvano Mior, Simon French

Objective: High-income countries such as Australia and Canada are currently experiencing rapid growth of older age groups. For older adults who seek chiropractic care, we aim to describe their demographic characteristics, the conditions they attended for, and the chiropractic treatment they received. **Methods:** A secondary data analysis from two large cross sectional, observational studies conducted in Australia (COAST) and Canada (O-COAST). We used descriptive statistics to describe older adults seeking chiropractic care, accounting for clustering of patients/encounters within chiropractors. **Results:** A total of 6781 chiropractor-adult patient encounters were recorded. Of these, 1067 encounters were for persons >65 years (16%), from 897 patients. The most common diagnoses within older adult-encounters were back symptoms (56%) and neck symptoms (10%). Soft tissue was the most frequently used chiropractic technique for older patients (85 in every 100 encounters). **Conclusions:** From nearly 7,000 chiropractor-adult patient encounters across two countries, one in seven adult patients were >65 years. Of these, nearly 60% presented with back symptoms. Back pain in older adults is condition and future research should explore the course of back pain in older chiropractic patients and the most effective way to manage these patients. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractic management of a patient with low back pain previously managed by chronic opioid use: a case study

Ryan Diana, Morgan Price, Gregory Reed, Michael Cole

Objective: The purpose of this case report is to present chiropractic management of a patient with chronic low back pain previously managed for 10 years on daily high-dose opioids in the forms of Morphine Sulfate and Hydrocodone. **Clinical features:** A 50-year-old Caucasian male presented to the chiropractic clinic with chronic low back pain with non-remitting radiation into the lower extremities. Provocative factors included movement and he lived a sedentary lifestyle. He presented after completely removing himself off daily opioids, which was the sole management of his pain for 10 years prior. **Intervention and outcome:** A trial of conservative chiropractic care of six visits over three months of manual spinal manipulation and flexion-based table mobilization protocol with at-home stretching protocol and a lumbar traction unit. Conservative chiropractic care was able to significantly decrease the patient's pain, while increasing his physical activity level, and overall quality of life, and supported his goals of non-pharmaceutical dependence, aside from Motrin. **Conclusion:** The progress of this case suggests that patients with non-cancerous back pain, a trial of chiropractic care, even after a decade of daily management with opioids, can still be indicated and significantly beneficial to quality of life. (This is a conference presentation abstract and not a full work that has been published.)

Resilience, perceived stress, quality of life and demographic assessments in chiropractic students: a survey based measurement

Michelle Drover, Tracey Littrell, Kira Baca, Dustin Derby

Objective: The objective of this study was to assess the predictability of resilience based on demographics, self-reported quality of life, and perceived stress levels in a chiropractic college. **Methods:** A questionnaire was distributed to the entire student body of a chiropractic program; demographic variables and responses to the self-reported quality of life (WHOQOL-BREF) and Perceived Stress Scale (PSS) were gathered. Hierarchical multiple regression analysis was used to calculate for significant relationships. **Results:** Of 873 potential student participants, 221 completed the survey. Resilience was significantly associated with the physical health and psychological health as reported by the WHO Quality of Life survey. When compared to resilience, PSS, WHOQOL domains 1-3, and Gender, were of highest statistical significance. This model revealed that males were statistically more resilience than females in an individual analysis. **Conclusions:** Self-reported factors of perceived stress, quality of life, and gender may predict the resilience level of students in intensive graduate level programs who may be susceptible to experiencing increased levels of psychological and physical stress, academic burnout, and fatigue. These findings may permit academic institutions to identify students at highest risk and to employ interventions to prevent program withdrawal. (This is a conference presentation abstract and not a full work that has been published.)

Experiential learning: ten years of reflection

Scott Dunham, David Starmer

Objective: The shift towards Competency-Based Education (CBE) has resulted in significant changes in delivery methods for chiropractic education. Educational literature reinforces the efficacy of experiential learning with development of student confidence and competence. The purpose of this study is to investigate the utilization of experiential learning during the 2008-2009 academic year and the 2018-2019 academic year at a chiropractic institution. **Methods:** Academic course calendars and syllabi were gathered to identify instances, purposes and the nature of experiential learning for comparison and discussion. **Results:** A significant increase in experiential learning and the variety of teaching and assessment strategies was observed. Artifacts of change include both increased hours for experiential learning opportunities (more labs, less lectures), change in infrastructure within the institution (room size, addition of a simulation lab), new formative methods of assessment (HPDs, clinical simulations), and increasingly complex high-stakes summative assessments. (OSCE) **Conclusion:** Experiential learning is more prominent and situated earlier on in a student's education than ten years ago. The impact of this change on student confidence and competence within a chiropractic context is undetermined and should be a focus of future studies. (This is a conference presentation abstract and not a full work that has been published.)

Back and chest pain predict bronchitis and emphysema in women: a potential role for chiropractors in chronic respiratory disease management

Roger Engel, Katie De Luca, Petra Graham, Masoumeh Kaboli Farshchi, Subramanyam Vemulpad, Julie Byles

Objective: To identify early predictors of bronchitis and emphysema in women 45 to 50 years of age. **Methods:** Data from the Australian Longitudinal Study on Women's Health (ALSWH) was analyzed to identify baseline (survey 1: year 1996) predictors of bronchitis and emphysema 20 years later (at survey 8: year 2016). Candidate predictors included back pain and chest pain. **Results:** 11,143 women without bronchitis/emphysema enrolled in the baseline cohort of ALSWH with 7,038 completing Survey 8. Results showed a dose-response relationship for back pain implying those with greater back pain earlier in life were more likely to be diagnosed with bronchitis or emphysema later in life compared to those with no back pain ("Sometimes": Odds ratio (OR):1.70, 95%CI:1.26-2.33, $p=0.001$; "Often": OR:1.96, 95%CI:1.40-2.76, $p<0.001$). Similar results were seen for chest pain. **Conclusion:** Back and chest pain in women aged 45-50 years are statistically significant predictors of bronchitis and emphysema later in life. The presence of dose-response relationships suggests that earlier management of these symptoms may improve prognosis. As health professionals who treat patients with back and chest pain, chiropractors are therefore well-placed to play a role in the early detection and management of chronic respiratory disease. (This is a conference presentation abstract and not a full work that has been published.)

Hypothenar Hammer Syndrome: a rare occupational injury

Erika Evans, Norman Kettner, Stacey Cornelson

Objective: This case describes the presentation and evaluation of Hypothenar Hammer Syndrome (HHS) in a chiropractic teaching clinic. **Clinic Features:** A 53-year-old male manual laborer presented with right hypothenar pain and swelling following an acute hand injury. Radiography excluded fracture and dislocation. Diagnostic ultrasound (US) revealed a $6.6 \times 6.4 \times 6.2$ thrombosis in the palmar arch of the ulnar artery. Ecstasia, tortuosity, and atherosclerosis were also appreciated in the ulnar artery. **Intervention and Outcome:** The patient was referred to an emergency care facility for evaluation and treatment. He was lost to follow-up. **Conclusion:** Although a rare occupational injury, HHS carries a risk of amputation due to digital ischemia. This case describes the value of US in the diagnosis of vascular trauma associated with musculoskeletal injury. Prompt referral to an emergency care facility for treatment is imperative. (This is a conference presentation abstract and not a full work that has been published.)

Exploring patient and clinician experiences and beliefs about benign adverse responses to spinal manipulation in chiropractic teaching clinics: a cross-sectional survey

Martha Funabashi, Katherine Pohlman, Alex Lee, Tony Tibbles, Silvano Mior, Greg Kawchuk

Objective: We explored the experiences and beliefs of patients and clinicians regarding benign adverse events (bAEs) following spinal manipulation therapy (SMT). **Methods:** Clinicians and patients from two chiropractic teaching clinics were invited to respond to an online survey exploring their experiences and beliefs about bAEs following SMT. Responses were analyzed using descriptive statistics. **Results:** A total of 39 clinicians and 203 patients completed the survey. Most clinicians (97%) believed bAEs occur, and 82% reported their own patients had experienced bAEs. For patients, 55% reported experiencing a bAE following SMT, with pain/soreness, headache and stiffness being the most common symptoms. Most clinicians and patients did not believe bAEs were related to specific SMT procedures (77% and 58%, respectively) or body regions (87% and 56% respectively). However, bAEs were perceived to occur more often with rotary SMT and in the neck region. **Conclusions:** For the first time, clinicians' and patients' perceptions of bAEs were investigated. While both groups seem to be aware that bAEs occur, they perceived no consistent factors that may be related to these occurrences. Understanding the experiences and beliefs about bAEs following SMT is an important step towards developing strategies to enhance

patient safety. (This is a conference presentation abstract and not a full work that has been published.)

Strategies to mitigate benign adverse events for spinal manipulation: exploring clinicians and patients perceptions

Martha Funabashi, Katherine Pohlman, Alex Lee, Anthony Tibbles, Silvano Mior, Greg Kawchuk

Objective: Reports suggest about 50% of patients experience benign Adverse Events (bAEs) following Spinal Manipulation Therapy (SMT). Mitigating against bAEs is an important strategy in patient safety and quality care. Our study aimed to compare clinicians' and patients' perceptions regarding strategies to mitigate bAEs following SMT. **Methods:** We surveyed clinicians ($n=39$) and patients ($n=203$) from two chiropractic teaching clinics. Demographic characteristics and perceptions regarding strategies for mitigating bAEs following SMT were descriptively analyzed. **Results:** While most clinicians (88%) reported trying a mitigation strategy with their patients, most patients (56%) perceived their clinicians had not. Clinicians perceived that patient education either before or after treatment is most likely to mitigate bAEs after SMT, followed by soft tissue therapy and/or icing after SMT. Patients perceived stretching either before or after SMT is the strategy most likely to mitigate bAEs, followed by education and/or massage after SMT. **Conclusions:** This is the first investigation of clinicians' and patients' perceptions of strategies to mitigate bAEs. We found they perceived common possible mitigation options. Future studies will focus on outcomes using these strategies to mitigate bAEs reported after SMT, contributing to improving patient safety and quality of care. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractic management of trismus following inferior alveolar dental nerve block: a case study

Rachel Gilmore, Mark Pfefer, Robert Moore

Objective: To describe a case of medial pterygoid trismus (myospasm) following dental procedure successfully treated with chiropractic care. **Clinical Features:** A 51 year-old male developed medial pterygoid trismus following an inferior alveolar nerve block as part of a routine dental restoration. Symptoms included pronounced facial pain, unilateral headache, and significantly restricted mouth opening, and moderate facial swelling but no fever or lymphadenopathy. The patient used moist heat and visited a physical therapist weekly for 6 weeks of treatment including ultrasound and stretching using bite blocks. There was virtually no improvement at 6 weeks with mouth opening limited to 4 mm. **Intervention and Outcome:** The patient was treated by a chiropractor with high velocity, low amplitude manipulation of the occiput-atlas region and mobilization and high velocity, low amplitude manipulation of the affected temporomandibular joint (TMJ). The patient had a significant improvement in pain and active jaw range of motion after two sessions. Complete resolution occurred after six visits, at 12 weeks after initial dental visit. **Conclusion:** Dentists should consider referral for chiropractic care in patients with recalcitrant TMJ dysfunction following dental procedures. Additional research is needed to develop best practices approaches. (This is a conference presentation abstract and not a full work that has been published.)

Development of rhabdomyolysis associated with treatment with a class 4 laser: a case study and review

Rachel Gilmore, Stuart McIntosh, Mark Pfefer, Jaden Butcher

Introduction: Photobiomodulation (PBM) therapy describes the application of light to stimulate endogenous chromophores with the goal of promoting tissue healing. The aim of this project is to briefly review contraindications and describe potential adverse events of PBM therapy. **Methods:** PBM therapy was used to treat a patient with an acute grade 2 hamstring strain. Therapy began 48 hours following injury. The authors reviewed published literature related to contraindications and adverse events associated with PBM for musculoskeletal dysfunction. In this IRB approved case report, 18 watt class 4 laser therapy was applied to the posterior thigh. **Results:** The patient, who was on a blood thinner, reported significant improvement in pain and disability within four days following treatment, but severe regional bruising developed. On day four, the patient observed dark urine and was referred to the emergency department. Creatine kinase

(CK) enzyme was elevated to over 1000 indicating rhabdomyolysis. Kidney function was normal. Intravenous fluids were given and levels of CK enzyme rapidly declined. Laser therapy was discontinued and the patient's pain continued to resolve quickly. Conclusion: These findings suggest that photobiomodulation should be used cautiously in patients taking blood thinners or with problems involving acute bleeding. (This is a conference presentation abstract and not a full work that has been published.)

Magnesium supplementation for migraine prevention: an umbrella review

Rachel Gilmore, Mark Pfefer, Connor Buckles, Jaden Butcher

Introduction: Migraine is a prevalent disease with substantial socioeconomic burden. Magnesium is an intracellular element that is involved in numerous cellular mechanisms. Deficiency of magnesium and other nutrients is associated with migraine and may play a role in prevention of migraine. **Methods:** A search was conducted of medical literature using MEDLINE, CINAHL, and Cochrane central register. All eligible review articles were reviewed then scored using the methodology for Joanna Briggs Institute (JBI) Umbrella Reviews. Two independent reviewers performed the scoring of articles. **Results:** Thirty-two review articles were considered eligible for this JBI Umbrella review. Overall the quality and size of the reviewed studies were limited. Supplementation with magnesium for migraine prophylaxis is promising but additional research is needed, especially with regard to prevention of pediatric migraine. **Conclusion:** Future studies are warranted in order to establish evidence upon which to define the role for magnesium for prophylaxis of migraine. Research is also needed to determine the best available form of magnesium with lesser gut side-effects and adequate bioavailability. (This is a conference presentation abstract and not a full work that has been published.)

Toward the development of a standardized chiropractic technique program

Brian Gleberzon, Charles Blum, Christopher Good, Christopher Roecker, Robert Cooperstein

Objective: We report on the results of 4-facilitated workshops aimed at developing a standardized technique curriculum for chiropractic college teaching programs during ACC-RAC research conferences in 2014, 2016, 2018 and 2019. **Methods:** Workshop participants were tasked with developing recommendations for diagnostic/therapeutic procedures to be taught at all chiropractic technique programs. **Results:** Diagnostic Procedures - In general, a strong majority of participants agreed that chiropractic technique programs should be standardized to include postural assessment, gait-analysis, palpation (static, motion, and joint play/springing), global range-of-motion, and the evidenced orthopedic tests. (This is a conference presentation abstract and not a full work that has been published.)

Perceptions of the present and future role of chiropractic qualifying examinations: a qualitative analysis of an international stakeholder survey

Bart Green, Claire Johnson, Richard Brown, Douglas Lawson, Charmaine Korporaal, Ricardo Fujikawa, Eric Russell

Objective: To explore the views of international chiropractic stakeholders about the use, potential barriers, and facilitators of Chiropractic Qualifying Examinations (CQE), which are exams that chiropractors must pass to be eligible to practice in a jurisdiction. **Methods:** The survey included 6 open-ended questions about benefits, myths, barriers, solutions, future, and opinions related to CQEs. The survey was distributed via SurveyMonkey to 234 stakeholders including academic leaders, practitioners, association officers, and students. Comments were extracted and concepts categorized. **Results:** The response rate was 56.4% (132/234 people, representing 43 countries) and 775 comments were extracted. Perceived benefits included that CQEs certify a standard of knowledge and competency and are part of the professionalization of chiropractic. Myths included that CQEs are able to screen for future quality of care or ethical practices. Concerns included a lack of standardization between jurisdictions and uncertainty about cost/value and what CQEs measure. Solutions included suggestions to standardize exams across jurisdictions and focus more on competencies. **Conclusion:** International stakeholders identified important concepts regarding CQEs.

These findings may improve stakeholder understanding of CQEs, stimulate further collaboration between programs, and facilitate jurisdictions to aid one another to improve these chiropractic exams throughout the world. (This is a conference presentation abstract and not a full work that has been published.)

The National Chiropractic Antitrust Committee preparing the path for chiropractic integration: a historical review

Bart Green, Claire Johnson

Objective: To provide a historical account of the National Chiropractic Antitrust Committee (NCAC), an organization that provided support for a lawsuit crucial to the integration of chiropractic in US healthcare. Up to this time, the history of NCAC has not been published. **Methods:** For this historical research, we reviewed original journal articles, court documents, texts, and primary historical documents. Information was synthesized and a chronology of events was documented. **Results:** The NCAC supported legal steps against actions of boycotts, restraint of trade, or any acts deemed unlawful against the chiropractic profession. NCAC provided the majority of funding efforts to support the Wilk et al v. American Medical Association et al lawsuit, which lasted from 1976 to 1992. Because of Judge Getzendanner's decision for an injunction, the AMA clarified that it permitted medical doctors to refer patients to doctors of chiropractic, thus preparing the path for chiropractic integration into mainstream healthcare. After the trial was won, NCAC managed the distribution of reparations to charity and research. **Conclusion:** Through the dedication of the NCAC staff and goodwill of the NCAC officers, the lawsuit was won, which resulted in the initial integration of chiropractic services in the US. (This is a conference presentation abstract and not a full work that has been published.)

Non-cardiac chest pain: a case for multidisciplinary collaboration with the emergency department

Cael Halfman, Nathan Hinkeldey, Heather Meeks

Objective: To present a case of multidisciplinary collaboration between the emergency department (ED) and a hospital-based chiropractic clinic in management of non-cardiac chest pain. **Clinical Features:** A 57-year-old male Veteran presented to a Veteran Affairs chiropractic clinic following a five-day ED admission with chief complaint of severe chest pain. Pain of cardiac origin was ruled out and the ED attending physician requested a same-day chiropractic consult. Physical examination demonstrated shallow breaths and forward-favoring antalgic posture. Orthopedic examinations could not be properly performed due to pain exacerbation with all movements. Allodynia was present globally over the chest and thorax, and light touch amplified the patient's pain. **Intervention and Outcome:** Treatment included diaphragmatic breathing, spinal manipulation of the thoracic spine, auricular acupuncture, and home exercises. The PROMIS Pain Interference 6B and subjective report were used to assess progress. Three visits took place over seven days and patient returned to work after visit one. He reported full resolution of subjective complaints after visits two. PROMIS Pain Interference 6B score improved from 30 to 6. **Conclusion:** Collaboration between the emergency department and a hospital-based chiropractic clinic resulted in full resolution of non-cardiac chest pain in this case. (This is a conference presentation abstract and not a full work that has been published.)

Baseball injury resulting in type III Salter-Harris Fracture of the first proximal phalangeal base

Jake Halverson, Stacey Cornelson, Quintin Murray, Norman Kettner

Objective: Hand fractures are common in pediatric patients. Those involving the proximal phalanges result from forceful hyperabduction injuries. The purpose of this report is to demonstrate clinical, radiographic, and diagnostic ultrasound findings in a patient who sustained a type III Salter-Harris fracture of the first proximal phalanx. **Clinical presentation:** A 14-year-old male baseball player presented with a two-day history of proximal thumb pain; this began following a forceful hyperabduction injury while sliding into base. Thenar swelling was evident on clinical examination, and both active and passive thumb motions were painful in all directions. Radiography revealed a type III Salter-Harris fracture of the first proximal phalangeal base. Additionally, diagnostic ultrasonography demon-

strated a high-grade ulnar collateral ligament sprain. No further displacement of the fracture fragment was visualized with radial deviation stress. Intervention and Outcome: The patient was referred for a pediatric hand orthopedic consultation. Conclusion: Optimal treatments for pediatric hand fractures vary. Fracture characterization with radiography is essential in determining the proper management. Ultrasonography and MRI may be useful in the evaluation of concomitant soft tissue injuries. (This is a conference presentation abstract and not a full work that has been published.)

SOT cranial therapy with light therapy for the treatment of trochlear nerve palsy and right eye concomitant deviation

Rachel Hamel

Objective: A 55-year-old male patient presented to this office for care with significant vision dysfunctions (e.g., inverting numbers, reading from the wrong line, and constant squinting). Clinical Features: The patient reported childhood head trauma leading to a 48-year history of left-eye dominance, inability to accurately see information, inversion of numbers and reading from the wrong line, sense of imbalance, decreased mood, eye strain, neck and bilateral shoulder tension. Intervention/Outcome: Examination revealed TMJ and related muscle dysfunctions with multiple cranial nerve issues predominately on the right side. A vision examination noted right eye pointing upward about 10-prism diopters, with a concomitant deviation and cycle-rotary strabismus. Treatment consisted of six-chiropractic treatments (over 5-months) incorporating sacro occipital technique (SOT) cranial, infrared and red-light therapy and craniofacial adjustments. Following care the patient reported significant reduction in all symptoms: able to see clearly with both eyes, increased work productivity, increased balance, and profound improved quality of life. Patient had not started vision therapy, so post treatment vision scores were not documented. Conclusion: Greater study is needed to identify if other patients presenting with vision problems and concurrent head traumas might benefit from SOT and cranial/craniofacial adjusting interventions. (This is a conference presentation abstract and not a full work that has been published.)

An interprofessional education activity on "roles and responsibilities"

Cheryl Hawk, John Mrozek, Renee Bogschutz

Objective: Interprofessional Practice and Education (IPE) is a discipline with specific competency domains. The purpose of this project was to develop a classroom team project addressing the "roles and responsibilities" IPE domain. Methods: We developed an active learning team project to integrate the Council on Chiropractic Education meta-competency concerning roles and responsibilities into a course with the student learning outcome of "explain their own roles and responsibilities and those of other care providers and how the team works together to provide care." Students created a clinical scenario in which at least 4 professions, including chiropractic, developed a patient-centered management plan. They also summarized and referenced the professions' roles and responsibilities. We evaluated the activity using a qualitative thematic analysis. Results: Fifty students developed scenarios involving a total of 28 professions, with primary care medical physicians, orthopedists, physical therapists and massage therapists most frequent. Open-ended responses to what they had learned fell under the themes of integration (52%), patient-centeredness (16%), learning about chiropractic's role (14%) and interprofessional communication (6%). Students found it worthwhile, with collaboration and future career learning the most common (71%). Conclusion: This is a feasible and useful team activity to promote IPE. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractic graduates' perceptions of University Health Clinic (UHC) versus Community Clinic (CC) educational experience

Navine Haworth, Louise Horstmanhof, Keri Moore

Objective: Compare perceptions of preparedness for transition to practice, professional identity, and inter-professional clinical practice after one year of practice. Methods: Repeated measures study with same Chiropractic participants from two Australian universities after one year in practice. Results – Phase Two UHC prepared transition to practice through scaffolded supervision with reasonably healthy patients, and longer consultation times than in practice. CCs prepared

readiness in terms of efficiency and experience with complex patients but not for continuity of care or interprofessional engagement. CCs provided clients from diverse socio economic and cultural backgrounds. These new graduates still lacked understanding of clinical and professional competencies, experiencing interprofessional activities as formal and informal reciprocal referrals. They felt challenged in their communication and business aspects (Enhanced Primary Care use) of the profession. They recommended inclusion of networking and learning within the professional environment for students. Discussion/Conclusion: UHC and CCs prepare for transition to practice in different ways. Most reported lacking understanding of industry standards and business aspects of practice. Curriculum development of chiropractic competencies related to professionalism and inter-professional clinical practice is indicated. (This is a conference presentation abstract and not a full work that has been published.)

Changing perceptions on Paper-Based Testing (PBT) vs. Computer-Based Testing (CBT)

Xiaohua He

Objectives: Students' performances are usually measured by test results. It's unknown whether the test format would affect the outcomes of tests. The purpose of this study was to get students' perception on testing formats and to analyze the impact of test formats on real test results. Methods: Participants (n=178) completed two surveys about their perception on CBT/PBT at the beginning and the end of the academic term. They were also randomly assigned to take 4 tests (2 PBT and 2 CBT). The data were statistically analyzed. Results: Eighty-seven percent of the participants surveyed said they preferred PBT in the first survey. Only less than 3% of them expressed no preference. When comparing test results, there was no statistical difference of outcomes between two formats. In the second survey, 51% of Participants expressed no preference, and also suggested more confident on CBT. Conclusions: The shifting of students' perception from PBT to CBT after taking exams suggested that testing format had less impact on test results than perceived originally. The CBT-phobic perception was mostly psychological. Faculty should develop the strategy to help students to cope with their fear perception on CBT and improve their skills on CBT. (This is a conference presentation abstract and not a full work that has been published.)

Treatment of lumbar radiculopathy using McKenzie Method Progression in a patient with multiple comorbidities

Nicholas Hedges, Devon Ackroyd

Objective: To demonstrate the effectiveness of McKenzie method in improving lumbar radiculopathy symptoms in a patient with multiple comorbidities. Clinical features: Patient with eight-year history of left-sided lumbar radiculopathy complicated by a C5/6 cervical fusion, and a five-year history of right-sided plantar fascia pain presented ambulating with single-point cane. Relevant MRI findings include L3/4 and L4/5 foraminal disc protrusions with moderate facet arthrosis at L3/4. Initial Oswestry Low Back Disability score was 58%. Intervention and Outcome: A total of six treatment visits were completed over a period of 9 weeks. Therapy consisted primarily of McKenzie method progression protocol with ischemic compression applied in the later treatments. In earlier treatments, the patient could only tolerate passive extension while prone. As the patient's strength and tolerance increased, active prone extension exercises were incorporated. After six treatments, a follow-up Oswestry Low Back Disability Index was administered revealing a 42% reduction in disability (from 58% to 16%). Furthermore, a 2-point decrease in plantar fascia pain assessed via numeric pain scale and was able to ambulate without the use of a cane for support. Conclusion: McKenzie Method progression proved successful in improving lumbar radiculopathy in patient with multiple complicating factors. (This is a conference presentation abstract and not a full work that has been published.)

Onsite chiropractic services: effects on workers' compensation cost across three sites

Chad Henriksen

Objective: This study analyzes the effectiveness of integrating chiropractic services within an employer-funded, onsite chiropractic

clinic for reducing the cost of workplace injuries. Methods: A 24-month contract was established with a manufacturing company to provide onsite chiropractic services including patient care, health coaching, and ergonomic recommendations at 3 of their 18 facilities. Services were available 8 hours/week and employees engaged voluntarily. Year-over-year workers' compensation claims were reviewed assessing the average cost/injury and the total cost of injuries. In addition, workers' compensation claim costs were compared to facilities without onsite care. Results: 437 of 633 employees received chiropractic services. The cost/workers' compensation injury decreased 65%; direct workers' compensation cost decreased 69.7%. The program yielded a savings of \$964,755 and a return-on-investment of \$2.54. For facilities with onsite chiropractic services, workers' compensation per claim cost were 47% lower in year-one and 58% lower in year-two than facilities without onsite chiropractic services. Conclusion: Results show a reduction in cost/injury and total workers' compensation cost. This suggests that employer-funded onsite chiropractic services may positively impact the reduction of workplace injuries and associated costs. Further studies are needed to test the durability of these results and in other settings. (This is a conference presentation abstract and not a full work that has been published.)

Examining the validity of pre-chiropractic and chiropractic grade point averages for predicting NBCE part I exam scores

Igor Himelfarb, Bruce Shotts, Andrew Gow

Objectives: The main objective of this study was to evaluate the validity of GPA for predicting the Part I scores. Methods: Data were collected during the January 2019 CBT administration of NBCE's Part I exam. The sample size was $n = 814$ of test takers from 18 domestic and 4 international chiropractic educational institutions. Two regression models were developed and tested to compare Part I scores with reported demographic variables. Residuals from both models were then disaggregated by institution. Results: Chiropractic GPA revealed a positive, statistically significant correlation with Gender, meaning that female chiropractic students were more likely to have a higher GPA when compared to their male counterparts. White examinees were more likely to have higher pre-chiropractic GPA and chiropractic GPA when compared to "Other" ethnicity status. Both GPA variables were found to be significant predictors of the Part I scores. A different perspective was obtained when residuals (observed minus predicted) were collected and split by chiropractic colleges where examinees obtained their training. Conclusions: The results provide a first glance at the connection between the requirements for admission to chiropractic training and the ability to pass the exams required to enter the profession. (This is a conference presentation abstract and not a full work that has been published.)

Pleomorphic undifferentiated sarcoma of the anterior thigh: a case report

Ashley Hook, Sophia da Silva-Oolup

Objective: This case presents a patient with a Pleomorphic Undifferentiated Sarcoma (PUS) of the anterior thigh. Clinical Features: An 81-year-old female presented to a chiropractor with a four-day history of left leg pain and swelling. There was no history of previous trauma. Observation revealed a large mass over the anterior compartment of the left thigh with engorged small vessels. There was redness and swelling of the left lower extremity. Superficial palpation revealed increased temperature over the left anterior thigh. Intervention and Outcome: The patient was referred to the Emergency Department for examination, advanced imaging and management. A grade two pleomorphic undifferentiated sarcoma was confirmed via biopsy. The patient was referred to an Orthopedic Oncologist and underwent supplementary neoadjuvant radiotherapy, surgical resection of the tumor with intramedullary nailing of the left femur. Conclusion: Most PUS are high grade and aggressive in their biological behavior. These tumors should be considered in the diagnosis of large soft tissue masses in the extremity with a history of trivial or no trauma. Patients often consult chiropractors for musculoskeletal conditions of varying severity. This case serves to highlight the importance of increased clinical acumen to ensure appropriate patient referral and management. (This is a conference presentation abstract and not a full work that has been published.)

On the feasibility of using outpatient clinic data archived in an Electronic Health Records (EHR) system for research

Ronald Hosek, Stephanie Sullivan

Objectives: To analyze the storage methodology of archived outpatient EHR records generated in a chiropractic teaching clinic and to develop techniques for transforming them into a useful database form. Methods: A randomized list of 100 patient numbers (excluding college employees and students) was utilized to direct the sampling of archived EHR records to determine their scope, structure and possible usability in the design of a system for extracting meaningful data. Results: Archived data were found to be non-relational, stored by patient by categories as PDF files—one for each patient interaction—averaging approximately 35 files per patient plus individual SOAP note files. To extract the files from the archive for processing, it was necessary to "print" them individually as PDFs to an external working directory. Once extracted, some categories of PDF files could be read and parsed which meant that they were amenable to machine processing. However, not all categories were compatible with such analysis. Outcome files, in particular, represented a great challenge requiring special software. Conclusions: cursory examination of extracted files indicated that data of interest exists. To improve feasibility, more sophisticated software and a batch processing methodology will have to be developed. (This is a conference presentation abstract and not a full work that has been published.)

Development and validation of a new treadmill walking test to discriminate between neurogenic, vascular and low back pain related claudication

Mariève Houle, Julie O'Shaughnessy, Charles Tétreau, Claude-Édouard Châtillon, Martin Descarreaux

Objective: Develop and Validate a treadmill walking test to discriminate between neurogenic, vascular and low back pain related claudication. Method: Forty-six patients including 20 with lumbar spinal stenosis (LSS), 12 with peripheral artery disease (PAD) and 14 with nonspecific low back pain (LBP) completed two treadmills walking tasks: upright and inclined walking posture for a maximum of 5 minutes. Each task was followed by a rest period (5 minutes in sitting position). A 10% increase in time between upright and inclined tasks for the Walking time to first symptoms variable was established to assess the test performance using receiver operating characteristic curve (ROC). Results: Respectively, 100% and 93% of participants with LBP completed the upright and inclined tests without leg pain. ROC curve analysis showed a sensitivity of 0.65 and a specificity of 0.667 for LSS and PAD group results and a sensitivity of 0.65 and a specificity of 0.857 for LSS and LBP group results. The area under the ROC curves were respectively 0.658 and 0.754. Conclusion: The test was able to discriminate neurogenic from vascular or LBP related claudication. Coexisting vascular and neurogenic claudication may have limited the treadmill walking test performance. (This is a conference presentation abstract and not a full work that has been published.)

The 1-year prevalence of occupational musculoskeletal disorders in practicing chiropractors in Ontario

Samuel Howarth, Anser Abbas, Sheilah Hogg-Johnson, Silvano Mior

Objective: To determine the 1-year prevalence of occupationally-related MusculoSkeletal Disorders (MSDs), their bodily distribution and practice-related changes in practicing chiropractors in the province of Ontario. Methods: This study was a cross-sectional survey of chiropractors who were members of the Ontario Chiropractic Association. A three-part online survey was developed to ask chiropractors about specific details of MSDs they experienced in the past year and any practice-related changes they made as a result of the MSDs. Results: From the 432 responses (11.8% response rate), 59.1% reported experiencing an occupationally-related MSD in the past year. MSDs were most commonly reported for the lower back (38.3%), wrists/hands (38.1%) and neck (37.4%). Positioning/performing manipulation was the most common occupational activity for MSD of the upper extremity (53.1%) and lower back (34.8%). Overall, 62.9% of respondents that reported an MSD also reported changing their technique or technique parameters due to their MSD(s). Conclusion: One-year prevalence of occupational MSDs

from this study are comparable to career prevalence reported by previous surveys of North American chiropractors. Chiropractors changing technique or technique parameters due to their MSDs provides direction for future research to reduce exposure to occupational MSD risk factors. (This is a conference presentation abstract and not a full work that has been published.)

Building education research capacity: a qualitative analysis to inform the chiropractic education research agenda

Claire Johnson, Bart Green, John Mrozek, Michael Wiles

Objective: To identify barriers and solutions to building education research capacity in the chiropractic profession. **Methods:** Participants attending a workshop at ACCRAC 2019 completed worksheets on education research domains: 1) developing collaborative relationships among chiropractic programs; 2) increasing skills/knowledge; 3) improving culture and value; 4) developing resources; and 5) improving funding. This study received prior IRB exemption. Written comments were extracted and concepts were categorized. **Results:** The 33 participants, representing faculty, administration, students, researchers, and practitioners, provided 85 comments on building education research capacity. Themes included: increase inter- and intra-professional relationships; develop a communications infrastructure; establish an education research agenda; establish an education research skills building program; develop a culture of interest, support, and reward; and identify resources needed. **Overarching solution domains included:** 1) training faculty (funding for training, degrees in education); 2) giving faculty support (funding, resources, time); and 3) providing faculty with the environment to do education research (academic leadership support, library resources). Contributors volunteered to participate in future project proposals to build research capacity. **Conclusion:** Potential solutions to develop education research capacity were identified by a diverse group of constituents. The findings of this study aim to improve chiropractic education research capacity. (This is a conference presentation abstract and not a full work that has been published.)

Women's health and chiropractic: a publication analysis and scoping review to identify research gaps

Claire Johnson, Bart Green, Katherine Pohlman, Katie de Luca, Kristina Petrocco-Napuli

Objective: The World Health Organization includes women's health as a high priority. Therefore the purpose of this study was to analyze research in chiropractic and identify research gaps in women's health. **Methods:** We performed a scoping review of women's health publications using PubMed from inception through August 2019. Search terms included chiropractic and 44 women's health terms without language or study design exclusions. **Results:** We found 438 citations for chiropractic, whereas the same search for other professions/modalities was higher: massage 1561, acupuncture 2,266, physical therapy 28,343, and osteopathy 54,868. From the 438 found, 167 publications were included: 92 studies (36 cross-sectional, 20 review, 14 clinical trials, 11 cohort, 8 validity/reliability, 3 other) and 75 case reports. Study topics were: pain (39), public health/prevention (19), women-specific conditions (17), and others (17). Publications that reported female infant/children/adolescents populations were: 0/91 studies and 19/75 case reports. Of 27 journals, 4 chiropractic journals published the majority (83.2%). **Conclusion:** There were few high-level studies. Most studies were pain-related but many important women's health topics have yet to be explored in depth. Compared to other professions, chiropractic research is underrepresented. More opportunities are needed for chiropractic research in women's health. (This is a conference presentation abstract and not a full work that has been published.)

The impact of retrieval practice stakes on knowledge retention

Ashlee Kates-Ascioti, Chad Warshel, Suellen Christopoulos-Nutting, Amy Simolo

Objective: This study aims to evaluate the effect the stakes of retrieval practices have on knowledge retention. **Methods:** Students enrolled in a United States' chiropractic college were studied based on type of retrieval practice completed, low- or high-stakes. A correlation between retrieval practice performance and examination performance was made using Spearman's rho correlation coefficients. Comparison

of correlations was made using the 95th confidence intervals. A Full Factorial ANOVA model with repeated measures was used to compare academic performance between the low- and high-stakes groups. A one-way MANOVA was used to determine the overall difference in academic performance between the groups. **Results:** The average quiz scores were higher at four of five comparisons for the high-stakes group. Moderate positive correlations were present between the retrieval practice scores and examination scores in both groups at four of the five comparisons. There was no difference between the groups for the strength of the correlations. **Conclusion:** A positive correlation is present in both groups for retrieval practice and examination performance. The academic performance on retrieval practices are dependent on the stakes of the retrieval practice. Greater knowledge retention is present with high-stakes retrieval practices on cumulative course examination. (This is a conference presentation abstract and not a full work that has been published.)

Brain responses to respiratory-gated auricular vagal nerve stimulation frequency: neuromodulation of autonomic nuclei

Norman Kettner, Roberta Sclocco, Ronald Garcia, Harrison Fisher, Jessica Stowell, Kylie Isenburg, Riccardo Barbieri, Vitaly Napadow

Introduction: Transcutaneous vagus nerve stimulation (tVNS) targeting the auricular branch has been applied to patients with chronic pain. Enhancement of the brainstem nucleus tractus solitarius (NTS) response was demonstrated by auricular nerve stimulation gated to the respiratory phase of expiration (RAVENS). Other parameters including stimulation frequency and pulse width require optimization, the objective of this research. **Methods:** Functional MRI (fMRI) 3T data from 30 healthy subjects from 3T whole brain multiband pulse sequences with cardiac and respiratory signals. Exhalation gated RAVENS was directed to the left ear cymbae conchae 300us for 1 second producing strong non-painful stimulation. Four scans using 2, 10, 25, 100 Hz were employed. Sham stimulation was gated to respiration without current. Image preprocessing and brainstem focused analysis yielding a hemodynamic response function was entered into a GLM with second level analysis providing group maps of RAVENS response and sham. **Results:** The ipsilateral NTS was stronger following RAVENS at 100 HZ compared to sham. The locus coeruleus and serotonergic nuclei were engaged. Insular and frontal cortical involvement were increased at 2 and 100Hz compared to sham. **Conclusion:** Auricular cutaneous vagal nerve stimulation with respiratory gating has optimal frequencies for autonomic neuromodulation. (This is a conference presentation abstract and not a full work that has been published.)

Assessing cultural competence and the perceived value of cultural training related to diverse patient populations

Lisa Killinger

Objective: To conduct pre/post assessment of students' cultural competence and knowledge related to several distinct cultural groups. **Methods:** Two student cohorts (n=28 and n=32) in a 45-hour chiropractic college Health and Diversity course were asked on the first and last day of class, to rate their CC, using a standardized Cultural Competency Continuum scale. Students also rated the importance of CC in healthcare facilities, on a 10-point Likert scale. **Results:** The majority (53%) of students rated themselves culturally "pre-competent" on day 1, indicating awareness of the need to improve, but after the course, nearly 100% rated themselves as culturally competent or proficient. Interestingly, 83% of students rated their college as culturally proficient or competent. 50% of students rated CC 10 out of 10 (critically important) and 30% rated CC as "very important." Also included in this presentation will be students' pre/post ratings of cultural knowledge related to 5 diverse patient groups. At post assessment, over 65% of students rated themselves at a HIGH level of knowledge. **Conclusion:** In an increasingly diverse society, CC is essential to health professional education. Students' cultural competence can readily be enhanced with focused training. (This is a conference presentation abstract and not a full work that has been published.)

Impostor phenomenon among U.S. chiropractic students

Kelly Kimball, Christopher Roecker, Katie Hoyt

Objective: To describe the prevalence of Impostor Phenomenon (IP) among students enrolled in a Doctor of Chiropractic Program (DCP) and to compare the occurrence of IP between males and females. **Methods:** We performed an anonymous, cross-sectional, online survey of students enrolled in the DCP at two campuses of one chiropractic college using a Clance IP Scale score of ≥ 62 as the IP threshold. We reported the point prevalence of IP and used chi-squared tests to evaluate IP differences in sex, marital status, whether chiropractic was their first career, and type of clinical experience the student encountered. **Results:** Our survey had a response rate of 34% with 406 responses. IP was reported in 39% of all students. Females had significantly higher rates of IP ($p = 0.005$); 46% of females and 32% of males met the IP criteria. We did not find differences in the occurrence of IP in the other factors. **Conclusion:** We found that over a third of students enrolled in a DCP met the criteria for IP, and females were significantly more likely to experience IP. The results from this survey are similar to those reported in other healthcare educational settings. (This is a conference presentation abstract and not a full work that has been published.)

Frequency of primary neck pain in mild traumatic brain injury/concussion patients.

Jeff King, Michael McCrea, Lindsay Nelson

Objectives: Determine the frequency of neck pain overall and relative to other symptoms in patients presenting to an emergency department (ED) with mild traumatic brain injury (mTBI) and predictors of primary neck pain in this population. **Methods:** mTBI ($n = 94$) and matched control ($n = 80$) subjects recruited from an ED completed symptom assessments within 72 hr, 15 and 45 days post-injury. Concussion symptoms were also assessed via phone at 8 days post-injury. **Results:** The frequency of reported neck pain was 68.4%, 50.6%, 49%, and 41.9% within 72 hours and at 8, 15, and 45 days, respectively. Frequency of primary neck pain (equal or worse/worse definitions) was 35.8%/17.9%, 34.9%/14.5%, 37%/14.8% and 39.2%/10.8% across follow-up assessments. Participants who sustained their injuries in motor vehicle crashes had a higher rate of primary neck pain than other mechanisms. **Conclusions:** A sizable percentage of patients who present to an ED with mTBI report neck pain, which is commonly rated as similar to or worse than other mTBI symptoms. Primary neck pain is more common after motor vehicle crashes than other mechanisms. These findings support consensus statements identifying cervical injury as a potential concurrent diagnosis in patients with mTBI. (This is a conference presentation abstract and not a full work that has been published.)

Expanding chiropractic services within a VA Health Care System. An evaluation of veteran accessibility and provider referrals for care

Matthew Knieper, Pamela Wakefield, Jason Napuli, Glenn Bub, Jeffrey Kamper

Objective: To evaluate the impact of expanding chiropractic service into multiple sites of care within a single VA Health Care system. **Methods:** A single site retrospective analysis of all referrals placed for evaluation within a VA chiropractic clinic. Location of requesting provider and completion of referrals were recorded overtime before and after addition of site for chiropractic care. The average number of referrals placed were compared before and after chiropractic care was added to the location. The average number of completed on site referrals were compared before and after chiropractic care was integrated into the new location. **Results:** Expansion of care to multiple sites may impact patient and provider accessibility. There were mixed results on the impact of adding additional care sites on overall number of referrals and number of completed referrals. **Conclusion:** Chiropractic care was previously offered at a single location within a VA healthcare system. Expanding sites of care may help to provide awareness of chiropractic services among current health care providers and influence veteran accessibility to care. (This is a conference presentation abstract and not a full work that has been published.)

Patient care access and referral patterns of chiropractic patients in a VA chiropractic clinic: evaluating opportunities for provider education on chiropractic appropriateness.

Matthew Knieper, Pamela Wakefield, Jason Napuli, Glenn Bub, Jeffrey Kamper

Objective: To evaluate the quality and appropriateness of referrals for chiropractic care within a VA integrative health care setting. **Methods:** A single site retrospective study assessing quality of referrals for triage into a VA chiropractic clinic. Reason for discontinuation of referral without chiropractic care was recorded and categorized into common themes. **Results:** Evaluation of discontinued chiropractic referrals were categorized into common themes including: patient no showed appointments, failed to schedule appointment, BMI greater than 39, concurrent referral to other provider, patient declined appointment, reviewer recommended alternate care, patient already established within chiropractic clinic, no documentation assessing complaint, patient chose to opt in for outside care, and other. When evaluated, many of these themes suggest opportunities for provider education in regards to when and how to place a chiropractic referral. **Conclusion:** Evaluation of reasons for discontinued consultation showed consistent trends from various healthcare providers. Implementing opportunities for provider education on appropriateness for referrals may help reduce inappropriate referrals for evaluation to the chiropractic clinic. (This is a conference presentation abstract and not a full work that has been published.)

Cultivating collaborative teams using an interprofessional collaboration competency framework in performance appraisals

Deborah Kopansky-Giles, Lindsay Beavers

Objective: At St. Michael's Hospital, an Interprofessional Collaboration Competency Framework (IPCCF) was developed to improve collaborative competency and support team-based care. The IPCCF was embedded in a modified employee performance appraisal (PA) process for pilot testing with staff and managers. **Methods:** Education for staff and managers was provided. Both groups completed modified PA forms and a PA meeting. A post PA survey was sent to staff. Managers completed a key informant interview, analyzed for themes. SMH ReQuIST REB approval was received. **Results:** An ICU and two medical/surgical units participated. 38 staff (82%) completed the survey. All reported they understood the competencies and that the process was 'easy.' Staff self-identified moderate to high confidence in all IPCCF domains. Managers had good understanding of the IPC competencies, recognizing the importance of embedding these in the PA. Managers identified two additional themes: variation in, and the need for, institutional support for the new PA process. **Conclusions:** Staff and managers completed the modified PA process demonstrating knowledge about the IPCCF concepts and high ratings in the IPCCF domains. Managers highlighted the importance of the practice context and institutional support as essential elements in any hospital-wide roll-out of this initiative. (This is a conference presentation abstract and not a full work that has been published.)

Cost-effectiveness of spinal manipulation, supervised rehabilitative exercise, or home exercise for spinal pain in the United States using an individual participant data meta-analysis approach

Brent Leininger, Gert Bronfort, Roni Evans, Karen Kuntz, James Hodges

Objective: Estimate the cost-effectiveness of spinal manipulation (SMT), supervised rehabilitation exercise (SRE), and home exercise (HE) for spinal pain. **Methods:** We estimated incremental cost-effectiveness ratios (ICERs) using eight randomized trials from the U.S. We used a two-stage individual participant data meta-analysis to estimate ICERs with quality-adjusted life years (QALYs) as the effectiveness measure. **Results:** The analyses included 1,739 participants with pooled analyses ranging from 380-650 participants (2-4 trials depending on comparison). On average, SRE (alone or with HE) led to higher societal costs and small QALY gains relative to HE or SMT with ICERs above \$400,000/QALY. SMT resulted in higher societal costs and small QALY gains compared to HE (ICER=\$226,000/QALY). Adding SMT to HE led to lower societal costs and a small increase in QALYs. Adding SMT to SRE led to higher societal costs and a small increase in QALYs with an ICER of \$34,000/QALY. Results for healthcare costs were similar. The only important difference was a reduction of the ICER for SMT compared to HE to \$87,000/QALY. **Conclusions:** Adding SMT to HE or SRE is likely a cost-effective approach for managing spinal

pain. SRE alone or in addition to HE is not likely cost-effective. (This is a conference presentation abstract and not a full work that has been published.)

Condensing osteitis of the clavicle: an unexpected finding in a 24-year-old female

Tracey Littrell, Michelle Drover

Objective: The objective of this case report is to describe the clinical presentation, radiographic features, differential diagnoses, and treatment options for condensing osteitis of the clavicle, a rare condition most commonly seen in women. **Clinical Features:** A 24-year-old female with symptoms of headaches and neck pain following a motor vehicle collision one year prior underwent a diagnostic imaging examination with cervical and thoracic spine radiographs. Homogeneous sclerosis of the clavicle, limited to the closed medial clavicular epiphyseal growth center, without expansion, erosions, lytic defects, or manubrial involvement was identified. Further questioning and examination of the patient revealed no history of trauma to the upper anterior thorax, clavicle, or shoulder, no history of infection in the area, and no symptoms present in the region of the left medial clavicle. **Intervention and Outcome:** Differentials for sclerosis within the medial clavicle include: condensing osteitis, osteoarthritis, osteonecrosis, inflammatory and crystal-induced arthropathies, infections, and post-traumatic changes. Examination with MRI was recommended to distinguish between the possible differential diagnoses. **Conclusion:** Condensing osteitis is a rare condition, usually demonstrating regional symptoms, requiring consideration of several differential diagnoses. (This is a conference presentation abstract and not a full work that has been published.)

Developing student experience: creation of a therapy practice lab - part 2

Marc Lucente, Sean Norkus, Jeffrey Krabbe

Objective: Two years ago, Part 1 was accepted as a poster presentation for the ACC-RAC. Students had expressed a desire for more “hands-on” learning opportunities for both active and passive care modalities, including muscle stretching, rehabilitative strengthening, electric stimulation, ultrasound, and cold laser. A practice lab was designed to offer students a new learning opportunity. Part 2 now reports on the effects of that lab. **Methods:** Outpatient clinic faculty had reported dissatisfaction with student abilities in the delivery of active and passive care modalities. It was decided to make the lab available to students early in the curriculum before they entered the outpatient clinic. Second year students cannot only use the lab to practice their skills but can also volunteer as interns in the lab mentoring first-year students, thereby creating a new learning opportunity. **Results:** Positive student response has been demonstrated by the high usage rates of the lab, averaging over 700 therapies performed per 10-week instructional period. **Conclusion:** This practice lab was created to improve students’ usage, understanding of, and skills in performing active and passive care. The outcomes have been positive. (This is a conference presentation abstract and not a full work that has been published.)

Assessing comorbidity rating among veterans receiving Veterans Affairs chiropractic care

Vivian Ly, Brian Coleman, Joseph Goulet, Kelsey Corcoran, Anthony Lisi

Objective: This study reports on Charlson Comorbidity Index (CCI) scores and associated factors among Veterans receiving Veterans Affairs (VA) chiropractic care. **Methods:** Cross-sectional analysis of administrative data from a national cohort study of Veterans with musculoskeletal diagnoses (the MSD Cohort) who received VA chiropractic care between 2003 and 2015. The prevalence of CCI score >0 , was modeled by logistic regression using covariates of sex, race, period of service, marital status, service connection, obesity, pain intensity, number of chiropractic visits, opioid prescription, smoking status, and mental health conditions. **Results:** We identified 19,946 MSD Cohort veterans receiving VA chiropractic care, with 4,380 (22.0%) having CCI >0 ; 1,756 (8.8%) >1 ; and 878 (4.4%) >2 . Opioid prescription (odds ratio [OR] = 1.20, confidence interval [CI] = 1.08-1.33), obese BMI (OR = 1.43, CI = 1.33-1.54), current smoker (OR = 1.46, CI = 1.35-1.58), and major depression (OR = 1.19, CI = 1.04-

1.36) were associated with a higher likelihood of having CCI >0 . **Conclusion:** Many VA chiropractic patients have CCI scores corresponding with multi-morbidity and diminished 10-year survival rate. More work is needed to understand the relationship between CCI scores, or other measures of comorbidity, and chiropractic treatment. (This is a conference presentation abstract and not a full work that has been published.)

The commonsense approach to spine-related disability in older adults: part 1 - using mixed methods to find deeper meaning to illness outcomes in a randomized controlled trial

Michele Maier, Stacie Salisbury

Objective: Interpret quantitative outcomes using qualitative data from an RCT comparing short- and long-term use of chiropractic spinal manipulation and exercise among older adults with chronic spine complaints. **Methods:** Qualitative interviews conducted with randomized participants (171/182) solicited treatment experiences. Content analysis of 50 randomly selected transcripts identified themes, organized in relation to quantitative results, provided thematic saturation. **Results:** RCT found no between-group differences in disability (primary outcome); however, participants receiving long-term care experienced greater improvement in neck pain, self-efficacy, function, and balance. Participants considered changes in pain, a global sense of improvement, and improved biomechanical function to make treatment worthwhile. Chiropractic care was well-liked, particularly for pain reduction. Tools enhancing self-efficacy, especially at-home exercises, were useful for maintaining improvement, increasing mobility, and overall health and well-being. Several noted the importance of alternatives to traditional medical care when seeking treatment for their spine condition. **Conclusion:** Older adults valued care that aided them in controlling neck and back symptoms, while empowering them to maintain clinical benefit gained after a course of chiropractic spinal manipulation and exercise. This study underscores the importance of understanding participants’ values and experience when interpreting study results and applying them to practice. (This is a conference presentation abstract and not a full work that has been published.)

Lumbar disc nomenclature: a knowledge survey and narrative review

Stuart McIntosh, Mark Pfefer, Rachel Gilmore, Stephan Cooper, Alexis Tucker, Kyle Koerner, Dakota Vaughn

Introduction: There is a need for chiropractors to have a consistent understanding of terminology used to describe lumbar disc pathology following advanced imaging. The purpose of this project was to provide a narrative review of the current literature on nomenclature utilized to report normal and pathological disc findings. Additionally, the authors surveyed doctor of chiropractic students regarding lumbar disc nomenclature. **Methods:** A search was conducted of medical literature using MEDLINE, CINAHL, and Cochrane central register. All eligible review articles were reviewed then scored using SIGN methodology checklists. A brief 8-question knowledge survey was developed collaboratively among four experienced clinical faculty. **Results:** Nine review articles were considered eligible for this narrative review. There are high quality publications which guide the clinician in accurate and consistent terms for describing normal and pathological lumbar disc presentations. Thirty-six respondents averaged 5.9 correct choices of 8 total questions. The most frequently missed question (13/36) related to definition of an intervertebral herniation. All respondents correctly identified a contained disc herniation. **Conclusion:** Wide dissemination of this review will encourage accurate and consistent descriptions of the lumbar disc among chiropractors. It is our hope to add collaborative partners to survey additional chiropractic students. (This is a conference presentation abstract and not a full work that has been published.)

Management of pain associated with end-stage arthritis using a class four laser: a case study

Stuart McIntosh, Mark Pfefer, Rachel Gilmore, Jaden Butcher

Introduction: Photobiomodulation describes the application of light to stimulate endogenous chromophores. It is used therapeutically to promote tissue healing and modulate pain and inflammation. The aim of this project is to briefly review the literature and present a case study on the clinical use of photobiomodulation therapy in a patient

with pain associated with end-stage arthritis. **Methods:** We briefly reviewed literature describing photobiomodulation therapy, particularly differentiating between laser classifications. In this IRB approved case report, class 4 laser therapy was applied to the region of the first metatarsophalangeal joint. **Results:** The author describes a case of disabling pain in the foot related to end-stage arthritis of the first ray, which was resistant to prior conservative interventions. The patient reported 75% reduction in symptoms after three visits and resolution of pain and disability after five visits. Additional treatments were applied every three to four weeks. The patient reported no return of symptoms at 90 days. **Conclusion:** These findings suggest that photobiomodulation therapy using a 10 W class 4 laser may be effective for relief of symptoms associated with end-stage arthritis and may provide an additional conservative option as opposed to surgical intervention. Further investigation is warranted. (This is a conference presentation abstract and not a full work that has been published.)

Factors influencing the transmission of force in human tissues during manual therapy: a crossover study

Jérémie Mikhail, Martha Funahashi, Martin Descarreaux, Isabelle Pagé

Objective: To evaluate the influence of Spinal Manipulative Therapy (SMT) force-time characteristics, anthropometrics variables and muscle activity on the forces transmitted during thoracic SMT. **Methods:** Thirty-four healthy adults participated in two sessions. A servo-linear motor mechanical device applied, to the T7 vertebrae of each participant, 8 SMTs with 20N preload, 100N/200N total peak forces and time-to-peak of 100ms, 250ms, 1s or 2s. During each SMT, transmitted forces (using the force-sensing table technology-FSTT®) and thoracic muscle activity were recorded. The effect of SMT parameters on the variation in force (applied force – transmitted force) and correlations between the variation in force, anthropometric variables and muscle response were evaluated. **Results:** The variation in transmitted force ranged between a decrease of 17% to an increase of 44% of the applied force. The applied SMT parameters significantly affect the magnitude of transmitted force ($p < 0.001$). Few anthropometrics and muscle activity variables were significantly correlated with the variation in force ($p < 0.05$). **Conclusion:** Studies are needed to determine the mechanisms involved in the transmission of force through the human thoracic region. Factors such as properties of thorax tissues, thorax muscle reflexes and sudden change in breathing or participants' movement should be investigated. (This is a conference presentation abstract and not a full work that has been published.)

Self-perceived recovery in patients participating a multi-arm randomized clinical trial. Is the outcome already determined? A pilot study

Corrie Myburgh, Greg Kawchuk, Julie Fritz

Objective: To determine if self-perceived recovery in low back pain patients can predict improvement in patient-reported disability. **Methods:** Fourteen participants enrolled in an ongoing NIH randomized clinical trial were interviewed by a blinded evaluator then completed a self-perceived recovery questionnaire prior to receiving trial care. This pre-treatment information was then used to predict post-treatment change in Oswestry Disability Index scores. **Results:** From the pre-treatment information, a four-category typology emerged with respect to recovery predictions. Six individuals were categorized as dynamic recoverers, one as passive/stoic, six as complex non-recoverers and one as stable/recovered. Dynamic and stable/recovered were collapsed into a "likely" to recover category while passive/stoic and complex were collapsed into an "unlikely" to recover category. In the likely to recover category, 5/7 (71%) experienced a $>50\%$ change in ODI. Similarly, 5/7 cases (71%) of the unlikely to recover category failed to reach a 50% improvement in ODI. **Conclusion:** These preliminary results show promise in using self-perceived recovery as a tool to predict the likelihood of disability improvement as well as identifying treatment responders. (This is a conference presentation abstract and not a full work that has been published.)

Feasibility of a same day access chiropractic clinic in a VA medical center

Shawn Neff, Samuel Holguin, David Paris

Objective: We sought to assess the feasibility and implementation of same day walk in appointments in a US Department of Veterans Affairs (VA) Medical Center based chiropractic clinic. **Background:** Demand has been shown to exceed supply in VA chiropractic clinics. Evidence has shown that earlier access to chiropractic care decreases cost and leads to more guideline concurrent care. **Methods:** New clinics were introduced to the Martinsburg, WV VAMC chiropractic clinics. A new clinic for acute new patients and a clinic for prn walk-in for exacerbations in chronic pain patients who are known responders to spinal manipulation. Data is being collected on patient use of these services as well as overall clinic workload. **Results:** Standard appointments for 10 patients' weekly were converted to chronic and acute same day slots to accommodate 20 patients. Initial data looks promising on utilization and overall workload. The data is still being collected but will be completed to allow analysis and conclusions by the presentation deadlines. **Conclusions:** Same day access clinics are feasible to create in VA chiropractic clinics. Data on opportunity cost, access, utilization and workload are forthcoming and their analysis will inform adaptability and appropriateness pertaining to future expansion. (This is a conference presentation abstract and not a full work that has been published.)

Factors affecting self-perceived confidence in clinical and patient communication skills among chiropractic students: a qualitative analysis

Cheryl Ng, Min Lei Chong

Objective: The objectives of this study were to explore the factors affecting self-perceived confidence in clinical and patient communication skills among chiropractic students, and to investigate the differences of self-perceived confidences of these skills between pre-clinical students and interns. **Methods:** A cross-sectional study was carried out in a private university among Chiropractic students for a period of three months in 2019 with a total of 16 participants comprising of pre-clinical students and interns. Data was collected through personal in-dept interviews conducted individually. **Results:** Among factors affecting patient communication skills, language barrier was most reported in pre-clinical students whereas for interns it was patient's feedback. Self-perceived confidence for clinical skills were most influenced by students' own perception of the quality of adjustments, diagnostic ability, and patients' outcomes. Pre-clinical students reported self-perceived confidence was lower in clinical skills but higher in the other. Self-perceived confidence in both skills increased when students progress along the course of the internship. **Conclusion:** Incorporating experiential learning in the curriculum for such skills and exposing pre-clinical students to clinical environment in earlier semesters may help build confidence. Communication workshop could be held as a pre-requisite for students becoming interns as well. (This is a conference presentation abstract and not a full work that has been published.)

Using Artificial intelligence (AI) to investigate the effects of chiropractic spinal manipulation on resting state EEG in stroke patients

Imran Khan Niazi, Sofie Helene Bjorsrud Jensen, Cecilia Klitgaard Jorgensen, Camilla Winther Nielsen, Kelly Holt, Heidi Haavik

Objective: This study aims to investigate whether an AI approach, can be used to assess potential neuroplastic changes in stroke patients following spinal manipulation. **Method:** Fourteen males, age 57.2 ± 12.3 who had ischemic stroke participated in the two intervention sessions; chiropractic and sham, on separate days in random order. Time since stroke was between 2 and 60 months. The EEG was recorded from 62 EEG channels. Patients fixated their gaze during which 2-3 minutes of resting EEG was recorded. The pretrained convolutional neural network (CNN), Alex Net was used as an AI algorithm to investigate whether changes between the pre and post measurements for the two interventions differed between the interventions. **Results:** The pretrained CNN yielded in following accuracy: 70.88%, 64.69%, 73.83%, 65.26% and 88.75%, for delta, theta, alpha, beta and gamma EEG frequency bands, respectively. **Conclusion:** The CNN was able to classify whether a difference map belonged to either spinal manipulation or sham. This yielded a higher accuracy for the delta, alpha and gamma band, indicating that changes in brain activity between the two interventions. Further research is required to quantify which spatial region of the brain

contributed the most in classification by AI. (This is a conference presentation abstract and not a full work that has been published.)

Empathy and perceived stress of second year chiropractic students

Lia Nightingale

Objective: To assess empathy and perceived stress of students in the beginning and end of Year 2 of a chiropractic program. **Methods:** Three cohorts of students ($n=280$) were assessed during their 4th and 6th trimester, where they completed the Toronto Empathy Questionnaire (TEQ) and Perceived Stress Scale (PSS). These cohorts were previously assessed during 1st trimester. Combined data were analyzed by descriptive statistics, ANOVA, and Pearson's correlation coefficient. **Results:** Response rates of 97% and 91% were achieved during the 4th and 6th trimesters, respectively. Empathy increased from the beginning to end of the 2nd year of the program; while stress levels were lower at the beginning of year 2 compared to the end, when students felt responsibilities were piling up. Female students were still more likely to be both empathic and have higher perceived stress. Younger students were more likely to favorably respond to excitement and happiness in others and get greater enjoyment out of making others feel better. Students with more education reported significantly less stress. Several empathy characteristics were negatively influenced by stress. **Conclusion:** Empathy increased as students progressed through a chiropractic program. More educated students were better prepared to handle stress. (This is a conference presentation abstract and not a full work that has been published.)

Service learning at a day laborer program affects chiropractic students' perceptions of community service, underserved populations, and clinical practice

Donna Odierna, Lori Pino, Farida Savai, David Currie, Monica Smith

Objective: We evaluated a chiropractic service-learning program at a California day laborer center. We report on students' experiences, 2009-2018. **Methods:** We used mixed methods to study students' experiences, perceptions of underserved populations, community service, and clinical practice. Data sources include student applications, site visit summaries, and ongoing interviews with current and former students, faculty, and staff. **Results:** During 94 monthly site visits, 201 student volunteers provided free care in over 2,000 new and repeat patient encounters. Motivations included serving their communities, increase skills, and "spread the word about chiropractic." Students registered patients, conducted intakes, took histories, and presented health talks. Each intern provided care to an average of nine patients per 5-hour site visit. Presenting conditions included musculoskeletal complaints related to physical labor, injuries, chronic illness, and poor health related to poverty and unstable living conditions. Many patients spoke only Spanish. Students and faculty described increased confidence, awareness of socioeconomic and cultural differences, and clinical, administrative, and communication skills. They discussed incorporating pro-bono and community service into their clinical practice. **Conclusion:** Chiropractic students providing community-based care gained real-world experience and may increase skills, cultural competency, and understanding of health and social concerns of underserved populations. (This is a conference presentation abstract and not a full work that has been published.)

Correlation between lumbar spinal stiffness and muscle activity in healthy adults: an investigation using a novel rolling device

Isabelle Pagé, Greg Kawchuk

Objective: This study was conducted to determine how contracting different spinal muscles may influence spinal stiffness at all 5 lumbar levels. **Methods:** A device consisting of rolling wheels with adjustable mass was used to acquire spinal stiffness (N/mm) from L5 to L1 in 12 asymptomatic subjects during 4 conditions: (1) relaxed, (2) arm extension, (3) leg extension and (4) breath hold. During these activities, muscle activity (EMG) from four pairs of back muscles was recorded. Correlations between muscle activity and spinal stiffness were computed while the effect of spinal level and the contraction condition was determined. **Results:** Overall, a moderate to good correlation between muscle activity and spinal stiffness ($0.30 \leq r \leq 0.53$) was observed throughout the lumbar spine. The three active conditions generated different amplitudes of muscle activity compared to the relaxed state but only leg extension increased spinal

stiffness significantly at all spinal levels. **Conclusion:** This study provides evidence that low magnitude muscle activity in some lumbar muscles will not significantly increase lumbar spinal stiffness measures. These results also suggest that measurement of spinal stiffness from one segment cannot be generalized to all segments and that muscle activity may influence upper and lower spine stiffness differently. (This is a conference presentation abstract and not a full work that has been published.)

The impact of introducing a posture awareness program in a secondary school environment

Anna Palmer, Adrian Hunnisett, Christina Cunliffe

Objective: Current lifestyle behavior is being linked to poor posture and an increase in neck or back pain. Adult sufferers report their first experience of back pain occurs during teenage years. The aim of this study was to evaluate the impact of a posture awareness program, as part of school curriculum. **Method:** Following ethical approval, an educational intervention of 3 posture workshops was delivered to 3rd year students in a UK high school ($n=60$) over a 3-month period. Awareness of correct posture was assessed using the Nordic Musculoskeletal Questionnaire, completed online before & after the intervention. A control group of 4th year students ($n=20$) completed the same questionnaires but did not participate in any intervention. **Results:** In the intervention group, the awareness of correct posture and implications increased significantly following the educational exercise ($p=0.016$), suggesting that the intervention could improve on their active understanding of posture. No such change was observed in the control group ($p=0.68$). **Conclusion:** There is a need to educate teenagers and young adults on how to look after their spine, and this study suggests that a simple intervention can be used and can be easily implemented into a school curriculum. (This is a conference presentation abstract and not a full work that has been published.)

Visual perception of patient attributes modulates spinal manipulation dose characteristics

Steven Passmore, Quinn Malone, Brian MacNeil, Elizabeth Sanli, David Gonzalez

Objective: The purpose of this study was to determine whether clinicians modulate spinal manipulation thrust dose characteristics based on their visual perception of patient attributes. **Methods:** In a cross-sectional, within-participants design, eight experienced chiropractors (1 female) performed spinal manipulative thrusts on a low-fidelity model while a life-sized silhouette of the potential patient was displayed. Eighteen combinations of sex, height, and BMI were displayed six times each, for a total of 108 trials in a randomized order. Dependent variables included normalized thrust force, displacement, peak acceleration, and time to peak acceleration (TTPA) of the thrust. A three-way repeated measures ANOVA model was used for each variable, followed by Tukey's HSD where significant interactions were found. **Results:** Thrust force was reduced when a female silhouette was presented ($F_{1,7}=10.74$, $p=0.003$). Compared to an obese BMI, an underweight image resulted in reductions of both thrust force ($F_{2,6}=6.48$, $p=0.007$) and peak acceleration ($F_{2,6}=9.92$, $p<0.001$). A 2-way interaction for TTPA was found, revealing that a tall patient image with a healthy or underweight BMI caused significantly longer TTPA than other conditions ($F_{4,28}=3.89$, $p=0.012$). **Conclusion:** Visual perception of patient attributes including sex, height, and BMI impact spinal manipulative thrust dose delivery. (This is a conference presentation abstract and not a full work that has been published.)

Use of the Community Health Environment Checklist to assess a chiropractic college outpatient health center for accessibility for persons with mobility limitations

Mark Pfefer, Jackson Berg, Kyle Koerner, Rachel Gilmore

Introduction: People with disabilities may experience health disparities related to inaccessibility of health clinics. Research is lacking on evaluation of chiropractic clinics for accessibility and usability of patients with disabilities. The aim of this project was to assess one chiropractic college program outpatient clinic using the Community Health Environment Checklist - Mobility (CHEC-M) tool for measuring usability and access of clinic space for people with disabilities. We also describe how this tool can be used for other

chiropractic public and private clinics to evaluate and improve accessibility of chiropractic clinic spaces. Methods: The CHEC-M is an objective measure designed to assess the overall usability of specific public sites in communities, including health care and fitness facilities. Included are features that people with disabilities identified as important. Results: Total score for this large chiropractic college outpatient clinic was 83.85 which compares favorably to a mean score for regional health facilities of 50.95. Fourteen potential barriers were identified, many of which could be easily modified. Conclusion: Training is needed so that clinical staff have knowledge about evaluation and treatment procedures to accommodate people with disabilities. Clinical staff also need additional training in how to perform transfers. (This is a conference presentation abstract and not a full work that has been published.)

Patients' and interns' expectations of adverse events: data from an electronic active surveillance study at a teaching clinic

Katherine Pohlman, Martha Funabashi, Gregory Kawchuk, Sheilah Hogg-Johnson, Silvano Mior

Objectives: There is limited information on adverse event (AE) expectedness in chiropractic. Our objective was to evaluate patient and intern expectations of symptom changes following a chiropractic visit at a teaching clinic. 'Worsening' and 'new' symptoms were considered AEs. Methods: We used active surveillance survey methodology to collect pre-post treatment symptoms in consecutive patients. Immediately post-treatment, interns reported changes in pre-existing symptoms, any new symptoms, and if these changes were expected. Two days after their visit, patients were asked to report on the same. Results: From intern reports immediately post-treatment, 576 symptoms were reported on 416 pre-treatment surveys as: 'better'—493(85.6%), of which 93.3% were expected; 'unchanged'—74(12.8%), 79.7% expected; and 'worsened'—9(1.6%), 44.4% expected. Nine 'new' symptoms were reported with 55.6% expected. From patients post-treatment reports (222(53.4%)), 336(59.9%) of pre-existing symptoms were described as: 'better'—289(86.0%), of which 91.3% were expected; 'unchanged'—43(12.8%), 58.1% expected, and 'worsened'—4(1.2%), 25.0% expected. There were 20 'new' symptoms reported with 55.0% expected. Conclusion: Most symptoms reported as 'better' by interns and patients were expected. Half or less 'worsened' and 'new' symptoms were expected by both groups. Future studies should explore the clinical value of AE expectation. (This is a conference presentation abstract and not a full work that has been published.)

Patient-centered outcomes in clinical pediatric manual therapy research studies: where are we?

Carol Prevost, Katherine Pohlman, Kris Anderson, Beth Carleo

Objective: Standardized Patient-Centered Outcomes (PCOs) ensure that studies are done on areas important to the patient. With the paucity of high-quality Manual Therapy (MT) research for the pediatric population, standardized PCOs are valuable. The objective of this study was to describe the condition specific PCO and cited Property Measurements (PM) used in MT research for the pediatric population. Methods: Extract PCO use and PM data from studies included in a 2019 systematic review of pediatric MT. Results: Fifty studies were reviewed, of which 27 (54%) noted the use of one or more PCO. Ten studies (37%) included PM information. PCOs were used most in special need conditions, scoliosis, and low back pain studies. Conclusions: While 54% of studies used a PCO, there was no consistency among the instrument and most lacked adequate PM description. There is a need for standardized PCOs for MT use in the pediatric population. (This is a conference presentation abstract and not a full work that has been published.)

The influence of digital lecture notes on pathology course performance and student satisfaction

Christopher Roecker

Introduction: Modern-day students are less likely to engage with physical textbooks and have a preference for educational materials in a digital format. This project involved the development and implementation of digital daily "lecture notes;" these notes replaced the textbook reading in three Pathology classes at a chiropractic college. We measured whether implementing these materials would

influence engagement in the course reading, along with whether these materials influenced course satisfaction and NBCE exam performance. Methods: We designed daily lecture notes that emphasized a simple and aesthetic design and delivered these notes, after each lecture, via the course website. At the end of course, comparisons were made between previous self-reported rates of reading engagement, student satisfaction, and NBCE scores. Results: Implementation of these notes was associated with a dramatic increase in student engagement with the course reading, from about 10% to nearly 90% "regularly" reading the course material. Course feedback also reflected a qualitative increase in student satisfaction and NBCE failure rates dropped, from about 10% to 0%. Conclusion: Implementation of digital daily lecture notes correlated with a dramatic increase in students' engaging with the course reading, improved course satisfaction, and improved performance on NBCE exams. (This is a conference presentation abstract and not a full work that has been published.)

The relationship between in-class polling participation and pathology course performance

Christopher Roecker, Kara Shannon, Zacariah Shannon

Objective: To evaluate if participation with optional, in-class practice questions, designed to promote spaced repetition, was associated with course performance. Methods: The TurningPoint student response system was used to administer questions and save student responses for three Pathology courses within chiropractic education. SAS was used to conduct a Spearman rank test to determine the correlation between grade and percent of TurningPoint participation. Cochran-Armitage tests for trend were also used to evaluate for trend in proportion of letter grades (A, B, and C or lower) by percent participation (25% quartiles). Results: Data from 268 students were analyzed and there was a significant correlation between percent earned in the class and percent participation, Spearman correlation coefficient = 0.44 (95% CI, 0.34 to 0.53). The strongest differentiation in participation was at the cut-point between B and C or lower, Cochran-Armitage test for trend z-score = 6.41. Conclusion: Participation with in-class TurningPoint questions had a significant relationship with overall course performance. Future study using a prospective design may compare students with similar levels of engagement to differentiate the effect of spaced repetition on overall course performance. (This is a conference presentation abstract and not a full work that has been published.)

A palpation method more accurate than the supracristal plane for identification of the L4 spinous process

Gregory Roytman, Scott Selby, Joe Cantu, Gregory Cramer

Objective: To assess a novel method of palpation of the L4 SP, an important manual therapy landmark. Methods: Clinicians in this IRB-approved case series used either: 1) the standard/traditional method of identifying the L4 SP using the supracristal plane (n=14); or 2) a novel method that manually induced sacral motion to identify the static L5 and then L4 SPs (n=54). The clinicians, blinded to the results of one another, used a grease pencil to mark the location identified as the L4 SP. An MRI high-signal marker was then taped across this location. The MRI scans were assessed by a radiologist, blinded to the palpation method, who extended a line posteriorly from the superior and inferior extent of the L4 SP, and determined if the high signal marker was within the lines bordering the L4 SP (i.e., "on-target"). Results: Palpation by the traditional method showed a 35.7% accuracy, (5 of 14 "on-target"). All "off-target" were too superior. Palpation by the novel method showed 77.8% accuracy; 42 of 54 on-target, 3 off-target being too superior and 9 too inferior. Conclusions: The novel method performed better than the traditional method in this case series. Funding: NIH/NCCIH Grant#—3R01AT000123-06S2. (This is a conference presentation abstract and not a full work that has been published.)

Rectus abdominis muscle tear diagnosed with sonography and its conservative management

Ashley Ruff, Stacey Cornelson, Austin Panter, Norman Kettner

Objective: This is a rare case of a post-traumatic rectus abdominis muscle tear in an adolescent female diagnosed by ultrasonography (US). Conservative management is also described. Clinical Features:

A 14-year-old female presented to a chiropractic clinic with extreme pain and tenderness in the right lower quadrant (RLQ) after post-plyometric power knee jumps. Movement aggravated her pain and she demonstrated active abdominal guarding with RLQ palpation. Intervention and Outcome: Ultrasonography revealed a subacute Grade 2 right rectus abdominis muscle tear, without evidence of hyperemia or a hematoma. Following the diagnosis of a right rectus abdominis muscle tear, she was treated with spinal manipulation and a course of musculoskeletal rehabilitation directed at truncal stabilization. After treatment, the patient was able to return to play five weeks post-injury without any pain or discomfort. A follow-up US at three months provided evidence of muscle healing without complications. Conclusion: This case demonstrates the diagnosis of a rare rectus abdominis muscle tear managed conservatively. To our knowledge, less than a dozen cases are reported using US in the evaluation and diagnosis of a rectus abdominis tear. (This is a conference presentation abstract and not a full work that has been published.)

Barriers, facilitators, and motivators to implementing chiropractic care in a multidisciplinary rehabilitation setting: a qualitative analysis using the Theoretical Domains Framework

Stacie Salsbury, Breanne Wells, Zacariah Shannon, Robert Vining

Objective: Characterize stakeholder perceptions of barriers, facilitators, and motivators to adding chiropractic care to the clinical services provided at a rehabilitation specialty hospital. Methods: An organizational case study investigated processes of integrating a chiropractor into a multidisciplinary healthcare team. Researchers analyzed stakeholder interviews conducted before chiropractic program initiation and used qualitative software to conduct a content analysis of salient themes regarding program implementation. Themes were categorized into barriers, facilitators, or motivators, and organized into the Theoretical Domains Framework (TDF). Results: Stakeholder perceptions were predominated by barriers to chiropractic integration. Barrier domains (themes) included concerns about setting-specific knowledge (chiropractic, patient conditions); practitioner skills (patient communication, mobility/assistive devices); professional identity (cultural authority/non-conformity); environmental context (equipment, location, finances, census); and emotions (derogatory language, touch tolerance). Integration facilitators encompassed perceived organizational strengths such as multidisciplinary team identity and capabilities as a learning environment. Additional facilitators included reinforcement through interprofessional communication and optimism about low risks of chiropractic care and potential clinical benefits. Motivators included beliefs (institutional mission), intentions (treatments offered, marketing opportunity), and goals (pain management, medication, program sustainability). Conclusion: TDF offers an insightful method for identifying key strategies to improve the integration of chiropractic care into multidisciplinary settings. (This is a conference presentation abstract and not a full work that has been published.)

The commonsense approach to spine-related disability in older adults: part 2 – a qualitative analysis of illness representations, coping styles, and coping strategies

Stacie Salsbury, Michele Maiers

Objective: Describe illness representations, coping styles, and coping strategies used by older adults to manage chronic neck and back conditions. Methods: Structured interviews in a randomized trial of chiropractic spinal manipulation and exercise therapy elicited common responses used by older adults to manage spine symptoms. Two investigators completed qualitative analysis of 50 randomly selected transcripts using NVIVO software. Results: Participants included 34 women (median age: 68 years). Older adults described 4 illness representations, 4 coping styles, and 6 coping strategies. Participants who described spine symptoms as of little impact had self-care coping styles and used distraction (position changes, hobbies, relationships) and limitation (rest/relaxation, restricted movement, activity modifications) strategies. Persons with bothersome symptoms relied on self-management and engaged in prevention (posture/ergonomics, nutrition, stress management, self-care knowledge) and movement (stretching, home exercise/walking, exercise therapy) strategies. During heightened symptom intensity, healthcare seeking was added as a coping style, with palliation (heat/ice, TENS,

medication management, spinal manipulation) the principal strategy. Unmanaged pain/disability led to fear avoidance behavior, with the main coping strategy being avoidance (staying home, stopping housework, missing work, using pain-relieving medicine). Conclusion: Older adults represent spine symptoms in multiple ways, leading to varied coping styles and strategies. (This is a conference presentation abstract and not a full work that has been published.)

The commonsense approach to spine-related disability in older adults: part 3 – theory generation for a conceptual framework of illness management in spine care

Stacie Salsbury, Michele Maiers

Objective: Propose a conceptual framework of illness management for spine-related disability among older adults. Methods: Theory generation derived from mixed methods analyses of a randomized controlled trial of chiropractic spinal manipulation and exercise for chronic spine pain and disability. Empirical findings were triangulated with Leventhal's Common Sense Model of Self-Regulation to articulate a conceptual framework. Results: The Commonsense Approach to Spine-Related Disability Framework is structured by 6 components. Illness Stimuli, such as spine pain or disability, initiates the individual's decision-making process to eliminate or reduce symptomology. Illness Representation allows assessment of the potential impact of current symptoms (low impact, bothersomeness, heightened intensity, or unmanaged symptoms). Coping Styles (self-care, self-management, healthcare seeking, fear-avoidance behavior) prompt the selection, use, and coordination of Coping Strategies (distraction, limitation, prevention, movement, palliation, and avoidance). Coping Appraisal gauges the success of efforts to manage spine-related symptoms along a continuum of adaptive to maladaptive coping. Patient-centered Illness Outcomes include the domains of spine symptoms, self-management, quality of life, and emotional outcomes. Conclusion: The Commonsense Approach may offer clinicians and patients a structured framework for conversations about illness management, treatment preferences, goal setting, and clinical outcomes within the context of spinal care. (This is a conference presentation abstract and not a full work that has been published.)

Description of chiropractic treatment in a pragmatic clinical trial conducted in Department of Defense military treatment facilities: a secondary analysis of ICD and CPT codes

Anna-Marie Schmidt, Zacariah Shannon, Cynthia Long, Robert Vining, Christine Goertz

Objective: To report diagnosis codes and treatments provided by doctors of chiropractic to active duty U.S. military personnel with low back pain. Methods: A secondary analysis of data from a pragmatic, clinical trial including participants randomly assigned to receive up to 6 weeks of usual medical care plus chiropractic care at 3 U.S. military treatment facilities was performed. International Classification of Diseases (ICD) and Current Procedural Terminology (CPT) codes were transcribed from chiropractic treatment forms. SAS was used to tabulate the number of participants receiving each ICD and CPT code and the number of each CPT code on unique visits. Results: Of 350 participants receiving chiropractic care over 1547 unique visits, spinal manipulation, the most common passive treatment, was provided to 325 participants (92.9%) on 1350 visits (87.3%). Therapeutic exercise was coded for 173 participants (49.4%) on 207 visits (13.4%). Lumbalgia (230, 66.1%) and headache (104, 30.5%) diagnoses occurred most frequently. Conclusion: Doctors of chiropractic routinely coded for passive therapies and general pain diagnoses when treating military personnel with low back pain. Patient education and active therapies were not commonly coded, limiting the ability to analyze specific treatment effects using ICD and CPT code data. (This is a conference presentation abstract and not a full work that has been published.)

Secondary analysis of pain occurrence data collected via SMS text message during a pragmatic, clinical trial comparing usual medical care plus chiropractic care to usual medical care alone for low back pain

Zacariah Shannon, Cynthia Long, Robert Vining, Christine Goertz

Objective: To describe SMS data from participants with low back pain (LBP) receiving usual medical care plus chiropractic care (UMC+CC) or UMC alone (UMC). Methods: After 6 weeks of care,

140 participants were sent weekly texts through 1 year asking the number of days with LBP (0-7). The median number of pain days per week and number of weeks with 0 pain days from 103 participants (56 in UMC+CC; 47 in UMC) who replied to at least 80% of texts over the 46-week period, are presented. Results: Twenty-three percent were women, 25% were non-white, and mean age was 34 years (18–50). Forty-seven participants reported acute LBP (<1 month) and 47 reported chronic (>3 months). The median number of pain days per week in UMC+CC was 2.7 for acute and 4.2 for chronic; UMC was 4.2 for acute and 5.6 for chronic. The median number of weeks with 0 pain days in UMC+CC was 5.0 for acute and 0 for chronic; UMC was 1.0 for acute and 0 for chronic. Conclusion: More work is needed to understand the longer-term influence of chiropractic care on the number of pain days and its relationship with other LBP outcomes. (This is a conference presentation abstract and not a full work that has been published.)

Multicentric reticulohistiocytosis presenting to a chiropractor: a case report

Brynne Stainsby, Sophia da Silva-Oolup

Objective: To detail the presentation of a male patient with new onset rash and stiffness and pain in multiple joints. This case report will outline referrals and investigations, diagnosis and management from medical and chiropractic perspectives. **Clinical Features:** The patient presented with a papulonodular, non-itchy rash over sun-exposed areas, along with pain and stiffness in his hands, wrists, knees and ankles. He reported no night pain, morning stiffness, or systemic symptoms. The pain limited his activities and required modified work duties. **Intervention:** The patient was referred to his medical doctor requesting blood work and referral to a dermatologist and rheumatologist. Following diagnosis with multicentric reticulohistiocytosis, his rheumatologist advised continuing chiropractic care for pain management and joint mobility. **Outcome:** With ongoing care, the patient continues to find relief with soft tissue therapy and joint mobilization. He has been able to some activity, and aims to return to full duties at work. **Conclusion:** Given the rarity of this condition, and the ability of this disease to affect the musculoskeletal system in addition to the skin and any organ, this case attempts to raise awareness, highlight the need for appropriate referral and outline medical and chiropractic co-management options. (This is a conference presentation abstract and not a full work that has been published.)

Integrative care for acute musculoskeletal pain in a Veterans Health Administration (VHA) Community Based Outpatient Clinic (CBOC): a case series

Charles B. Sullivan, Raisa Figueroa, Russell Bishop, Neil Hofbauer, Ti Liu, Robert Walsh

Objective: The purpose of this case series is to present outcomes experienced by 22 U.S. Veterans presenting for interdisciplinary management in a Veterans Affairs Acute Musculoskeletal (MSK) Pain Clinic. **Clinical features:** Twenty-two patients with acute MSK pain were referred by their PCP the same day with a complaint of lower back pain (n=17) or neck pain (n=5) for chiropractic care and physical therapy. At initial examination the low back pain patients averaged 7.2 VDS and 51% Oswestry Disability Index (ODI), and the neck pain patients average 7.5 VDS and 56 % Neck Disability Index (NDI). **Intervention and outcome:** Patients were managed with a combination of manipulation and dry needling. The average number of visits to discharge was 4.3 visits. Results showed average 1.0 VDS final pain scores, a 90% ODI improvement and a 87% NDI improvement. Two patients were lost to follow-up. **Conclusion:** All twenty patients with follow-up reported decreased pain measured by VDS and a significant decrease in ODI and NDI scores. Early access to spinal manipulation and dry needling services appears to have a positive impact in recovery from acute pain episodes involving the low back or neck. (This is a conference presentation abstract and not a full work that has been published.)

Evaluating the integration of interprofessional collaboration competencies within simulation training

Minisha Suri-Chilana, Deborah Kopansky-Giles, Silvano Mior, Douglas Campbell, Kari White, Lianne Jeffs

Objective: St. Michael's Hospital interprofessional collaboration competency framework (IPCCF) was developed to improve collaborative competency and support team-based care. Our study evaluated whether formally embedding domains from the IPCCF within team simulation-based medical education (SBME) enhanced practitioner competency compared to usual simulation training. **Methods:** A randomized control trial with concurrent mixed methods was used. Participants were randomized to receive pre-simulation education (Intervention) or usual pre-briefing (Control). Self-perceived collaborative competency was measured using the Health Professional Collaborative Competency Perception Scale (HPCCPS). Qualitative thematic analysis of debriefing audio-video data was used to explore participant perception of interprofessional collaboration (IPC). **Results:** Intervention (n=28) and control (n=25) groups were demographically similar. There were no significant between group mean differences in change on HPCCPS. During debriefing, intervention participants generated increased dialogue around communication, teamwork and role awareness, and initiated more self-reflection on IPC than controls. Facilitators frequently adopted a teaching role, which may have inhibited dialogue surrounding IPC. **Conclusions:** Results suggest that pre-simulation education on IPC competencies did not affect participants' self-reported collaboration. It did lead to greater discourse about IPC, which may result positively in attitudes toward and ability to collaborate. Results may inform future SBME intended to enhance IPC competencies. (This is a conference presentation abstract and not a full work that has been published.)

Quantification of the forces applied and transmitted through the body during thoracic spinal manipulation in asymptomatic adults

Joshua Thomas, Tom Murphy, Steve Tran, Sam Howarth, David Starmer, Martha Funabashi

Objective: Forces exerted on the patient's body during spinal manipulative therapy (SMT) remain under investigation to elucidate how these may contribute to SMT's potential beneficial or harmful effects. This study aimed to quantify clinician-applied forces and transmitted forces through the participant during a thoracic SMT in asymptomatic adults. **Methods:** Forty asymptomatic volunteers (20 females/20 males; average age 27.2 ± 4.9) laid in prone position on the force-sensing table technology (FSTT®). An experienced clinician then provided a posterior-to-anterior SMT to T7 using pre-determined force-time characteristics. Clinician-applied forces were recorded by triaxial load-cells. Transmitted forces were recorded by the FSTT®. **Results:** Total peak applied forces in z-direction averaged 588N (± 48 N) whereas total peak transmitted z-forces averaged 668N (± 33 N); transmitted z-forces were on average 1.14 times (± 0.09) larger than applied. **Conclusion:** Results are consistent with mathematical models developed to investigate thoracic impact simulating a dynamic force-deflection response. This study identified that during SMT, the thorax acts as a deformable body in a dynamic loading scenario, rather than a rigid body undergoing quasistatic loading as previously believed. This significantly advances our understanding of thoracic biomechanics during SMT. Future studies can now be properly developed to accurately investigate thoracic SMT forces. (This is a conference presentation abstract and not a full work that has been published.)

Lessons learned from cases of rib fractures after manual therapy: a case series to increase patient safety

Daphne To, Anthony Tibbles, Martha Funabashi

Objective: Most adverse events (AEs) experienced after chiropractic care are mild and transient; however, some may be more impactful to patients' well-being. This study aimed to: identify commonalities amongst cases of rib fractures after manual therapy (MT); discuss clinicians' perspectives in case management; and propose strategies for prevention and/or management of future cases. **Methods:** Semi-structured interviews were conducted with clinicians who identified cases of rib fractures after MT at teaching clinics. Charts were reviewed; data on patient demographics, case details, and clinician's perspectives were collected and analyzed. **Results:** Three clinicians were interviewed, each identifying one case. Patient ages ranged from 57-77; two were female; two had osteopenia; two cases involved thoracic spinal manipulation; and one case involved lumbar spinal

manipulation. Clinicians agreed that verifying and updating potential patient risk factors for rib fractures, transparent communication prior to MT and/or after the occurrence of an AE, and enhancing student education on AE management were important. Conclusion: This study suggests that important lessons can be learned from AEs, despite their infrequent occurrences. As patient safety is a global healthcare challenge, chiropractors need to be leaders in creating an open and constructive patient safety environment within their profession. (This is a conference presentation abstract and not a full work that has been published.)

First messages matter: aligning evidence with practice

Alyssa Troutner, Lindsay Rae, Brooke Morphet

Objective: This case series serves to describe three patients presenting to a VA chiropractic clinic with chronic low back pain that were given patient education and reassurance as formal treatment. Additionally, this series will review three common types of educational interventions utilized to address maladaptive behaviors or beliefs in chronic pain. **Clinical Features:** Three patients presented with chronic, nonspecific low back pain. They had received mixed diagnoses from previous healthcare providers and denied receiving any formal pain education for their persistent complaint. These factors contributed to the development of fear avoidance beliefs and maladaptive behaviors, reinforcing the chronic pain cycle. **Intervention and Outcome:** Patients were counseled in pain education including central sensitization, hurt versus harm concepts and pacing. Emphasis was placed on the patient's nonspecific diagnosis as well as maladaptive behaviors and beliefs that may be contributing to their persist pain. At subsequent visits, patients reported significant pain reduction and a proactive mindset to self-manage their chronic back pain. **Conclusion:** Addressing patient's maladaptive behaviors and providing pain education empowers self-management of their chronic spine condition. (This is a conference presentation abstract and not a full work that has been published.)

How chiropractic websites communicate to patients: a descriptive analysis of US chiropractic websites

Elissa Twist, Judy Bhatti, Katherine Manley-Buser

Objective: Descriptively analyze US chiropractic college websites regarding readability and communication level of information provided about chiropractic care. **Methods:** Information was obtained from 17 US chiropractic colleges' websites related to patient care. Two researchers independently scored webpages using the Centers for Disease Control Clear Communication Index (CDCCI). CDCCI scores under 90 indicate poor communication. Readability was measured using Microsoft Word Flesch-Kincaid (F/K), an algorithm indicating the grade-reading level competency needed for comprehension. Health literacy estimates of individuals in the county of college locations were computed using the University of North Carolina's (UNC) Health Literacy Data Map. UNC determined scores 225 or lower indicate below basic literacy of the population. **Results:** CDCCI mean score ($n=17$) 52.3 ± 21.4 . F/K mean score 13.4 ± 3.3 . Health literacy estimate of counties of chiropractic colleges: mean 245.9 ± 9.1 . **Conclusion:** Of the 17 chiropractic colleges' websites analyzed, none met standards for clear communication, while all provided information above nationally recommended readability levels. All colleges are in counties of varied but mean above basic health literacy levels. (This is a conference presentation abstract and not a full work that has been published.)

Changes in strength, balance, and endurance in active duty U.S. military personnel with low back pain following chiropractic care

Robert Vining, Cynthia Long, Amy Minkalis, Maruti Ram Gudavalli, Ting Xia, Lance Corber, Crystal Franklin, Christine Goertz

Objective: To measure the effect of chiropractic care on strength, balance, and endurance in active-duty U.S. military members with low back pain (LBP). **Methods:** A 4-week, randomized controlled trial conducted in Pensacola, FL at a U.S. military treatment facility enrolled 110 active-duty personnel (aged 18 to 40 years) reporting LBP. Participants were randomly assigned to either chiropractic care or a wait-list control group. The primary outcome was peak isometric strength. Secondary outcomes included single-leg balance and endurance using the Biering-Sorensen test. Changes were evaluated

with analysis of covariance, adjusting for baseline values. **Results:** Mean age (range) was 30 years (18–40). Of 202 participants screened, 110 were enrolled (55 per group). Participants were 67% white and 13% black, with 75% reporting LBP for over 1-year. Females comprised 17%. The chiropractic care group showed statistically significant improvement compared to the control group for: strength (5% increase vs. 6% decrease, $p=0.001$), balance with eyes closed (28% increase vs. 0% change, $p=0.001$), and endurance (14% increase vs. 10% decrease, $p=0.001$). **Conclusions:** Increased strength, balance and endurance occurred in the chiropractic care group. Control group participants demonstrated decreased or no improvement. Chiropractic care may facilitate improving key physical performance characteristics. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractic-initiated opioid taper of a partial tetraplegic patient

Robert Walsh, Felisha Truong

Objective: To present a case demonstrating interdisciplinary management of a spinal cord injury patient on high dose opioids with goals of developing a successful tapering regimen. **Clinical features:** A 66-year-old veteran presented with primary complaint of chronic, constant, severe neck pain following a motorcycle accident, complicated by cervical decompression with fusion and spinal cord injury. Prior pain management strategies included long-term use of oxycodone at high dose ($>90\text{MME}$), gabapentin and naproxen. **Objective findings** were Neck Disability Index (44%) and pain rating 8/10 on numeric rating scale. **Intervention and outcome:** A trial of spinal manipulative therapy was performed. Positive results included improved Neck Disability Index score (26%) and pain reduction (4/10) after 6 visits. This resulted in the initiation of a pharmacological consult by the chiropractor with goals of reducing the patient's opioid levels, which was implemented by the patient's PCP. Conservative treatment was continued with the chiropractic service. **Conclusion:** Management of an opioid legacy patient with non-pharmacological intervention is presented. Further educational opportunities on opioid tapering strategies and non-pharmacological options may be warranted. (This is a conference presentation abstract and not a full work that has been published.)

Discomfort during setup of side posture hypothernar/iliac push manipulation

Simon Wang, Cory Niedjalski, Sheilah Hogg-Johnson

Objective: Discomfort during spinal manipulation is poorly documented and discomfort due to setup positioning alone has not been investigated. The purpose of this study was to examine whether the setup positioning of a side posture for Hypothernar/Iliac Push manipulation produces discomfort in asymptomatic individuals. **Methods:** Asymptomatic participants were recruited from the student population of a chiropractic college. Sixty-nine participants were set up in pre-manipulative positioning for side posture Hypothernar/Iliac Push manipulation and asked to rate their comfort on an 11-point Likert scale (0 = most comfortable, 10 = most uncomfortable) while standing and while in left and right side posture. **Results:** Discomfort increased from standing to setup position for at least one side in 30.4% (95%CI 19.3-41.6) of participants and on both sides for 10.1% (95%CI 2.8-17.5) of participants. Mean comfort rating while standing was 0.19 (SD 0.49). Mean change in comfort for those reporting important change (>2 points) was 3.10 (SD 1.66) on the left and 2.67 (SD 1.24) on the right. **Conclusion:** Setup positioning for side posture Hypothernar/Iliac Push manipulation led to decreased comfort ratings in approximately one third of young, asymptomatic participants. This is likely an underestimation of what is seen clinically. (This is a conference presentation abstract and not a full work that has been published.)

The immediate effects of cervical spine manipulation on upper extremity ergometer performance to muscle failure in asymptomatic participants

John Ward, Jesse Coats, Ken Sorrels

Objective: To determine if cervical spinal manipulative therapy (SMT) impacted upper extremity ergometer performance to muscle failure in asymptomatic participants. **Methods:** Forty-six college students were randomized into three study groups using an AB:BA crossover study

design with an additional control arm (BB). Each week, of the two-week protocol, participants engaged in an upper extremity ergometer test at 50 W resistance for females and 100 W for males while maintaining 50 rpm until muscle failure. Group 1(AB) received cervical SMT prior to testing during week one and no SMT prior to testing during week two. Similarly, group 2(BA) received no SMT during week one but received SMT during week two. Group 3(BB) did not receive SMT either week. Exercise time to exhaustion, exercise heart rate, blood lactate, post 1-min Rating of Perceived Exertion (RPE), and post 5-min RPE were recorded during each session. Results: There was no statistically significant difference between SMT and no-SMT conditions for time to exhaustion ($p=0.712$), heart rate ($p=0.220$), blood lactate ($p=0.462$), post 1-min RPE (0.804) and post 5-min RPE (0.561). Conclusion: This research demonstrates that cervical SMT does not impact upper extremity ergometer performance in asymptomatic participants. (This is a conference presentation abstract and not a full work that has been published.)

Decreased neurologic pain signature activation following thoracic spinal manipulation in healthy volunteers and participants with neck pain

Kenneth Weber, Tor Wager, Sean Mackey, James Elliott, Wen-Ching Liu, Cheryl Sparks

Objective: To introduce brain-based models of pain in manual therapy research, characterize the central mechanisms of spinal manipulation (SM), and advance the validation of these models as potential biomarkers of pain. Methods: We performed a secondary analysis of two functional MRI studies investigating the effect of thoracic SM on pain-related brain activity: 1) A non-controlled study in healthy volunteers ($n=10$) and Study 2) a randomized controlled study in acute to subacute neck pain participants ($n=24$). Pain-related activity due to noxious mechanical stimulation of the right index finger was studied within brain regions predictive of physical pain defined by the Neurologic Pain Signature (NPS). Results: In Study 1, evoked mechanical pain ($p<0.001$) and NPS activation ($p=0.010$) decreased following SM, and the changes in evoked pain and NPS activation were correlated ($r=0.418$, $p=0.016$). In Study 2, neck pain ($p=0.046$) and NPS ($p=0.033$) activation decreased following verum but not sham SM. Associations between evoked pain, neck pain, and NPS activation, were not significant and less clear. Conclusion: The findings provide preliminary evidence that SM may alter the processing of pain-related activity within specific pain-related brain regions and further validate the use of brain-based models as biomarkers of pain. (This is a conference presentation abstract and not a full work that has been published.)

An evolving model of whole health at one VA facility

Susan Wenberg, Teri Davis

Objective: To illustrate the evolving structure of a Whole Health Program at one VA facility. Patient centered active care is known to improve healthcare outcomes. Through Whole Health, veterans are introduced to a patient centered active care model and are offered the opportunity to explore CAM approaches such as yoga, qigong, meditation, gardening, and wellness education. Implementing such a multifaceted program in an established medical setting is challenging. Methods: Our Whole Health Program began in a facility which offered one weekly yoga and one weekly qigong class in 2015. Training, space, staffing, and stakeholder buy-in were required to grow the program. Results: Currently 13 distinct types of movement classes are offered to veterans each week, 2 are also offered to rural veterans via telehealth. Mind-body training, meditation, and health care education classes are offered weekly. Programs originally led by MDs, DCs, or PTs are now being taught by Whole Health coaches and educators. Conclusion: There is no unified model for incorporating an active care program in an existing healthcare system. We illustrate the dynamic nature of one program in a multidisciplinary setting. Staff chiropractors have contributed to Whole Health services both directly and indirectly. (This is a conference presentation abstract and not a full work that has been published.)

Best practice recommendations for chiropractic management of patients with neck pain

Wayne Whalen, Ron Farabaugh, Cheryl Hawk, Amy Minkalis, William Lauretti, Louis Crivelli, Michael Sheppard, Sheryl Walters

Objective: To develop a set of evidence-based best practice recommendations for chiropractic management of adult patients with neck pain. Methods: A steering committee of experts in chiropractic practice, education and research drafted a set of recommendations based on the most current relevant clinical practice guidelines. Additional supportive literature was identified through targeted searches conducted by a health sciences librarian. A national panel of chiropractors representing expertise in practice, research, and teaching rated the recommendations via a formal Delphi consensus process. This process was conducted using the RAND Corporation/UCLA methodology. Results: Fifty-six panelists rated the 50 statements/concepts and reached consensus on all statements within three rounds. The statements/concepts covered key aspects of the clinical encounter, from informed consent through diagnosis, assessment, treatment planning and implementation, and concurrent management and referral. Conclusions: A set of best practice recommendations for chiropractic management of patients with neck pain based on the best available evidence reached a high level of consensus by a large group of experienced chiropractors. For uncomplicated neck pain, including neck pain with headache or radicular symptoms, manual therapy including manipulation and multi-modal care are recommended front line therapies. (This is a conference presentation abstract and not a full work that has been published.)

Impact of chiropractic care on use of prescription opioids

James Whedon, Andrew Toler, Louis Kazal, Serena Bezdjian, Justin Goehl, Jay Greenstein

Objective: Utilization of non-pharmacological pain management may prevent unnecessary use of opioids. We evaluated the impact of chiropractic utilization upon use of prescription opioids. Methods: We employed a retrospective cohort design to analyze health claims data in three contiguous U.S. states over a six year period. Subjects included adults aged 18-84 years with office visits to a primary care physician or chiropractor for spinal pain. Recipients received both primary care and chiropractic care; Non-recipients received primary care but not chiropractic care. We performed adjusted time to event analyses to compare risk of filling an opioid prescription. We stratified the recipient populations as: acute (first chiropractic encounter within 30 days of diagnosis) and non-acute (all other patients). Results: Overall, between 1.55 and 2.03 times the number of non-recipients filled an opioid prescription, as compared to recipients (HR: 1.55 to 2.03, $p<0.0001$ to 0.01). Similar differences were also observed for the acute groups. Conclusions: Patients with spinal pain who saw a chiropractor had roughly half the risk of filling an opioid prescription. For patients who saw a chiropractor within 30 days of diagnosis, reduction in risk was greater as compared to those seen after the acute phase. (This is a conference presentation abstract and not a full work that has been published.)

Implementation of the primary spine care model in a multi-clinician primary care setting: initial outcomes

James Whedon, Andrew Toler, Serena Bezdjian, Justin Goehl, Robb Russell, Louis Kazal, Melissa Nagare

Objectives. Primary Spine Care (PSC) is an innovative approach to the care of Spine-Related Disorders (SRDs). A specially trained clinician serves as the initial point of contact, coordinates all spine care, and follows up throughout the episode. Our objective was to compare the value of PSC with that of usual primary care. Methods. We retrospectively examined clinical health records and claims data. PSC was provided at Site I and usual care at Sites II and III. For cost outcomes, we employed a controlled quasi-experimental design. For clinical outcomes, we compared care at Sites I, II, and III, all with reference to usual care at Site I. Results. At Site I, average per patient expenditure was \$162 in Year 1 and \$186 in Year 2, as compared to Site II (\$332 in Year 1; \$306 in Year 2), and Site III (\$467 in Year 1; \$323 in Year 2). Patients who received PSC care were 72% less likely to receive spinal diagnostic imaging. Conclusions. PSC was associated with reduced total expenditures and a lower likelihood of diagnostic imaging of the spine as compared with usual primary care. (This is a conference presentation abstract and not a full work that has been published.)

The use of FSTT™ in teaching force and loading rate control to chiropractic students

Shari Wynd, Brad Koby, Amy Arton

Objectives: To examine the use of Force Sensing Table Technology™ (FSTT™) in assessing control of peak applied forces (PF) and loading rates (LR) during the application of high-velocity low-amplitude (HVLA) thrusts. **Methods:** Chiropractic students with 2-years of HVLA training were instructed to apply a diversified mid-thoracic posterior-to-anterior (P-A) HVLA thrust on a mannequin using 100%, 50%, and 10% of their effort. Demographic and HVLA data were collected and statistically analyzed using SPSS (IBM, version 21). **Results:** The mean PF application at 50% effort ($401.1\text{N} \pm 15.7\text{N}$) was not significantly reduced when compared to the 100% effort ($423.8\text{N} \pm 16.9\text{N}$); however, the 10% effort PF was significantly reduced ($258.4\text{N} \pm 12.0\text{N}$, $p < 0.01$) but not representative of a 10% effort. LR were similar for the 100% and 50% efforts, $2238.1 \pm 137.6\text{N/s}$ and $2272.1 \pm 116.5\text{N/s}$ respectively, but at 10% effort, LR were significantly reduced ($1372.8 \pm 67.2\text{N/s}$, $p < 0.01$). **Conclusions:** PF and LR at 100%, 50%, and 10% effort can be measured using FSTT™ and can provide insight into the level of control students have when performing HVLA thrusts. (This is a conference presentation abstract and not a full work that has been published.)

Using Force Sensing Table Technology™ (FSTT™) to examine the relation between lung function and treatment force in subjects with Chronic Obstructive Pulmonary Disease (COPD)

Shari Wynd, Victor Quiroz, Aladin M. Boriek

Objectives: To examine the forces applied during high velocity low amplitude (HVLA) thrusts on subjects with COPD and relate the measured force parameters to changes in lung function. **Methods:** A total of 12 subjects with COPD were enrolled in this study. Forced-expiratory volume in 1-second (FEV1) and Forced Vital Capacity (FVC) were measured before and after thoracic HVLA-thrusts that were performed on the subjects while lying on the FSTT™. Comparative and correlative statistics were performed on the collected spirometry and FSTT™ parameters. **Results:** FVC and FEV1 significantly increased by $12.8 \pm 3.0\%$ and $6.9\% \pm 2.7\%$, respectively following thoracic HVLA thrusts ($p < 0.01$). The mean applied peak force during the HVLA was $841 \pm 22.2\text{N}$. A linear regression analysis demonstrated that there was no correlation between the percent change in lung function and the applied peak force of the HVLA. **Conclusions:** Our data show that the force magnitude applied during an HVLA thrust are not directly correlated to the observed improved lung function. The precise mechanism responsible for improved lung function following HVLA thrusts requires further investigation. (This is a conference presentation abstract and not a full work that has been published.)

A curriculum review to identify gaps in evidence-based practice (EBP) competencies within a chiropractic teaching program

Destiny Yerby McElroy, Dana Lawrence, Katherine Pohlman

Objective: To assess if identified EBP competencies are being taught within a chiropractic educational program by conducting a thorough review of the curriculum. **Methods:** There were 3 phases in this study; we first reviewed each course syllabus to identify EBP learning objectives. Second, we conducted in-person interviews with each faculty member ($n=39$) to obtain in-depth information and lesson plans related to the identified EBP objectives. Finally, we matched the objectives and lesson plans to the desired EBP competencies ($n=7$) and identify existing gaps. **Results:** Twenty-two (59.5%) of faculty teach EBP, equating to 27 (48.2%) of classes in the program. Four of the desired competencies were found to be introduced in classes, including recognizing the role of EBP ($n=3$), the fundamentals of research ($n=17$), developing research questions ($n=3$), and conducting research ($n=4$). Competencies on critical appraisal, synthesis, and application were largely uncovered. **Conclusion:** We found the EBP competencies identified in this review were taught at an introductory level while several of the higher-level competencies were not taught at all. There is a need to develop a curriculum map to ensure all desired outcomes are introduced, practiced, and mastered. Efforts to engage faculty and administration also need consideration. (This is a conference presentation abstract and not a full work that has been published.)

Non-pharmacological management of soft tissue disorders of the shoulder: a clinical practice guideline from the Ontario Protocol for Traffic Injury Management (OPTiMa) collaboration

Hainan Yu, Pierre Côté, Jessica Wong, Heather Shearer, Carolina Cancelliere, Anne Taylor-Vaisey

Objective: To develop an evidence-based guideline for non-pharmacological management of shoulder soft tissue disorders (shoulder pain). **Methods:** This guideline is based on high-quality evidence from seven systematic reviews (search date up to April 26, 2019). A multidisciplinary expert panel formulated recommendations based on evidence of effectiveness, safety, cost-effectiveness, societal and ethical values, and patient experiences. **Results:** Clinicians should (1) rule out major structural or other pathologies; (2) in partnership with patients, provide care in addition to structured patient education; (3) for shoulder pain ≤ 3 months, consider cervicothoracic spine manipulation and mobilization as adjunct to usual care, thoracic spine manipulation, multimodal care (heat/cold, joint mobilization, range-of-motion exercise), or low-level laser therapy; (4) for shoulder pain > 3 months, consider stretching and/or strengthening exercise, laser acupuncture, cervicothoracic spine manipulation and mobilization as adjunct to usual care, thoracic spine manipulation, usual GP care (information, recommendation, pain contingent medical or pharmaceutical therapy), multimodal care (heat/cold, joint mobilization, range-of-motion exercise), or low-level laser therapy; (5) for calcific shoulder pain, consider shock-wave therapy; and (6) reassess the patient at every visit to determine whether a referral is indicated. **Conclusion:** Our guideline provides evidence-based recommendations for shoulder pain. (This is a conference presentation abstract and not a full work that has been published.)

How coping strategy affects chiropractic students' perceived stress

Niu Zhang, Charles Henderson

Objective: At our institution, we examined students' perceived chiropractic college stress (PCCS), coping strategies used, and how these strategies might correlate with PCCS. **Methods:** Four hundred and seven (407) first-quarter students were recruited. PCCS was assessed via a modification of Vitaliano's Perceived Medical School Stress survey instrument. This assessment was performed at the 1st quarter (PCCS1) and, 6 months later, at the 3rd quarter (PCCS2). The validated Brief COPE inventory was used to assess coping strategies in 1st quarter. **Results:** PCCS2 was greater than PCCS1. Male and female coping strategies were similar, with one exception. Female students used emotional support more than males. Of the 14 coping behavior subscales, both genders used "active coping," "acceptance," "planning", and "positive reframing" most frequently (top 4), while "venting", "denial", "behavioral engagement", and "substance use" were used least (bottom 4). Problem-focused and avoidant-emotion coping strategies correlated with PCCS1, while only avoidant-emotion correlated with PCCS2. **Conclusion:** We found increased perceived stress among students after 6 months in the chiropractic program. Gender correlation with perceived stress was small and not statistically significant. Both genders preferably used active coping strategies. The maladaptive avoidant-emotion coping strategies correlated with increased perceived chiropractic college stress. (This is a conference presentation abstract and not a full work that has been published.)

POSTER PRESENTATIONS

Impact of Force-Sensing Table Technology (FSTT) on student's self-perceived confidence when learning cervical techniques

Daniel Armstrong, Alex Naquin, Dana Hollandsworth

Objective: FSTT may provide a rich learning environment for chiropractic students to receive immediate objective and subjective feedback simultaneously to psychomotor skill development. This study explored students perceived confidence following the initial addition of the FSTT cervical lab with a goal to achieve a predetermined set of targets. **Methods:** A census sample of cervical technique students ($n=79$) were given formal instruction on how to practice bi-directional supine lateral cervical maneuver using FSTT mannequins and given targets to reach: preload (25-75N), impulse

force (125-175N) and speed (<110ms). Student's confidence levels were surveyed bi-directionally on a rating scale (1–10) prior to the formal instruction and prior to performing final practical. Results: Of the 64 consenting students (81.0%), 82.6% met the target goals at least once out of their three attempts and 45.6% met the targets with all attempts. Regardless of direction, self-perceived confidence was improved for all students irrespective of whether targets were met. Conclusion: Despite the small sample size, the use of FSTT may improve self-perceived confidence for all students learning cervical manipulation techniques. No differences were found for students meeting target goals or not. Further investigation of confounding factors needs to be conducted. (This is a conference presentation abstract and not a full work that has been published.)

Risk factors for pinguecula: a narrative review

Lisa Barker, Barclay Bakkum, Cynthia Chapman

Objective: Pinguecula is a common finding in the general population. It can lead to pterygium, which can have significant clinical implications, and other ocular problems, like dry eye. Even though the etiology of pinguecula is unknown, several risk factors for it have been identified. The purpose of this study was to determine what the literature reveals about the risk factors for pinguecula. **Data Sources and Selection:** This was a narrative review using the PubMed database and the term: pinguecula. The reference sections of newer articles were searched for any other pertinent articles. Consensus was reached among the authors as to what articles had relevance for this study. **Results:** The PubMed search yielded 158 articles. Agreement was reached that 83 articles were pertinent to this study. **Conclusion:** Many risk factors of pinguecula cannot be regulated, including age and gender (male>female). Some may be changeable, depending on circumstances, such as geographical location (nearer the equator and drier environments), education level, outdoor occupations, and underprivileged conditions. Other risk factors, however, can more easily be modified, e.g., ultraviolet radiation exposure, smoking, alcohol consumption, and diet low in antioxidants. These data suggest recommendations for public health and patient education. (This is a conference presentation abstract and not a full work that has been published.)

Diagnosing acetabular labral tears with hip traction sonography: a case series

Jessica Billham, Stacey Cornelson, Amy Koch, Mero Nunez, Patricia Estrada, Norman Kettner

Objective: Three cases of acetabular labral tear (ALT) diagnosed with sonography (US) are reported. We aim to show utility for US as an adjunctive modality to the current diagnostic imaging of choice, magnetic resonance arthrography (MRA), for diagnosing ALT. **Clinical Features:** Three cases of young athletic patients with similar clinical presentations are reported. All received US examination of the hip with attention to the labrum that included a long axis hip traction technique which assisted in diagnosing ALT. **Intervention and Outcome:** In the first case, a conformational MRA and orthopedic consult were obtained. Arthroscopy was performed to correct the ALT. At most recent follow-up, the patient had not yet returned to sport. In the second case, an MRA and orthopedic consult were acquired, but surgery was delayed. Conservative management in the interim incorporated McKenzie method active care resulting in decreased pain and increased activity. The third patient declined an MRA. Conservative management consisted of McKenzie method active care, resulting in return to sport. **Conclusion:** These three cases demonstrate the clinical and sonographic presentation of ALT. The dynamic long axis hip traction protocol facilitated the use of US as an adjunctive modality for diagnosing ALT. (This is a conference presentation abstract and not a full work that has been published.)

Sacro Occipital Technique (SOT) and cranial treatment for a patient presenting with dysautonomia possibly secondary to vagal nerve entrapment in the jugular foramina: a case report

Thomas Bloink, Charles Blum

Objective: Dysautonomia has far reaching implications in a patient's health and wellbeing. This case discussed novel treatment for a patient presenting with dysautonomia unresponsive to various interventions. **Clinical Features:** A 29-year-old female Caucasian presented (2-year

duration unresponsive to medications) with nausea, chest "tightness, difficulty breathing, heart palpitations, significant anxiety, abdominal sensitivity to palpation, muscle tension in the cervical spine/TMJ regions, and increased symptom intensity (6-months). The patient was also co-treated with a dentist, cardiologist, and psychotherapist. **Intervention and Outcome:** SOT/Cranial evaluation/treatment revealed significant craniomandibular and dental-occlusal disorders, right cervical/suboccipital myofascial palpatory pain/hypertonicity, and sacroiliac joint dysfunction. Treatment focused on balancing her pelvis, craniomandibular region, and cervical spine, with particularly cranial treatment vagal nerve (jugular foramina) decompression. Immediately following treatment her heart palpitations stopped, chest tightness/breathing improved, anxiety reduced, and palpatory pain/tension to the abdominal region decreased significantly. The patient is still under care for TMJ issues but her symptoms have not returned in the months following the initial office visit. **Conclusion:** Further study into sympathetic/parasympathetic imbalance, associated with vagal nerve entrapment in the jugular foramina might be warranted. Greater research is needed to determine if chiropractic care might be helpful for other patients with dysautonomia. (This is a conference presentation abstract and not a full work that has been published.)

Sacro Occipital Technique (SOT) and dental co-treatment of a patient with increased eye pressures and related dysfunction: a case report

Thomas Bloink, Charles Blum

Objective: Describe care of a patient presenting with eye discomfort and pressure disorders. **Clinical Features:** A 52-year-old male Caucasian presented with increased eye pressures of 3-year duration measured at 21mm Hg in both eyes with left "bloodshot" eye when waking. His ophthalmologist determined he had an enlarged left-optic nerve and SOT examinations revealed cervical spine pain/dysfunction, pelvic torsion, and multiple craniomandibular disorders. **Intervention and Outcome:** Patient was treated twice-a-week for 4-weeks with SOT/cranial care to balance his pelvis, craniomandibular region, and cervical spine. He concurrently had dental co-treatment utilizing a lower occlusal splint to balance his occlusal forces. Once-a-week for 3-weeks following his chiropractic treatment he immediately received dental treatment to balance occlusal forces to the splint. Reexamination by ophthalmologist revealed eye pressure measurements of 16 bilaterally and optic nerve pressure had reduced and the patient no longer would awaken with a left "bloodshot" eye. Dental occlusion/TMJ translation had improved with normalization of his cervical spine motions and reduced pain. At 6-months without treatment his eye pressure was still below 20 and remained symptom free. **Conclusion:** Further study is needed to determine if dental chiropractic co-treatment can be helpful for treatment of eye pressure disorders. (This is a conference presentation abstract and not a full work that has been published.)

Sacro Occipital Technique (SOT) and dental co-treatment of a pediatric patient with increased eye pressures while receiving orthodonture care: a case report

Thomas Bloink, Charles Blum

Objective: Describe the care of a pediatric patient presenting with increased eye pressure, possibly related to orthodonture treatments. **Clinical Features:** An 11-year-old Caucasian male presented to the clinic due to an ophthalmologist examination revealing significant eye pressure increase over the past year from 16mm Hg bilaterally, to 29 right eye/23 left eye. It was noted this condition coincided with him undergoing orthodontic treatment. **Intervention and Outcome:** Patient was treated twice in one-week and one follow up visit (3rd) the following week. Treatment incorporated SOT/cranial care to balance his pelvis and cranium and support cranial compliance of orthodontic forces to his teeth and craniomandibular regions. On the 3rd-follow-up visit it was noted his eye pressures had returned to a normal reading of 16 bilateral. The patient continued to be treated approximately every 3-weeks during orthodonture treatment and without relapse of increased eye pressures during that time (1-year). **Conclusion:** Secondary iatrogenic findings are not uncommon during pediatric orthodonture care, however correlation to increased eye pressures has not been sufficiently studied in the literature. Further research is needed to determine if SOT/cranial care can be helpful for treatment of eye pressure disorders, possibly secondary to pediatric

orthodonture interventions. (This is a conference presentation abstract and not a full work that has been published.)

Whiplash-Associated Disorders (WAD) and Temporomandibular Joint Disorders (TMD): a review of the literature

Charles Blum

Objective: This literature review sought to determine if a relationship exists between TMD and WAD (secondary to motor vehicle collision accidents). If a relationship exists also considered was if chronic WAD might lead to chronic TMD related presentations. **Data Sources and Selection:** A search of Pub-Med was made for the search phrases: Whiplash, Temporomandibular Joint, TMJ, and TMD. While searching if an article appeared to be related to this topic, "similar articles" would be accessed and a search of all those lists was also performed. **Results:** The literature does support a relationship between WAD/TMD existing in both acute and chronic presentations. The relationship between WAD/TMD presentations has various possible causations: jaw-neck sensory-motor dysfunction, kinematic chain imbalanced function, deranged functional coupling between the jaw and head-neck motor systems, a WAD/TMD specific pathophysiology, and a symptom cluster of potentially regional and widespread pain impacted by psychosocial factors. One study noted that some patients with chronic cervical spine dysfunction and TMD following a WAD, might only successfully recover when their concurrent TMD condition was treated. **Conclusion:** The literature does support the relationship between WAD/TMD, and also does support a delayed response for TMD presentations post accident WAD. (This is a conference presentation abstract and not a full work that has been published.)

Making a case for genomics in chiropractic education

Kara Burnham, Leslie Takaki

Objective: Genomics is informing and changing healthcare with the expectation it will be used in routine care. This study surveyed chiropractic college graduates to determine their experience with patients and genetic testing and their own comfort with genomics. These results helped inform the curriculum of an introduction to clinical genomics class for chiropractic students. **Methods:** A survey of ten Likert scale questions and one open ended question was emailed to chiropractic college graduates. The Likert questions included items regarding patients and direct to consumer (DTC) genomic testing (e.g., 23andMe®), clinical experiences with genomics-related topics, and opinions on genomics. Spearman correlation determined if a relationship existed between year of graduation or years in practice and opinions on genetics education. Content analysis was performed for the open ended question. **Results:** Out of 181 responses, 42% have had patients ask them about DNA test results 1-3 times per month. Analysis revealed very weak correlations with years in practice and (DTC) genomic testing and clinical experiences with genomics-related topics. Content analysis found two categories and six themes. Themes included making chiropractors relevant and interest in nutrigenomics. **Conclusion:** An introductory course in genomics is needed to prepare chiropractors for practice. (This is a conference presentation abstract and not a full work that has been published.)

Chronic abdominal post-operative pain: a case for conservative management

Bianca Catalano, Nathan Hinkeldey, Heather Meeks, Brittnei Scott

Objective: To present a case of chiropractic management of chronic low back pain following surgical hernia repair. **Clinical features:** A 70-year-old Veteran presented to a Veteran Affairs chiropractic clinic with a 26-year history of worsening low back pain that traveled to the left anterior hip, groin and into the scrotum. The pain began after a left inguinal hernia repair. Aggravating movements included standing erect and sitting was palliative. There was no clinically significant relief with epidural steroid injection, chiropractic treatment, and assessment by general surgery. **Intervention and outcome:** The veteran reported to the chiropractic clinic for a total of five visits within a ten-week time period. Interventions included spinal manipulation, instrument assisted soft tissue manipulation, static posture support, and therapeutic exercises targeting the anterior chain. Treatment allowed for complete resolution of the chief complaint, re-engagement into exercise, fifteen pound weight reduction, and improvement in the

following: PROMIS Pain Interference 6B (raw 24 to 12), Oswestry Disability Index (52% to 6%), and pain catastrophizing scale (31 to 8). **Conclusion:** Multimodal care including manual therapy to the post-surgical scar, provided in a hospital-based chiropractic clinic, was effective in resolution of chronic low back pain. (This is a conference presentation abstract and not a full work that has been published.)

Manipulation force characteristics and clinical outcomes of prone thoracic spinal manipulation in chiropractic students with neck pain: a pilot study

Grand Choi, Martha Funabashi

Objective: Despite recent work characterizing force-time characteristics of spinal manipulation therapy (SMT), their clinical significance remains unknown. This study aimed to explore SMT force-time characteristics and clinical outcomes in chiropractic students with neck pain. **Methods:** Participants completed VAS measures of pre- and post-SMT perceived neck pain and stiffness, and post-SMT comfort and global improvement. A thoracic posterior-to-anterior SMT was applied by a experienced chiropractor while the SMT transmitted forces characteristics were recorded using force-sensing table technology (FSTT®). Preload force, total peak force, and time to peak were extracted from FSTT® software and analyzed. **Results:** Preliminary results from 11 participants (36% female) aged between 23-29 years show preload forces ranged between 146-220N, total peak force between 394-671N, and time to peak between 92-106ms. On average, pain decreased by -6.7mm (range: +3 to -17mm) and stiffness by -12.2mm (range: -2 to -27mm). Mean SMT-related comfort was 11.5mm±9.8 and mean global improvement was 49.6mm±22.3. **Conclusions:** For the first-time, differences in self-reported neck pain and stiffness; comfort and global improvement in those experiencing neck pain were described together with their respective SMT force-time characteristics. Once completed (Nov 2019), this study will inform future work regarding SMT safety and efficacy. (This is a conference presentation abstract and not a full work that has been published.)

Nerve flossing in a patient with chronic radiculopathy who previously failed to respond to manipulation alone

Michael Cole, Gregory Reed, Ryan Diana

Objectives: The purpose of this case report is to present the chiropractic management of a patient who previously failed to respond to manual manipulation alone for low back pain with bilateral lower extremity radiculopathy. Who responded well to manual manipulation, flexion-distraction and neural flossing. **Clinical Features:** A 40-year old African-American male who previously failed to obtain long-term benefits from manual manipulation alone while seeking chiropractor care in the community presented to the VA for care. He presented to the clinic with chronic low back pain with bilateral lower extremity radiculopathy. Recent MRI displayed spinal and neural foraminal stenosis with multiple disc herniations of the lumbar spine and degenerative changes noted. **Intervention and Outcome:** Treatment consisted of manual manipulation, flexion-distraction, myofascial release, at home stretching protocol with the addition of neural flossing providing the best benefits of his radicular symptoms. Patient reported a decrease numeric pain rating score from 7/10 to 0/10 and Back Bournemouth from 35/70 to 0/70, with complete resolution of his radicular symptoms after adding neural flossing. **Conclusion:** Patients with chronic radicular symptoms even with disc herniation and spinal stenosis can benefit from conservative care, with neural flossing prescribed as an at-home protocol. (This is a conference presentation abstract and not a full work that has been published.)

A descriptive analysis of US chiropractic teaching institutions' clinical application of patient reported outcome measures and screening tools for low back pain patients

Jesse Cooper, Jordan Gliedt, Katherine Pohlman

Objective: With chiropractic education's clear impact on practice patterns, it is reasonable to hypothesize that the utilization of patient reported outcome measures (PROMs) and screening tools (STs) at chiropractic teaching institutions may be reflected in clinical practice. The first step to investigate this hypothesis was to describe the use of

PROMs and STs administered to low back pain (LBP) patients at US chiropractic institutions' teaching clinics. Methods: This descriptive analysis communicated with a representative at each US institution (n=19) who was knowledgeable of PROMs/STs use within their teaching clinic(s). Results: Representatives from 18 institutions (94.8%) indicated that only one (5.6%) did not utilize PROMs/STs. The most common PROMs/STs reported were disability measurements, such as the Oswestry Disability Index (n=14), Patient Specific Functional Scale (n=3), and Roland-Morris Disability Questionnaire (n=2). Pain rating scales (n=12) was the most common pain measure used. Six institutional representatives reported the administration of psychosocial specific STs, such as Keele STarT Back (n=4). Conclusion: Most US chiropractic teaching institutions reported administering PROMs/STs to patients presenting with LBP. Only 1/3 used PROMs/STs designed to capture psychosocial determinants, which may reflect the current lack of understanding of the biopsychosocial model among practicing US chiropractors. (This is a conference presentation abstract and not a full work that has been published.)

Non-Hodgkins Lymphoma mimicking symptoms of typical low back disorder

Stephan Cooper, Mark Pfefer, Alexis Tucker, Jaden Butcher

Objective: Describe a case of primary Non-Hodgkins Lymphoma (NHL) of the spine with symptoms mimicking other common spine-related disorders. Clinical Features: A 40-year-old male experienced a new episode of back pain and right leg parasthesia. Intervention and Outcome: He consulted multiple (8) healthcare providers: a physician diagnosed a muscle strain, a chiropractor diagnosed SIJ and left T10 dysfunction, an athletic therapist and massage therapist diagnosed muscle strain and core weakness, a second chiropractor diagnosed discogenic LBP. Neurological tests were unremarkable. Symptoms centralized with end range loading. An MRI showed a L5-S1 paracentral disc extrusion. The thoracolumbar pain remained and was treated with SMT. Later the patient felt a "shock" and bilateral leg weakness. The ER physician concluded it was the disc herniation. He attended the second chiropractor again with progressive leg weakness. Radiographs were unremarkable. Thoracolumbar palpation recreated his symptoms. He was referred to a neurologist but prior had another episode of leg weakness. He attended the ER again with saddle anesthesia. A second MRI was performed identifying 3 masses and was subsequently diagnosed of follicular lymphoma. Conclusion: NHL can mimic typical LBP thereby delaying diagnosis. (This is a conference presentation abstract and not a full work that has been published.)

Common and uncommon muscle injuries identified in chiropractic practice utilizing diagnostic ultrasound

Stacey Cornelson, Ashley Ruff, Norman Kettner

Objective: Muscle injuries are commonly seen by chiropractors. Diagnostic ultrasound (US) is a quick and accurate way of establishing the extent of muscle injury. We describe a series of common and uncommon muscle injuries identified utilizing US. Clinical Features: Case 1: 31-year-old male with right groin pain and bruising after playing soccer; Case 2: 59-year-old male with left arm pain and a "popeye sign" after forceful elbow extension injury; Case 3: 24-year-old male with left thigh pain, swelling, and bruising after jumping over a wall; Case 4: 59-year-old male with right arm bruising and swelling after slipping on wet grass and striking his elbow on a rock; Case 5: 22-year-old male with left thigh pain after sliding into base during a softball game; Case 6: 13-year-old female with left thigh and groin pain and bruising after performing a gymnastics stunt. Intervention and Outcome: All patients underwent US evaluation. Grade 1 or 2 muscle injuries were diagnosed. These were treated conservatively with rehabilitation and passive modalities. Conclusion: US is more cost-effective for determining grade of muscle injury than magnetic resonance imaging. Chiropractors trained in US can utilize this imaging modality in the clinic setting. (This is a conference presentation abstract and not a full work that has been published.)

Investigating the link between skeletal muscle substance P levels of rats and quantitative ultrasound image texture utilizing multiple regression: an exploratory pilot study

Felipe Coutinho Kullmann Duarte, Michael Behr, Jeremy Simpson, John Z. Srbely, Dinesh Kumbhare

Substance P (SP) is enhanced in myotomes in a clinical population with myofascial pain syndrome. However, measurements of SP are invasive presenting difficulties when studying human populations. In comparison, quantitative b-mode ultrasound imaging is a non-invasive imaging technique has been used to detect differences in muscle texture between healthy and individuals with chronic skeletal muscle pain. Objective: To further validate this non-invasive analysis, we proposed investigating the link between SP and muscle texture changes as a secondary analysis from pre-clinical studies showing increased of SP in myotomes in presence of spine osteoarthritis and central sensitization. Methods: Ultrasound images of left rectus-femoris muscle from twenty-one male Wistar Kyoto rats were recorded (Vevo 2100 US-system) and after euthanasia muscle samples were promptly collected for western-blot SP testing. Results: Energy was a significant statistical predictor of the SP data ($0.0094 < 0.05$) and provided a linear regression model with an R-squared value of 0.3051. Conclusion: This analysis demonstrated that texture features have a small degree of predictive power when it comes to SP, and must be interpreted with caution. Future extensions of this work will include a larger dataset in to confirm these exploratory findings. (This is a conference presentation abstract and not a full work that has been published.)

Association between pregnancy-related hormones and lumbopelvic pain characteristics in pregnant women: a scoping review

Catherine Daneau, Mariève Houle, Mègane Pasquier, Stephanie-May Ruchat, Martin Descarreaux

Objective: The objective of this scoping review was to document and assess the potential associations between LBPP and pregnancy-related hormones. Data Sources and Selection: The literature search was conducted in six databases and completed using search terms relevant to pregnant women, pregnancy-related hormones and LBPP. The risk of bias for each studies was assessed using the criteria recommended by Guyatt et al. for observational studies. Results: Four studies out of nine reported an association between relaxin and LBPP. One of these studies was considered as having a low risk of bias whereas among the five studies reporting no association, two were considered as having a low risk of bias. One study (moderate risk of bias) showed that progesterone levels were found to be significantly higher in pregnant women with PGP compared to women without PGP while estrogen concentrations were similar in both groups of women. Conclusion: Based on limited and conflicting evidence, and due to the overall poor quality of the literature, we cannot conclude that there is an association between pregnancy-related hormones and LBPP characteristics. More studies of higher methodological quality are needed to better describe the possible association between pregnancy-related hormones and LBPP. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractic care and specific exercises or bracing in adolescent idiopathic scoliosis: a narrative review

Natalie Day, Adrian Hunnisett, Christina Cunliffe

Objective: The use of bracing in scoliosis is becoming controversial with some claims of overprescribing. The aim of this review is to investigate whether scoliosis-specific exercise (SSE) and chiropractic manipulation could be recommended in the first instance in mild cases. Data sources & selection: Database searches were conducted on PubMed, Cochrane and BioMed Central (Scoliosis and Spinal Disorders) using the following search terms: 'exercise AND scoliosis', 'PSSE AND scoliosis', 'Schroth AND scoliosis', 'SEAS AND scoliosis'. All forms of research from peer reviewed journals between 2014-2017 were considered and screened against strict inclusion/exclusion criteria. Results: A total of 90 research articles were identified and, following screening, 5 articles met the inclusion/exclusion criteria and were considered for review. All papers reviewed returned favorable results for exercise and chiropractic as part of the management plan for scoliosis, halting curve progression and reducing curve. The quality of evidence, however, was judged to be low to moderate. Conclusion: Despite the lack of high quality research, the evidence reviewed suggests that exercise and chiropractic manipulation should be recommended in the first instance for scoliosis

curves <30° Cobb as an alternative to bracing. Further high quality clinical trials are warranted. (This is a conference presentation abstract and not a full work that has been published.)

Comparison of the effects of ergonomic chair design on videonystagmography and cognitive performance

Emily Drake, Mark Vettrano, Stephanie Sullivan, Ron Hosek, Michael Longyear, Brent Russell, Shannan Behrens, Sadeddin Yamlikha

Objective: To assess whether chair design had an impact on videonystagmography (VNG) and cognitive performance following short-term sitting. **Methods:** Individuals (n=29) performed baseline assessments in a plastic chair: simple and choice reaction times, Stroop test, and saccadic eye movements. Following randomization, participants were acclimated to either the mid-grade or high-end ergonomic chair for fifteen minutes and then post tested. **Results:** Latency and accuracy values were analyzed for each assessment. Individuals in the high-end chair showed better baseline to post latencies in 700ms and 1100ms simple reaction time, left eye horizontal saccades, and left eye vertical saccades with significant within group changes for the Stroop test ($p=0.045$). Accuracy in Stroop and left eye vertical saccades were also better in the high-end chair. Individuals in the mid-grade chair demonstrated better latencies in 500ms and 900ms simple reaction time, choice reaction time, right eye horizontal saccades, and right eye vertical saccades. Better accuracy on choice reaction time, horizontal saccades and right eye vertical saccades were also demonstrated. **Conclusion:** Changes in latency and accuracy were mixed when comparing high-end to mid-grade ergonomic chairs after short-term sitting. More research is needed to assess chair design's impact on performance. (This is a conference presentation abstract and not a full work that has been published.)

Reciprocal inhibition for management of acute shoulder pain: a case report

Nick Dugger, Nathan Hinkeldey, Tanner Morris, Michael Tunning

Objective: To describe the treatment of acute shoulder pain, upper extremity weakness, paresthesia, and associated fear of movement. **Clinical Features:** A 35-year-old female presented to a Veteran Affairs chiropractic clinic with right shoulder pain and paresthesia from the cervical spine to the C6 and C8 dermatomes. She was injured attempting to catch her falling husband. Shoulder abduction was unable to be performed as a result of severe pain, and median and radial nerve tension tests reproduced pain and paresthesia. Most notably, cervical spine retraction extension resulted in severe aggravation, muscle spasm, and peripheralization resulting in the need to cease the movement. **Intervention and Outcome:** Treatment included diaphragmatic breathing, manual therapy, and graded shoulder D2 movement. She reported for 3 visits over six weeks. Upon discharge she reported full recovery. The PROMIS-29 and PROMIS Pain Interference 6B both illustrated complete resolution. Longitudinally, a follow up phone call was performed 2.5 months following discharge and the relief was sustained. **Conclusion:** Graded exposure produced a positive outcome in the management of this case of acute shoulder pain. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractic management as a treatment in Deformational Plagiocephaly: a narrative review

Karen Forsyth, Adrian Hunnisett, Christina Cunliffe

Objective: Increasing incidence of deformational plagiocephaly (DF) is now a recognized factor for neuro-developmental delay in children. This study aims to investigate whether there is literature support for chiropractic in managing and resolving DP. **Data sources & selection:** Database searches were conducted on PubMed, ERIC, AMED, Cochrane Database, CINAHL, DARE, and Science Direct to identify studies that have evaluated the use of chiropractic as a treatment for DP. All forms of research from peer reviewed journals between 2008-2017 were considered and screened against strict inclusion/exclusion criteria. **Results:** A total 17 articles met the inclusion/exclusion criteria and were considered for review. The study found a lack of high-quality published studies. However, the results from those studies that have been performed report a high rate of success of chiropractic in resolving DP. The review suggests a lack of consistent diagnostic

criteria, no universal tool treatment effectiveness and no universally accepted management strategy as hindering factors. **Conclusion:** Chiropractic care may be a successful form of treatment in the management of DP. Future research is warranted into the development of universal guidelines to diagnose, classify and measure the progression of DP, both aesthetically and neuro-developmentally. (This is a conference presentation abstract and not a full work that has been published.)

Assessing the feasibility of implementing a fall risk assessment program in a VA chiropractic clinic

Jonathan Free, Kena McDermott, Anthony Lisi

Objective: To evaluate the implementation of the screening and assessment portion of the Stopping Elderly Accidents, Deaths, and Injuries (STEADI) algorithm for fall risk screening. **Methods:** This was a program assessment of a quality improvement project, analyzing the screening and assessment portions of the STEADI algorithm in a Veterans Affairs (VA) chiropractic clinic. Screening included the Stay Independent Brochure (SIB) questionnaire and three key questions (3KQ) completed prior to or at the beginning of the encounter. A score of ≥ 4 on the questionnaire or "yes" answer to one of the 3KQ required a timed up and go test, 4 stage balance test, and 30 second chair stand test. Total time for testing was measured and qualitative feedback from DC clinicians was obtained. **Results:** To date 11 patients completed the SIB questionnaire with 9 patients requiring assessment. Assessment testing added an average of 2 minutes and 41 seconds to the standard chiropractic evaluation. Clinicians reported the process was manageable within a standard clinical encounter. Patients expressed appreciation for fall risk assessment. **Conclusions:** Implementation of screening and assessment portions of the STEADI fall risk algorithm was feasible during typical VA chiropractic clinical encounters. (This is a conference presentation abstract and not a full work that has been published.)

Manipulation force characteristics for older adults using mannequin simulators

Martha Funabashi, Katie De Luca, Samuel Howarth, Steven Tran, David Starmer, Greg Kawchuk

Objective: Despite advances in spinal manipulation therapy (SMT) force-time characterization, little is known regarding forces applied to older adults (age ≥ 65). This study aimed to describe SMT force-time characteristics of two techniques commonly used to treat older adults. **Methods:** Characteristics of SMT transmitted forces were recorded using the force-sensing table technology (FSTT®) during two techniques. Following the methodology of a previously published study, both techniques were applied five times to the thoracic region of three human analogue mannequins by a chiropractor with eleven years of clinical practice in treating older adults. Preload force, total peak force during SMT and time to peak were extracted from FSTT® software and analyzed. **Results:** Bilateral hypothernar transverse push technique presented force magnitudes of $162N \pm 18$ during preload, $400N \pm 30$ total peak force and $101ms \pm 6$ time to peak. Crossed-bilateral hypothernar push presented force magnitudes of $201N \pm 32$ during preload, $541N \pm 52$ total peak force and $166ms \pm 22$ time to peak. **Conclusions:** For the first time, force-time characteristics of two SMT techniques applied to older adults were described. These are comparable to the force-time characteristics in the adult (age 18-65) population. This study will inform future work regarding SMT safety and effectiveness for older adults. (This is a conference presentation abstract and not a full work that has been published.)

The effects of cervical adjustment on sensorimotor function in asymptomatic subjects

Igor Generalov, Adrian Hunnisett, Christina Cunliffe

Objective: The aim of this study was to investigate the effects of cervical spine adjustment on sensorimotor function of asymptomatic patients using an innovative assessment of force estimation. Findings from the study may assist in gaining a better understanding of existing neurophysiological mechanisms behind chiropractic adjustment. **Method:** Following ethical approval, 25 asymptomatic participants were recruited to an observational pilot study. Active cervical range of motion (CROM) in lateral flexion and rotation, hand grip maximum voluntary isometric contraction (MVIC) and surface electromyogra-

phy of flexor carpi radialis during MVIC was recorded, and compared, pre & post cervical spine adjustment using Toggle-Torque-Recoil adjustment, specifically including cervicothoracic junction. Results: The adjustment to cervicothoracic junction (C7-T1) resulted in more accurate force sense estimation during sensorimotor task ($p=0.005$). CROM outcomes between pre and post-intervention indicated a statistically significant difference in all assessed planes of movement ($p<0.001$). Conclusion: This study provides preliminary evidence that cervicothoracic adjustment can improve sensorimotor function in the hand of asymptomatic patients. It contributes to recent findings associating improvements in sensorimotor function following chiropractic adjustment. (This is a conference presentation abstract and not a full work that has been published.)

Survey of students' perceptions of the jurisprudence, ethics, and business management course at the Canadian Memorial Chiropractic College

Brian Gleberzon

Objective: The objective of this study was to ascertain students' perspectives of the restructured 'Jurisprudence, Ethics and Business Management' course taught at a chiropractic program. Methods: This study was approved by the REB. A paper survey was distributed to all enrolled students during the 2018-19 academic year. Using a 5-point Likert scale, students were asked to opine on the (i) presentation and (ii) relevance of the lectures, small group sessions and online business management modules, in addition to the course assignments. Students were required to sign a consent form which was separated from their survey prior to data extraction, ensuring respondent confidentiality. Results: Survey response rate was 95% (177/185 students). On average, over 80% of respondents 'strongly agreed/agreed' the lectures, small group session and course assignments were well presented and important for them to know as future chiropractors. However, respondents were much more critical of the content and structure of the online business modules (on average, 40% 'strongly agreed/agreed'). Conclusions: The information from this survey will not only enable refinement of future versions of this course but it may assist in the development of a standardized course curriculum for all chiropractic programs worldwide. (This is a conference presentation abstract and not a full work that has been published.)

Four sensory pillars: a teaching model for collaborative patient care

Victoria Graham, Susan Wenberg

Objective: Interprofessional education (IPE) is valued to improve healthcare outcomes. Translation to interprofessional clinical practice (IPC) is challenging. This review examines the status of educational pedagogy seeking to translate IPE to IPC. Data Sources and Selection: The literature was searched using EBSCOhost, Google Scholar, PubMed and Science Direct. Indexing terms included IP teaching models, education and care. Studies were selected if they included two or more professions, and translation to IPC. Results: IPE is effective in changing student's perceptions and biases. Translation to IPC is practice area specific with various theories and models proposed in the literature. Conclusion: We present a teaching model for collaborative patient care with a systems approach rather than a profession specific model. There is need for more research into best teaching models for translating IPE to IPC. (This is a conference presentation abstract and not a full work that has been published.)

Post-operative hip pain: a case of resolution following end range loading and directional preference

Cael Halfman, Nathan Hinkeldey, Harold Olson

Objective: To describe a case of post-Ganz procedure hip pain resolving with manual therapy and end-range loading. Clinical Features: A 35-year-old male patient reported to a Veteran Affairs chiropractic clinic with four years of chronic hip pain following a Ganz procedure. Provocative factors included sustained posture or movements and relieving factors included position changes. His examination was most notable for a lack of hip internal rotation and pain with attempt. His end range loading examination was consistent with right hip posterior derangement. Intervention and Outcome: The initial treatment consisted of end-range loading of the hip joint Fifty

percent relief following end range loading with clinician overpressure occurred on visit one. Following three visits of end range loading along with manual therapy, his hip complaint resolved. He did present three weeks later with a re-aggravation of his hip pain; however, this resolved in another visit. The patient followed up two weeks later with no complaint. Conclusion: End range loading and manual therapy in this case produced complete resolution of chronic hip pain post-Ganz procedure within a hospital-based chiropractic clinic. (This is a conference presentation abstract and not a full work that has been published.)

A survey of Veterans Health Administration chiropractors and chiropractic clinics

Stephanie Halloran, Todd Kawecki, Anthony Lisi

Objective: 10-year follow-up survey assessing demographic and professional characteristics of Veterans Affairs (VA) chiropractors. Methods: A descriptive observational report of an electronic survey that was sent to all chiropractors identified with any VA appointment. REDCap electronic data capture tools were used. Data were exported to Microsoft Excel for statistical analysis. Results: We received 118 completed surveys from the 177 providers solicited (66.6% response rate). Respondents were predominantly VA employees (95.8%), male (77.1%), mean age 47.1 years old, and reported at least 75% of their time being spent on clinical care. Approximately half report supervising chiropractic or other health professions students, and 29.6% report authorship of >2 peer-reviewed publications. The average clinician sees 6-15 new consults and 31-60 follow-up visits per week. Largely similar to the results of the 2009 VA survey, diversified and flexion-distraction techniques along with myofascial therapies, therapeutic exercises, and self-management advice are the most commonly employed interventions. In contrast with the prior survey, our respondents were more likely to be employees (95.8% vs 67%), female (33% vs 6%) and have published peer-reviewed work (43.2% vs 33%). Conclusion: Characteristics of the VA chiropractic workforce have evolved over the past decade. (This is a conference presentation abstract and not a full work that has been published.)

Cultural competence in chiropractic education: a research study to evaluate the knowledge and perceptions about cultural competence in the doctor of chiropractic program at Life University

Charmaine Herman, Lewis Van Brackle, Nancy DeSousa Williams

Objective: Like other health professional programs, the Doctor of Chiropractic program (DCP) at Life University (LU) is challenged to train professionals to provide care that recognizes and understands the role of culture in influencing patient outcomes and preparing students to navigate changing demographics. The purpose for this research study was to investigate the knowledge and perceptions about cultural competence (CC) as a necessary skill set for the future Doctor of Chiropractic (DC). Methods: A desk review of the DCP curriculum at 17 chiropractic colleges was performed. LU DCP faculty ($n=66$), students ($n=486$) and alumni ($n=144$) completed surveys. Students ($n=12$) and faculty ($n=8$) participated in focus group discussions (FGDs) to evaluate the current curriculum and make suggestions for future CC inclusion. Tukey test and p-values were used to analyze survey data. Focus group data were analyzed for themes through content analysis. Results: Alumni ($p<0.001$) and faculty members ($P\text{-value}=0.013$) strongly agreed that CC was as a skill needed for future DC. Students in both groups agreed that a CC skill set is necessary for the 21st century DC and should be provided. Conclusion: The LU DCP curriculum should provide a CC course, module or integrate CC principles. (This is a conference presentation abstract and not a full work that has been published.)

Examining the correlates of successful performance on the NBCE's part IV exam

Igor Himelfarb, Bruce Shotts, Andrew Gow

Objectives: The objectives of this study are to: 1. identify factors predictive of performance on the Part IV exam, and 2. investigate relationships between the scores obtained in the Part I, Part II, Physiotherapy, and Part III exams and the Part IV examination. Methods: A random sample of $n = 1341$ records was drawn from NBCE data to investigate the relationships between the scores obtained on the NBCE exams. A hierarchical multiple regression

analysis related the performance on Part IV to examinee's gender, Part IV repeater status, and scores obtained on the Part I, Part II, Physiotherapy, and Part III exams. Results: The analyses revealed statistical relations among all NBCE exams. The strongest predictors of the Part IV score were found to be examinees' scores in Diagnostic Imaging, Chiropractic Practice, Physiotherapy, and the Part III exam. Conclusion: Performance on NBCE's Part IV exam is related to the performance in all other NBCE exams. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractic care and rehabilitation combined with myofascial release technique for a patient with a Harrington Rod fusion of C4-T4: a case study

Jesse Hodges, Jason Belcher

Objective: Use of chiropractic care and rehabilitation combined with myofascial release to treat a patient with a surgical fusion suffering from daily migraines over a 7-year period. Clinical Features: 21-year-old female presented with a CC of daily migraines for the past 7 years. Harrington rods were surgically placed to correct a cervicothoracic scoliosis from C4-T4. With OTC medication only providing temporary relief. All cervical ROM were decreased. Foraminal compression was positive bilaterally. Cervical distraction was positive with relief of pain. All MRS were within normal limits. Intervention and Outcome: Passive myofascial release technique was performed on the cervical spine along with a supine diversified chiropractic adjustment at C2. An immediate increase in all cervical ranges of motion were noted. Patient was seen 1 x week for 4 weeks and given stretches for the cervical spine to be done 3-5 times per day for 30 second holds each. Conclusion: Migraines decreased from daily, to one per week after two treatments. This demonstrates that chiropractic care along with myofascial release can potentially improve the quality of life of a patient even after major surgery of the spine and opens the door for future research. (This is a conference presentation abstract and not a full work that has been published.)

Ask your doctor before beginning a new diet: a chiropractic student survey

Gregory Hollandsworth, Vanessa Morales

Objective: Despite the increased emphasis on healthy lifestyles, throughout the literature there is no evidence that healthcare professionals understand nutrition and its application, including within the chiropractic profession. This study was done to assess chiropractic students' fundamental nutrition understanding as well as its clinical applications. Methods: Chiropractic students (n=69), who completed their nutritional and basic science courses, were invited to participate in this cross-sectional survey. Participants were asked 36 multiple choice questions: 18 for nutritional fundamentals (from a prior pediatric residents' study) and 18 for nutritional application (content validated questions by nutrition and chiropractic faculty). We used the scoring of <15% correct as the response criteria to stay congruent with the pediatric residents' study. Results: Fifty-two students (75.4%) completed the survey. When using the <15% correct response criteria, chiropractic students scored above the 15% threshold 100% of the time, whereas pediatric residents scored below the 15% threshold in three out of their eighteen questions. Conclusion: While more studies are needed, this survey found chiropractic students more proficient than pediatric residents regarding nutrition fundamentals. Additionally, this survey found chiropractic students to be proficient in nutrition application with regards to counseling for a healthy lifestyle. (This is a conference presentation abstract and not a full work that has been published.)

The effects of 4 weeks of chiropractic care plus physical therapy, compared to physical therapy alone, on motor function in chronic stroke patients: a pilot clinical trial

Kelly Holt, Imran Khan Niazi, Imran Amjad, Muhammad Shafique, Jens Duehr, Heidi Haavik

Objective: The primary objective of this study was to investigate the effects of 4 weeks of chiropractic care plus physiotherapy, compared to physiotherapy alone, on motor function in chronic stroke patients. Methods: This parallel group randomized controlled trial was conducted in a hospital setting in Rawalpindi, Pakistan. Fifty-five chronic stroke patients, with ongoing motor weakness, participated in

the trial. Participants were randomly allocated to receive either 4 weeks of conventional physical therapy alone, or 4 weeks of conventional physical therapy combined with 4 weeks of chiropractic care. The primary outcome measure was the Fugl-Meyer Assessment of Motor Recovery after Stroke (FMA). Groups were compared using linear mixed regression models. Results: After 4 weeks of care the group receiving chiropractic care improved by 23.2 points (95% CI 19.2-27.3) on the FMA and the physical therapy alone group improved by 17.1 points (95% CI 13.0-21.2). The between group difference (6.1 CI 2.19-10.2) was significant (p=0.04) in favor of the group receiving chiropractic care. Conclusion: In a group of chronic stroke patients, 4 weeks of chiropractic care combined with physical therapy, resulted in improvements in motor function compared to 4 weeks of physical therapy alone. (This is a conference presentation abstract and not a full work that has been published.)

Report of two cases of familial occipitalization in a father and daughter

Shaveen Jayalathge, Lauren Tollefson, David Mackenzie, Siddharth Patel

Objective: To report two cases of familial occipitalization the atlas (atlantooccipital-assimilation) occurring in a father and daughter, and to describe the pathologic features of this rare developmental anomaly. Clinical Features: Two patients initially presented with complaints unrelated to the cervical spine. A father (age-70) seeking maintenance care regarding a low back complaint (spanning 30 years), and a daughter (age-30) who began treatment in 2007 for cervical and thoracic spine pain. Following a motor vehicle collision in May 2019, the female patient had cervical radiographs to assess for traumatic injury. The radiographs revealed occipitalization of the atlas, unrelated to the trauma. Retrospective review of her father's radiographs obtained in 2014 revealed that he also had occipitalization—a finding not identified initially. Intervention and Outcome: The patients were informed of their anomalies and its clinical significance. Neither patient exhibited neurologic manifestations. Informed consent was provided by patients to carefully observe for manifestations, and to have CT/MRI examinations in the future, if warranted. Conclusion: To our knowledge, these cases are the only examples of familial occipitalization in the existing literature. These cases suggest the possibility of a potential genetic component concerning occipitalization. Future research and familial studies are suggested. (This is a conference presentation abstract and not a full work that has been published.)

Origins of x-ray use in chiropractic: historical qualitative analysis of the first 30 years of radiography advertising in the United States

Claire Johnson, Bart Green

Objective: To investigate the early use of x-ray advertising by chiropractors in the United States. Methods: This historical research qualitatively reviewed publicly available documents from 1895 to 1925 for information related to spinography, skiagraphs, and x-ray. Searches were performed in PubMed, Google Scholar, Google Books, Newspapers.com, electronic historical archives, chiropractic books, journals, and magazines. Results: At the turn of the 19th century, Americans were enthralled by x-rays, which were a symbol of scientific progress. When Roentgen discovered x-rays in 1895, the birth year of chiropractic, conventional medicine was an established profession and rapidly adopted x-ray as a treatment and diagnostic tool. The first "separate and distinct" legal argument used in 1907 to protect chiropractors from practicing without a license likely influenced how x-rays were communicated to the public. Chiropractors first began using and advertising x-ray in 1910. The advertisements were similar to other professions' x-ray ads during this era. The use of radiographs showed early attempts by chiropractors to validate their theories, to collect objective data, and to perform research. Conclusion: This study shows how chiropractors were communicating about the use of x-rays at the time when chiropractic was still emerging as a health profession. (This is a conference presentation abstract and not a full work that has been published.)

Engaging chiropractic students in basic research measuring Serum IL-1a levels in a Spared Nerve Injury (SNI) rat peripheral neuropathic pain model

Ward Jones, Alexandra Bishop, Clare Arko, Charles Arends, Randall Sozio, Stephen Onifer

Objective: Chronic pain is a world-wide problem with significant consequences that impact quality of life and health care resources. It is well established that various inflammatory markers, including cytokines, are linked to injury and pain. Also, these markers may be targets of chiropractic care leading to pain relief. Our goals included faculty-mentored student development of relevant biomarker protocols and quantitatively measuring IL-1a in (Spared Nerve Injury) SNI rat serum. **Methods:** In collaboration with colleagues, we collected blood samples from SNI rats. Students were engaged in developing testing protocols and measuring rat serum IL-1a levels using quantitative ELISA. **Results:** Initial qualitative cytokine array results suggested IL-1a may be elevated in SNI animals. As a follow-up, students further assessed serum IL-1a levels by quantitative ELISA. These results were not conclusive as levels were very low in both control and treatment animals. **Conclusions:** We met our goals of establishing biomarker measurement protocols and student-centered research. To further study cytokines, inflammation and chronic pain our future goals include developing studies specifically designed to measure biomarkers in chronic pain and determine the influence of chiropractic care on these markers. (This is a conference presentation abstract and not a full work that has been published.)

Health and wellness characteristics of chiropractic students in a DCP program

Koen Kallop, Sergio (Tony) Fernando, Monica Smith

Objectives: Describe wellness characteristics of DC students, and changes over time from start to finish of their Doctor of Chiropractic Program (DCP). **Methods:** All patients complete a wellness questionnaire during periodic re-evaluations. We collected data from former students (n=137) comparing responses from early vs late progress through their DCP. **Results:** Descriptive and inferential statistical analyses (Chi-square, paired t-test, and Sign Test) indicate most of our students: express high positive attitudes about their general state of well-being, outlook & Attitude (averages 8-9 on a scale of 10); report mid-range stress (average 4-5 on a scale of 10); participate in regular exercise (90%); reported behaviors that changed significantly ($p < .05$) over time in DC program; percentage Non-smokers increased from 96% to 99%; alcohol use was common, but decreased from 72% to 71%; caffeine drinkers increased from 54% to 73%; percentage that skipped meals increased from 34% to 40%. **Conclusions:** Other studies of young adults and our findings suggest need for further attention to potential use/misuse of alcohol and caffeine, and possible other substances, among our students. We invite collaboration with other colleges on future studies of student wellness. (This is a conference presentation abstract and not a full work that has been published.)

Literature review on chronic pain, Opioid Use Disorder, their relationship to empathy, and the effect of educational interventions on empathy. Prepared in advance of a research project titled; effect of a chronic pain and Opioid Use Disorder train

Jeffrey Kamper

Objective: The purpose of this literature review is to investigate how the degradation of empathy among health profession trainees and providers creates barriers to the delivery of patient-centered care, the possible impact of the Opioid Use Disorder (OUD) and treating chronic pain patients on physician empathy, and the use and effectiveness of educational interventions on improving empathy. **Data Sources and Selection:** The literature search was conducted through Logan University Learning Resource Center's data bases, including Pub Med, Google Scholar, EBSCOhost, and Cochrane Collection Plus. Key search words included: empathy, empathy training, opioid use disorder, chronic pain, Toronto Empathy Questionnaire, empathy measurement tools, educational interventions. **Results:** This literature revealed a failure to unveil any existing research investigating the possible impact of educational interventions which targeted improving the understanding of chronic pain and OUD on physician empathy. Additionally, the literature indicates that many attempts to provide empathy training have been ineffective. However, the work of several researchers supported the concept that training can influence attitudes and behaviors, including empathy. **Conclusions:** Despite the importance of empathy training, there exists a gap in the literature relative to the effects of chronic pain and OUD

training on physician empathy. (This is a conference presentation abstract and not a full work that has been published.)

High resolution sonographic properties of the normal sciatic nerve

Norman Kettner, Stacey Cornelson, Ashley Ruff, Courtney Wells, Roberta Sclocco, Patrick Battaglia, Daniel Haun

Introduction: The sciatic is the longest human nerve and thus exposed to a variety of insults including trauma and entrapment. High resolution ultrasound (US) of the normal sciatic nerve provides data for comparison with clinical disorders. **Methods:** We utilized 9 MHz US on a Logiq E9 (GE Milwaukee, WI) at 4 sites along (n=79) sciatic nerves of asymptomatic (24 females, 25 males, x age 27) to obtain cross-sectional area (CSA), and shear elastographic properties (kPa). Gender and BMI were recorded. The values were analyzed using mixed effects random intercept, and random slope models in Matlab (MathWorks Inc.) Nerve site, gender, and BMI were included as fixed effects. Factor significance was tested with ANOVA and post-hoc comparisons where appropriate. Significance defined at $p \leq 0.05$. ICC was computed for intra- and inter-examiner reliability. **Results:** Sciatic CSA was significantly decreased across each of the 4 sites from proximal to distal and correlated with BMI. Sciatic stiffness (kPa) was significantly elevated from proximal to distal. Gender differences were significant, male larger, and BMI was correlated with stiffness measures. Intra-rater reliability was moderate (0.70) and inter-rater was poor (0.40). **Conclusion:** High resolution US provides a comprehensive analysis of the normal sciatic nerve. (This is a conference presentation abstract and not a full work that has been published.)

Blood Flow Restriction therapy (BFR) for lower extremity injuries: a case series

Amy Koch

Objective: There is emerging support for BFR resistance training to increase mass and strength of muscles. Three cases of lower extremity post injury weakness were treated with blood flow restriction to improve strength. **Clinical Features:** Therapy was provided to three males post injury. Two cases involved meniscus tears and one case of Achilles tendinopathy. **Intervention and Outcome:** Three cases utilized a minimum of five BFR treatments. Treatments included BFR protocol using 80% blood flow restriction at high level. Patients initially performed squats on a shuttle and later progressed to body weight squats. They completed the 30/15/15/15 repetitions protocol in eight minutes followed by low-intensity laser treatment. All three cases demonstrated increased strength and functional improvement supported by increased shuttle resistance at subsequent visits and increased activity levels. Quadriceps and gastrocnemius circumference increased after each individual treatment, but returned to baseline measurements prior to the next treatment. Although the proposed outcome measures of increased quadriceps and gastrocnemius circumferences were not significant, increases in strength and function with pain reduction were demonstrated both subjectively and objectively. **Conclusion:** Blood flow restriction therapy can improve strength and function in the lower extremity of patients with ongoing weakness post injury. (This is a conference presentation abstract and not a full work that has been published.)

Recognizing our hidden faculty: 3-year outcomes of the Health Professional Educators (HPE) program in the Department of Family and Community Medicine at the University of Toronto

Deborah Kopansky-Giles, Judith Peranson

Background/Objective: The transformation of teaching units into interprofessional teams has created opportunities for non-physician teachers (Health Professional Educators - HPEs) to take on roles as teachers in Family Medicine (FM). The integration of HPEs has historically been implemented on an ad hoc, informal basis, with implications for the quality of education for both learners and teachers. **Methods:** The DFCM launched a faculty development (FD) program, co-lead by an HPE and physician, to identify support needs and implement strategies for optimizing HPE integration within clinical teaching units. Stufflebeam's CIPP model of program evaluation was used to describe the context, input, process/methods and products of this program. **Outcomes:** Inclusion of HPE objectives into DFCM's 2015-2020 strategic plan; creation of HPE faculty appointments guideline; increased # of HPE faculty appointments;

integration of co-leads into FD and other committees; 127 HPEs in Community of Practice; workshops at 8/14 sites, increased professional development offerings; 7 Scholarly conference presentations; successful grant application for HPE needs assessment. Conclusion: This initiative has resulted in a number of successful outcomes, including recognition and inclusion of HPEs, increased faculty appointments, and a growing Community of Practice. (This is a conference presentation abstract and not a full work that has been published.)

Practical innovation: the development of a physical medicine checklist

Erik Korzen

Objective: Checklists are utilized by skillful and knowledgeable professionals in complex situations. Based on the Surgical Safety Checklist, developed by the World Health Organization in 2007, research demonstrated a significant reduction in morbidity and mortality following implementation. I hypothesize that a Physical Medicine Checklist, consisting of basic management concepts and designed to be used in daily clinical practice, could improve the outcomes of patients treated by neuromusculoskeletal practitioners. **Data sources:** To assess the use of checklists, a PubMed search and review of the existing literature is presented, focusing on the use of checklists in medicine. **Results:** A compilation of sixteen articles and two books were reviewed in this discussion. The results of this study indicate that checklists can vastly improve patient safety, and in doing so, improve patient outcomes. Despite current research, the development of a checklist for the Physical Medicine realm has yet to be explored. **Conclusion:** Regardless of specialty, a physician's objective must always be a patient-centric outcome. A Physical Medicine Checklist has been developed, derived from the Surgical Safety Checklist, to facilitate appropriate evaluation and management of patients. (This is a conference presentation abstract and not a full work that has been published.)

Identification of Master Patient Index (MPI) record challenges from healthcare professionals' perspectives

Joe Lintz

Objective: To identify the gaps between the revenue cycle and patient information functionalities used in Electronic Health Records (EHRs) in collecting and reporting patient information. Additional focus was on perceptions of healthcare professionals who are familiar with MPI systems on the impact of these gaps of ensuring maximum reimbursements and adequacy of services provided. The study also sought to glean their perceptions vis-a-vis key challenges in the EHRs that affect organizational workflow. **Methods:** A semi-structured questionnaire was used to collect information from healthcare professionals responsible for the MPI. The population studied is healthcare organizations using EPIC as the Electronic Health Records (EHRs). **Results:** This study revealed systems gaps between EPIC and other downstream systems used by the healthcare organizations to process patient information, as well as the extent of patient matching challenges that healthcare professionals have encountered in the MPI. **Conclusions:** The study offered evidence found in the literature that implies that duplicate records continue to plague healthcare organizations. Widespread technological interoperability insufficiency among healthcare facilities points to future challenges for federal policy makers as they seek to promote interoperability programs to demonstrate meaningful use of certified electronic health record technology (CEHRT). (This is a conference presentation abstract and not a full work that has been published.)

Midfoot stress fractures in a patient with recurrent gout

Marc Lucente, Jeffrey Krabbe

Objective: To demonstrate the presentation of stress fractures in the recurrent gout patient. **Clinical Features:** A 39-year-old male with a previous diagnosis of gout presented with intense rubor, dolor, calor, and tumor of the right midfoot. History revealed no incidence of trauma. The patient reported that previous flareups resolved in several days, yet this instance had lingered for several weeks with far worse symptoms of pain, swelling, and redness. X-ray examination showed no appreciable gouty arthropathy. **Intervention and Outcome:** The patient was referred for MRI examination of the right foot. MRI revealed nondisplaced stress fractures of the cuboid and lateral

cuneiform. **Conclusion:** Gout is a common condition. Repeated attacks may compromise structural integrity of affected regions. Practitioners must be aware of the potential for further complications, including stress fractures, in the recurrent gout patient. (This is a conference presentation abstract and not a full work that has been published.)

Physical training approaches for chiropractic manipulation skill development: a narrative review

Mitchell Ludwig, Mark Pfefer, Stuart McIntosh, Steven Reece, Jaden Butcher, Rachel Gilmore

Introduction: Force sensing table technology is now becoming more available to assess and train doctor of chiropractic students. There are many proposed methods to improve manipulation skill but studies are lacking to guide best practices. The purpose of this project was to perform a narrative review of the literature on best approaches for training to improve motor control, strength, and speed. **Methods:** A search was conducted of biomedical literature using MEDLINE, CINAHL, SPORTDiscus. All eligible review articles were reviewed using SIGN critical appraisal checklists. Two independent reviewers performed the scoring of articles. **Results:** Twenty-seven articles were considered eligible for this review. Overall the quality and size of the reviewed studies were limited. All reviewed articles involved sports activities. No articles specifically related to spinal manipulation skill were reviewed. **Conclusion:** It is likely that a combination of motor control, standard progressive resistance training, and plyometric training can improve characteristics of spinal manipulation skill. Future research is needed to investigate outcomes related to a variety of specific exercise protocols to enhance spinal manipulation skill development. (This is a conference presentation abstract and not a full work that has been published.)

Reproducibility of a prescribed adjustive thrust force by chiropractors: a pilot study

Billy Lunsford, Brent Russell, Edward Owens, Ron Hosek

Objective: This was a pilot of a protocol to study if experienced DCs can reproduce a prescribed level of force while performing chiropractic adjustments. **Methods:** Two DC faculty members performed mock adjustments on a mannequin created to reproduce the feel and resistance of a human. Forces were recorded with a force plate in 3 sessions of 6 trials each. Participants performed P-A thrusts on L4 to produce 700 N of force; unlimited practice time was allowed. In the first session, participants could see a computer monitor for immediate feedback; in the second and third sessions, no feedback was allowed. A custom application was written in Excel for data analysis. **Results:** The participants' pre-load forces averaged 323.3 (32.9) N and both showed "dips" immediately before thrusts, averaging 22.7 (14.9) N. Peak forces averaged 797 (61.4) N, with target errors ranging from 1.7% to 33.6%. The app did not work properly with some large dips by participant 1 (ranging from 50-60 N), necessitating some manual calculations. **Conclusions:** The results led to modifications of the app and procedural instructions for additional investigation. The results will contribute to designing assessment tasks for students in a technique lab setting. (This is a conference presentation abstract and not a full work that has been published.)

The effects of chiropractic on dizziness: a narrative review

Anna Mackay, Adrian Hunnisett, Christina Cunliffe

Objective: Previous research supports the use of manual therapy for cervicogenic dizziness however further research was suggested. The aim of this study was to critically examine the current research base relating to effects of chiropractic on dizziness, taking into consideration the more recent evidence for manipulative therapies. **Data sources & selection:** A search of 4 different databases was undertaken (PubMed, Science Direct, EBSCO & Cochrane Library) using the search terms: 'Chiropractic' or 'Chiropractor' AND 'Dizziness' or 'Cervicogenic Dizziness', each within the context of 'manual therapies' and 'Chiropractic'. All forms of research from peer reviewed journals between 2014-2018 were considered. **Results:** A total of 537 research articles were identified and, following screening, 6 articles met the inclusion/exclusion criteria and were considered for review. Of these papers 5 found a positive effect on dizziness following chiropractic treatment and 1 found no impact. **Conclusion:** The outcome of this

study suggests that chiropractic may have a positive effect on dizziness symptoms. However, it is still evident that further studies in this area are required to enhance the evidence base and strengthen this, and previous, conclusions. (This is a conference presentation abstract and not a full work that has been published.)

Pain and substance use disorder comorbidity and considerations for doctors of chiropractic: a review of the literature

Dana Madigan, Jessy Glaub, William Foshee

Objective: This narrative review describes the association of pain and substance use, sharing best practices that can be implemented to address Substance Use Disorder (SUD) in musculoskeletal pain patients. **Methods:** A literature search was conducted in PubMed, public health organizations, and using hand searches for the association and assessment of SUD and musculoskeletal pain. Based on this information, additional searches were conducted to identify best practice toolkits for physicians. **Results:** Information was gathered from 19 articles relevant to the epidemiology, 106 articles relevant to assessment tools, and 5 toolkits. A meaningful percentage of patients experiencing pain have a co-existing SUD, also having significantly higher rates of pain interference, aberrant related drug behaviors, and psychopathological conditions. Over 60 SUD screening methods were identified. Improved patient outcomes have been associated with substance-aware intake forms and history taking methods, validated substance use screening tools, and evidence-informed management strategies found in various toolkits such as those published by governmental public health organizations. **Conclusion:** Due to the prevalence of SUD in musculoskeletal pain patients, doctors of chiropractic can further address public health priorities and enhance patient care with appropriate screening and referral for SUD. (This is a conference presentation abstract and not a full work that has been published.)

The use of an online case-based learning module to facilitate integration of basic and clinical sciences

Christine Major, Kara Burnham, Jenny Nordeen, Kathryn Brown, Chad Lambert, Leslie Takaki

Objective: An online, case-based learning module was developed and implemented in a doctorate of chiropractic program to integrate basic and clinical science knowledge. Student perception of the module and knowledge of module-related content were evaluated. **Methods:** Faculty members from basic science and clinical education departments developed an integrative, case-based online learning module on Bell Palsy. One cohort of students received Bell Palsy-related content in a traditional lecture format and another cohort received the integrated module in addition to traditional lecture. Both cohorts were given the same multiple-choice questions on Bell Palsy as part of an exam and scores were compared between cohorts. A mixed-methods survey was given to the cohort that received the module to assess their perceptions of the module and their learning. **Results:** Test performance was equivalent between cohorts for the Bell Palsy-related questions. Survey responses indicated that students felt positively about the module and reported that it was helpful with improving, reinforcing, and integrating basic science and clinical knowledge. **Conclusion:** This study provides evidence that case-based integrated modules are well received by students and produce similar results in test performance. They are a useful tool to increase integration within a chiropractic curriculum. (This is a conference presentation abstract and not a full work that has been published.)

Radiographic reporting errors in an integrated clinic: a case series

Ross Mattox

Objective: This case series describes the effect of erroneous radiological reporting and its impact on case management and outcomes. **Clinical features:** All 3 of these patients were referred for chiropractic care within a federally qualified health center. Patient 1 (34F) had lumbar radiography reported as having calcification in the region of the right kidney. Patient 2 (43M) had lumbar radiography reported as osteoblastic metastasis in the thoracolumbar region. Patient 3 (23F) had ankle radiography reported as having an ununited fracture of the navicular. **Intervention and outcomes:** Patient 1 had an unnecessary CT ordered. Radiography review revealed that the calcifications did not localize to the kidney on the lateral film. Patient

2 had an unnecessary MRI ordered. The osteoblastic appearance was due to increased density from fat folds. Patient 3 threatened lawsuit against the providers who had missed the fracture, which was actually an ossicle. **Conclusion:** Providers often rely on radiology reports to guide further testing and treatment. There is disconnect between the radiologist who doesn't see the patient and the provider who might not look at the images. It is advisable for providers to review imaging themselves and not rely solely on the radiology report. (This is a conference presentation abstract and not a full work that has been published.)

Evaluation of a research article for quality and relevance in a microbiological lab setting for trimester 2 chiropractic students

Anjum Odhwani, Paula Robinson

Objective: To provide students the skills necessary for the evaluation of a research article for quality and relevance in an evidence-based practice paradigm. **Discussion:** Healthcare professionals are required to make evidence-informed decisions related to diagnosis, treatment, and prognosis for patients. In microbiology lab, students practice performing literature searches for an article on infectious disease. The article must be published in a peer-reviewed journal within the last 5 years and can be a meta-analysis, systematic review, cross-sectional survey, case-control, cohort study, case study or series. Students review the abstract, generate a PICO question from the article, and then construct a clinical question. Each student group project includes correct citation of the journal, publication date, journal impact factor, authors' names, credentials, type of study and site(s) where the study was performed. Students evaluate the citation to determine the quality, relevance, and application of the research article to potential patients. Students demonstrate the abstract displays the core information about the article, presenting the completed findings of the literature search and project to their laboratory groups. **Conclusion:** Student presentations and self-reflection enhanced their confidence in locating reliable, current, peer-reviewed, clinically relevant research to support evidence-based chiropractic practice. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractic multimodal treatment of a grade 2 quadriceps strain

Harold Olson, Michael Tunning

Objective: To describe the management of grade 2 quadriceps strain in a female high school varsity track athlete in which the strain was sustained only 10 days prior to her state qualifying meet. **Clinical Features:** An 18-year-old female varsity track athlete sustained a grade 2 quadriceps strain during practice while transitioning from a light jog into a sprint. The strain was felt at the very end of the toe off phase. **Intervention and Outcome:** Multimodal chiropractic intervention, including instrument assisted soft tissue mobilization (IASTM), rehabilitative exercises, and dry needling with electric stimulation was performed. An initial 5 treatments over the course of 7 days allowed the patient to fully return to competition, setting a PR in the 100m and 200m dashes at the first subsections meet. An additional 1 treatment was provided the following week, with the patient competing at the state championship and setting her PR in the 100m and 400m. **Conclusion:** Quadriceps strain is a common athletic injury causing athletes to potentially miss significant time away from sport. This case demonstrates a grade 2 quadriceps strain with treatment over the course of 7 days resumption of competition. (This is a conference presentation abstract and not a full work that has been published.)

Development and testing of a lumbar spine palpation training device

Edward Owens, Brent Russell, Ronald Hosek, Stephanie Sullivan

Objectives: Static palpation to locate vertebral structures is an important skill taught in manual therapy education. Here we describe the evaluation of a training device that mimics the experience of palpating a human and gives location and load feedback. **Methods:** The prototype was comprised of full-sized 3D-printed lumbar spine and partial pelvis. Pressure sensors mounted over each spinous and mammillary process, and 2nd sacral tubercle were covered by silicone material. Software monitored pressure at each sensor, displaying shades of green or red to indicate light or heavier palpation for each location. We presented the model and gathered feedback from 40

students and faculty clinicians. Results: Respondents considered the overlying material acceptably lifelike and recognized the value of feedback on student palpation location and force. Regarding purchase, students preferred open lab and library checkout privileges to personal ownership. Suggested modifications included: sensors on the PSISs, multiple size models with different body compositions, the ability to be turned for side posture palpation, and the ability to simulate muscle spasm. Conclusions: The feedback in this study is being used in designs of a full mannequin and regional spinal units, and will contribute to developments in chiropractic technique education. (This is a conference presentation abstract and not a full work that has been published.)

Cannabidiol (CBD) for pain management: a scoping review

Colette Peabody, Stuart McIntosh, Mark Pfefer, Rachel Gilmore, Connor Buckles, Jaden Butcher

In the last two years, the popularity of cannabidiol has exploded as evidenced by the number of retailers, dispensaries, and storekeepers marketing a wide variety of products infused with cannabidiol (CBD) oil. Manufacturers often claim the product is helpful for reducing pain, anxiety, and insomnia though there is very little scientific evidence to support their claims. Objective: a scoping review of current scientific research and available information was used as the theoretical framework to demonstrating the efficacy, side effects and potential use of cannabidiol for chronic non-malignant pain and common associated symptoms; the condition most commonly seen in the chiropractic setting. The purpose of the research is to assist chiropractors in making sound, reliable recommendations for patients. Data sources and Selection: five electronic data bases were used including PubMed, Cochrane, EMBASE, Google Scholar & SciVerse, 2015-2019, for CBD for pain, anxiety and insomnia in humans. Seven articles met the criteria. High-quality instruments were utilized to compile and compare the data. Results and conclusions: The analyses failed to show statistically significant improvement in pain levels and associated symptoms using cannabidiol verse placebo. This information may guide the conversation between chiropractic doctors and their patients. (This is a conference presentation abstract and not a full work that has been published.)

The effect of trunk stability training on transfer activities in a patient with Type II Neurofibromatosis

Leslie Reece, Daniel O'Quinn

Objective: To measure the effect of trunk stabilization exercises on the ability to self-transfer from a wheelchair in a patient with Type II Neurofibromatosis. Clinical features: Patient presented in a power wheelchair, having previously been diagnosed with Type II Neurofibromatosis with multiple schwannomas and a prior history of spinal rod placement to correct for scoliosis curvature. The patient demonstrated marked neurological deficits in lower extremity dermatomal and myotomal testing and an inability to sit unsupported for longer than 48 seconds or to transfer greater than 6.35 cm. Intervention & Outcome: The patient underwent a 15-week course of care involving core stability and upper extremity strength training exercises mimicking transfer tasks. At the end of the 15-week period, the patient was able to successfully self-transfer from his wheelchair to the treatment table. Conclusion: Trunk stability training proved effective in improving self-transfer ability in a patient with Type II Neurofibromatosis. (This is a conference presentation abstract and not a full work that has been published.)

Establishing laboratory methods for determining the contribution of neuropeptide Y to the pain relief of spinal manipulative therapy

Virginia Salata, Claire Sheridan, Charles Arends, Abigail Vande Hei, Randall Sozio, Cynthia Long, Zacariah Shannon, Bradley Taylor, Stephen Onifer

Objective: Spinal manipulative therapy (SMT) is used to manage chronic low back pain and associated radiculopathy, but the sites and mechanisms of action are largely unknown. To address this gap in knowledge, doctor of chiropractic students are establishing laboratory methods to study SMT-induced analgesic effects on mechanical hypersensitivity in the spared nerve injury (SNI) rat model of peripheral (sciatic nerve) neuropathic pain. SMT involves movement of skin and joints as well as manual contact. This information is

transmitted from medium-to-large dorsal root ganglia (DRG) neurons to the dorsal horn of the spinal cord and the brainstem and then to the brain for processing. After SNI, lumbar (L) DRG neurons undergo a cascade of changes including a dramatic upregulation of neuropeptide Y (NPY) expression. Methods: DRG and brainstems were obtained 15-18 days after SNI surgery. Cryosections were immunostained for NPY and neurofilament (NF200) in medium-to-large DRG neurons and central axon terminals. Results: We found that NPY expression in L4 and L5 DRG neurons and in central axon terminals within the gracile nuclei was co-localized with NF200 on the side ipsilateral to SNI. Conclusion: Methods are available for student-centered investigations of SMT sites and mechanisms of action. (This is a conference presentation abstract and not a full work that has been published.)

Improvements of post-herpetic neuralgia following acupuncture treatment in a patient with spinal cord injury: a case report

Alec Schielke, Benjamin Whiles

Objective: To present a case demonstrating the effects of acupuncture treatment on post-herpetic neuralgia in a spinal cord injury veteran. Clinical Features: A 70 year-old male patient presented to the chiropractic clinic with 5 months of constant and severe unilateral post-herpetic neuralgia along the C5-C7 dermatomes with allodynia to light touch, and upper extremity weakness. Pertinent past medical history includes American Spinal Injury Association 'A' classification at C6, status post fusion, secondary to trauma in 1972. Prior interventions included pharmacological management, physical therapy and occupational therapy with minimal relief. Intervention and Outcome: The veteran elected to a trial of acupuncture once per week for 5 weeks. Needle insertion points were focal to the area of pain. Improved outcome measures included numeric pain scale, upper extremity myotomes and dermatomes, and changes in activities of daily living. Conclusion: Overall support for acupuncture is limited in the literature for post-herpetic neuralgia and spinal cord injury as separate conditions, and even less so when presenting together. This case study demonstrates anecdotal evidence of a positive response to acupuncture for a patient with post-herpetic neuralgia and spinal cord injury. (This is a conference presentation abstract and not a full work that has been published.)

Prevalence of essential oil usage in chiropractic students: a cohort study

Samantha Schmidt, Paige Schultz-Enwright, Lia Nightingale, Breanne Wells

Objective: Essential oils are a popular method of stress relief and relaxation. While essential oils might be a popular choice for use by the student population, prevalence data on use is nonexistent. Methods: A convenience sample of students attending a College sponsored event were given an 18-item survey with questions pertaining to students' perceptions, use and interest in essential oils. Descriptive statistics and frequencies were used to analyze the data. Results: Of the convenience sample, 145 students enrolled in first through tenth trimester of the Doctor of Chiropractic program completed the survey. Females comprised 56% of the cohort and 81% were 21-26-years old. Only 15% of students surveyed did not care for essential oils, while 34% loved them. Rates of current use were 40%, on average 1-3 days/week, while 68% report previous usage. Sixty-three percent of students were interested in essential oil research. Twelve percent reported some type of adverse effect from essential oil use. Conclusion: Although essential oils are thought to be a popular modality, this is the first study to analyze usage on a college campus. Chiropractic students report a high prevalence of essential oil use. (This is a conference presentation abstract and not a full work that has been published.)

The impact of lavender and rosemary aromatherapy on test anxiety in chiropractic students: a randomized crossover study

Paige Schultz-Enwright, Samantha Schmidt, Breanne Wells, Lia Nightingale, Steven Torgerud

Objective: Test anxiety is a debilitating disorder that can affect cognitive performance and academic success. Aromatherapy is commonly used for relaxation therapy. The primary aim of the study was to determine if nasal inhaler aromatherapy with rosemary and lavender essential oils is a useful strategy to reduce testing anxiety.

Methods: First trimester chiropractic students enrolled in Neuroanatomy I and Biochemistry I were recruited. A randomized crossover design was utilized over 2 study days during final exams, with a 2-day wash-out period. Each day, students were given a nasal inhaler with a blend of lavender and rosemary essential oils or distilled water. Students completed pre-and post-test surveys rating their anxiety levels. Paired sample t-tests were performed to determine differences in test anxiety. Intention-to-treat and per-protocol analysis were conducted. Results: Forty-five students were randomized into the study and 38 completed per-protocol. Between group comparisons showed no statistically significant difference for change in anxiety scores between aromatherapy and control for both intention-to-treat ($p = 0.10$) and per-protocol ($p = 0.07$). Conclusion: Personal inhalers and aromatherapy diffusers were not shown to reduce test anxiety in a chiropractic population under high-stakes examination. Other options should be explored in future research. (This is a conference presentation abstract and not a full work that has been published.)

Sacro Occipital Technique (SOT) and dental treatment of dysfunctional breathing in a child: a case report

Jason Scoppa, David Buck

Objective: Sleep disordered breathing in children is a largely under-diagnosed condition that negatively affects children in a number of ways, from structural development of their cranium and dental arch growth and development, to behavior and attention deficit/hyperactivity issues. Due to lack of awareness healthcare providers often overlook this condition and its far-reaching effects. Generally when diagnosed, treatments are often one-dimensional, non-uniform, and have slow responses to care. **Clinical Features:** This is a case report about a four-year-old girl with signs of sleep apnea, airway compromise, and disordered breathing, as well as, related dental occlusion dysfunction. **Intervention and Outcome:** This patient received co-treatment with an SOT chiropractor and a cranio-facial growth specialist dentist, incorporating SOT cranial therapies, active rehab tools for her occlusion, and airway, and passive rehab tools such as a non-customized dental orthotic for craniofacial growth and development. Within 5-months of care (6-chiropractic/2-dental office visits) the patient began to have normal sleep studies, improved oxygenation, and balanced occlusion. **Conclusion:** When this is on the radar of a healthcare practitioner it is relatively easy to spot, and with the right tools sleep disordered breathing in children can be managed successfully utilizing a multi-pronged, team approach. (This is a conference presentation abstract and not a full work that has been published.)

Practice analysis and changes to the Chiropractic Board of Clinical Nutrition Diplomate

Bruce Shotts, Igor Himelfarb, Greg Crawford

Objective: The main objective of this study was to report results of the practice analysis survey and to provide insights into the average levels of performance, and importance of, professional tasks executed by chiropractic nutritionists. In addition, this study informs the chiropractic community of the changes made to the Chiropractic Board of Clinical Nutrition Diplomate Exam. **Methods:** Seventy-eight practicing chiropractic nutritionists responded on the practice analysis survey. Their responses were analyzed and conclusions about frequency and importance of performance tasks were reached. A panel of subject matter experts provided a qualitative review of the survey responses. The quantitative and qualitative analyses of the survey responses indicated that minor changes to the test plan were needed. **Results:** The qualitative panel suggested reducing the number of domains on the Nutrition exam from 7 to 6 domains. Additionally, the panel decided on the final distribution of weights combining the quantitative results with qualitative perspectives. **Conclusion:** The practice analysis is a first step in the definition of the skills required for practicing chiropractic nutritionists. The analysis becomes one of the references and a decision-making tool used by the Board for developing and administering quality assessments. (This is a conference presentation abstract and not a full work that has been published.)

Methodologic challenges of using Medical Expenditure Panel Survey (MEPS) data for chiropractic health services research

Monica Smith, Krista Ward

Objective: Describe methodologic considerations using Medical Expenditure Panel Survey (MEPS) data and statistical software (STATA/IC and SPSS) to analyze chiropractic utilization in the United States. **Methods:** We downloaded annual Medical Condition and several Utilization Events files for MEPS data years 2012-2016. Mapping annual MEPS data to their corresponding MEPS 2-year longitudinal Panels 16-20, we constructed longitudinal datasets for examining 2-year prevalence of episodic back pain and utilization of chiropractic and other services. **Results:** All MEPS data files imported directly into STATA/IC, except for longitudinal files which exceeded STATA/IC data capacity and required editing in SPSS. Variation exists within MEPS Panels for condition coding. Panel 16 (2011 & 2012) included ICD9 codes within utilization event files whereas subsequent Panels contain this information only in condition files. MEPS also discontinued use of ICD9 code 846 after the 2011 condition file. In 2016 (the second year of Panel 20), MEPS switched from ICD9 to ICD10 for coding conditions. **Conclusion:** The publicly available MEPS data is a useful resource for researchers trying to understand chiropractic utilization patterns; however care must be taken constructing and analyzing 2-year longitudinal panels due to changes in MEPS data and methods over time. (This is a conference presentation abstract and not a full work that has been published.)

The effects of the side bridge exercise on immediate internal rotation range of motion of the hip

Amanda Star, Mikaela Buchli-Kelly, Simon Wang

Objective: The primary purpose of this study was to explore whether sustained contraction of stabilizers in the trunk and pelvis during the McGill side bridge exercise could make an immediate change in hip internal rotation as measured by prone Hibb's test. **Methods:** Data was gathered from 43 healthy, asymptomatic subjects aged 18-35 at a chiropractic college. Examiner 1 measured and recorded internal rotation of both hips using a goniometer. The hip with less internal rotation was selected for the exercise. Instructions for the exercise was delivered by Examiner 2. Immediately post-exercise, internal hip rotation angles were assessed by Examiners 1 and 3, separately. **Results:** Mean internal hip rotation was 36 (SD 9) degrees for males and 38 (SD 9) degrees females. Pre-exercise, the measured hip angles for the entire group ranged from 15 to 48, with mean 27.3 (SD 7.5) degrees. Post-exercise, the measured angles ranged from 19 to 52 with mean 32.1 (SD 7.8) degrees. **Conclusion:** There was a statistically significant increase of approximately 5 degrees in internal hip rotation after the McGill side bridge exercise. Future studies could examine long term effects of the side bridge exercise on internal hip rotation. (This is a conference presentation abstract and not a full work that has been published.)

Improved lower extremity function after implementation of chiropractic and rehabilitation care in a 25-year-old male with Diffuse Axonal Brain Injury (DABI): a case report

Sheldon Stuckart, Leslie Reece, Devon Ackroyd

Objective: To demonstrate the effect of chiropractic care and rehabilitation on gait mechanics and functional outcome measures in an individual with Diffuse Axonal Brain Injury (DABI). **Clinical Features:** 25-year-old male with a 2-year history of a DABI following an MVA presented with a cane and left ankle-foot orthosis for left-sided foot drop. Patient displayed core weakness, rotational torso restriction, left lower extremity muscular spasticity, hip extensor weakness, motion restriction, and decreased motor control and stability of the left hip. **Intervention and Outcome:** The patient underwent a 14-week course of chiropractic care consisting of spinal manipulative therapy, soft tissue therapy, kinesio-taping, and acupuncture dry needling. Additionally, proprioceptive and strengthening exercises with an anti-rotation focus were utilized to address the core weakness. Post-treatment functional outcome measures, such as the Mini-BESTest improved by 23.2%, and the 6-Minute Walk test increased by 66.75 meters. **Conclusion:** Management of a patient with a DABI improved many of their functional outcome measures following 14 weeks of chiropractic and supervised rehabilitation care with a focus on addressing joint restrictions, myofascial dysfunctions, and gait mechanics. (This is a conference presentation abstract and not a full work that has been published.)

A model for chiropractic research designed to move the healthcare dialogue toward a development-of-health model

Stephanie Sullivan, Brent Russell, Ronald Hosek, Edward Owens, Jr., Angela Seckington, Emily Drake

Objective: Introduce a perspective on research for the chiropractic profession that is designed to move the healthcare dialogue from a condition-based model toward a development-of-health model. **Methods:** Resources to support research in the chiropractic profession are limited. The proposed approach is based on the use of health status and risk factor assessments easily deployed within a chiropractic clinic that underlie multiple health conditions. High blood pressure, for example, is listed as a key risk factor for cardiovascular, kidney, and cognitive diseases by the CDC and WHO. This is different from condition-based models of research, in which a condition is researched repeatedly to determine effectiveness. **Results:** It is anticipated that this approach will compound the dollars allocated to chiropractic research, leveraging biomedical research demonstrating links between health status, risk factors, and conditions. Additionally, through evaluation of risk factors, the focus of care would be improvement of health, not merely resolution of pain or disease. The results will depend on the selection of key risk factors and the quality of research conducted. **Conclusion:** Focused studies designed to examine key health risk factors may provide an alternative research perspective that maximizes research dollars and shifts the healthcare dialogue. (This is a conference presentation abstract and not a full work that has been published.)

Management of Carpal Tunnel Syndrome with conservative multimodal therapy: a prospective case series of outcomes with concurrent wrist and cervical manipulation

David Taylor

Background: There is gap between common clinical practice and the literature-based evidence regarding the conservative management of carpal tunnel syndrome; most notably the combination of wrist and cervical manipulative therapy. A prospective case series involving the conservative multimodal management of carpal tunnel syndrome is conducted. **Clinical Features:** Eight patients (13 Carpal Tunnels) diagnosed by physical exam with carpal tunnel syndrome (CTS), and confirmed by electrodiagnostic tests, were treated with nonsurgical conservative care and outcomes were observed over 10 weeks via Carpal Tunnel Syndrome Questionnaire, electrodiagnostic testing, examination findings, and symptom resolution. **Intervention and Outcome:** Multimodal conservative care for CTS, including a combination of cervical and wrist manipulation, provided favorable outcomes. A high concordance rate of concurrent cervical complications of carpal tunnel syndrome is observed in the patients involved with this study. **Conclusions:** Conservative care is a viable alternative to surgical interventions for CTS. The CTS Questionnaire is proposed as a measuring tool that concurs with Patient Oriented Evidence that Matters (POEMs) to evaluate the outcome of manipulative therapy for CTS. There is a need for further research to delineate the most efficacious conservative care for CTS and the contribution of proximal neurological abnormalities to CTS. (This is a conference presentation abstract and not a full work that has been published.)

Dual task exercises and chiropractic care increased patient functional abilities post Traumatic Brain Injury (TBI)

Mark Thenhaus, Devon Ackroyd

Objective: To demonstrate the effect of combined dual-task rehabilitation and chiropractic care on gait mechanics in a patient with history of traumatic brain injury. **Clinical features:** Following 60-foot fall 10 years prior, the patient sustained a skull fracture and subdural bleed, bilateral pneumothorax, multiple rib fractures, lacerated spleen, comminuted pelvic fracture, and bilateral scapulae and clavicular fractures. Patient was placed in an induced coma for 3 weeks with a sustained coma for 8 weeks. Trauma resulted in an altered gait pattern, speech disturbances, decreased coordination, inability to heel strike during gait on the left, and both short and long-term memory recall difficulties. **Intervention & Outcome:** Dual-task rehabilitation exercises (cognitive load combined with physical exercise) were implemented. Patients gait cycle became more normalized when the degree of cognitive load was increased. Further interventions included low force chiropractic manipulations to segmental dysfunctions

identified via ROM and palpation testing. Patient improved her ability to heel strike versus the initial toe strike gait pattern while improving 3 points (19/28-22/28) on the MiniBestest outcome measure, deemed significant. **Conclusion:** It is believed that adding dual-task exercises into this exercise program increased the patient's functionality post TBI. (This is a conference presentation abstract and not a full work that has been published.)

The "5 A's instruction:" a novel approach to teaching the evidence-based practice to chiropractic students

Natalia Tukhareli

Objective: The study will describe an innovative approach to the Evidence-Based Practice (EBP) teaching introduced at one Chiropractic College and outline the collaborative process of integrating it into curriculum. The principle features, delivery methods, and assessment of the new instructional model will be discussed. **Methods:** A literature review of the current evidence in the EBP instruction was conducted to 1) identify effective EBP teaching methods; 2) develop active learning activities to facilitate the EBP instruction; and 3) adopt high-quality instruments for evaluating the effectiveness of the instruction. **Results:** The health sciences library took the initiative to incorporate the five steps (5 A's) of the EBP cycle into instruction to assist chiropractic students in gradually building core competencies in EBP identified for health professionals. Librarians and clinicians collaborated on developing a series of online tutorials on EBP. A variety of the experiential learning methods were utilized to embed the EBP instruction into curriculum. **Conclusion:** With the current emphasis on the EBP teaching, the health science library can play critical role in the support and promotion of the evidence-based clinical practice. Collaboration between health sciences librarians, faculty and clinicians provides an effective platform for teaching EBP competencies. (This is a conference presentation abstract and not a full work that has been published.)

Identifying different types of headaches: signs and symptoms, causes, and current treatment recommendations

Anna Walden

Objective: To report a narrative review focused on headache diagnosis and evidence-based treatments for conditions described in the International Classification of Headache Disorders, 3rd Edition (ICHD-3). **Data Sources and Selection:** A narrative literature review was conducted to summarize information related to identification and treatment of primary and secondary headaches, based on ICHD-3 criteria. PubMed and Google Scholar databases were used to search for articles related to diagnosis and management. Search terms included headache subtypes, chiropractic, spinal manipulation, manual therapy, and complementary and integrative health. Articles were reviewed and information was synthesized into bullet lists. **Results:** From a total of 34 articles reviewed, contemporary literature indicates that headaches are very frequently misdiagnosed across healthcare specialties. Consistent headache classification was not identified within the articles reviewed. Evidence-based visual aids were developed to assist clinicians in headache identification, and in making management decisions. **Conclusion:** Inconsistencies in headache terminology among the literature reviewed suggests the need for practitioners and researchers to adopt uniform terminology. Quick-reference visual aids describing typical presentations and evidence-based treatments for common headache diagnoses may assist clinicians in diagnostic and treatment decision-making and in adopting language consistent with ICHD-3 terminology. (This is a conference presentation abstract and not a full work that has been published.)

Evaluating medical expenditure panel survey data for the association between chiropractic utilization and opioid prescriptions among people with back and neck pain

Krista Ward, Monica Smith

Objective: To assess the association between seeing a chiropractor (DC) and receiving an opioid prescriptions (RX) for back or neck pain, using data representative of the United States (US) noninstitutionalized population. **Methods:** We included panels 17-19 Medical Expenditure Panel Survey (MEPS) respondents who participated in all five rounds, were at least 18 years old, did not have cancer, and

reported back or neck pain. DC users reported at least one DC visit for back/neck pain and opioid users reported purchase/receipt of a RX classified as ML “60” and “191.” We adjusted for socioeconomic and clinical variables using multiple logistic regression in STATA 15. Results: After applying inclusion criteria, our sample contained 4,686 people (weighted = 105,527,844), 21% of whom reported an opioid RX for back/neck pain. Among opioid users, 14% reported a DC visit for back/neck pain compared to 31% of non-opioid users. The adjusted odds ratio for the association between DC use and opioid RX was .45. 95% CI: .36, .57. Conclusion: US adults with back/neck pain who see a chiropractor have 55% less odds of an opioid RX than those who do not see a chiropractor after controlling for socioeconomic and clinical variables. (This is a conference presentation abstract and not a full work that has been published.)

The effect of cervical spine adjustment on elderly patient's grip-strength

Adrian Wenban, Pablo Perez de la Ossa

Objective: This study aims to evaluate the effects of chiropractic cervical adjustment on grip strength and cervical spine range of motion (CROM) among elderly patients. Methods: Nine patients over 65 years of age were recruited for this preliminary study. Participants were allocated randomly to chiropractic (active intervention) or sham treatment groups. After history taking and full examination, hand grip strength and CROM were measured. Measurements were taken again immediately after the initial intervention. Subsequent measures were taken before and after the fifth and tenth visit. Results: Measurements of grip strength before and after treatment showed an increase only in the active intervention group in the first and fifth intervention. Only the sham group showed any improvement following the tenth intervention. We compared grip strength between base line and after the 1st, 5th and 10th intervention. The active intervention group showed an increase of 10-20%, whereas the sham group showed a decrease of 30%. The differences between both groups were statistically significant ($p < 0.05$). No significant differences were observed in the CROM between active intervention and sham treatment groups. Conclusions: Hand grip strength seemed to improve significantly following chiropractic cervical adjustment in this cohort of elderly patients. (This is a conference presentation abstract and not a full work that has been published.)

Cost comparison of chiropractic care for patients with acute and sub-acute low back pain

James Whedon, Serena Bezdjian, Patricia Dennis, Vivi-Ann Fischer, Robb Russell

Objective: Low back pain (LBP) imposes a costly burden upon patients, healthcare insurers, and society overall. Cost comparisons were conducted among patients diagnosed with acute or subacute low back pain who received chiropractic treatments from three separate cohorts of providers within a large healthcare system to determine overall expenditure. Cohort 1 served as the baseline comparison for this study. Methods: A retrospective cohort design was employed to examine multiple measures of costs in health claims data associated with patients ($N = 25,621$) diagnosed with acute or subacute low back pain. Generalized linear regression modeling was used to estimate the influence of demographic and clinical factors on expenditures. Results: Average amounts per patient for Cohorts 2 and 3 were lower compared to Cohort 1. Regression analyses revealed that various clinical and demographic factors also significantly influenced

costs and demonstrated that Cohort 3 was significantly lower in cost compared to Cohort 1. Conclusion: Providers in Cohort 3 (a more specialized group of providers) were found to be significantly associated with lower costs for care of patients with acute or subacute low back pain when compared to Cohort 1. (This is a conference presentation abstract and not a full work that has been published.)

Can factors in the educational environment influence cognitive appraisals of control and value in chiropractic medical students?

Michael Wiles

Pekrun described a theoretical construct by which the educational environment is posited to influence cognitive appraisals of control (over one's academic performance) and value (of one's education). These appraisals are said to influence emotions that are tied to educational outcomes. This construct suggests that educational outcomes could be influenced at the onset by the educational environment. Objective: To determine if factors in the educational environment influenced cognitive appraisals of control and value in chiropractic students. Methods: Chiropractic students were surveyed and interviewed to assess their perceptions of the educational environment, control and value. The survey instrument consisted of the Dundee Ready Educational Environment Measure, and ten questions measuring cognitive appraisal of control and value. Results: The qualitative and quantitative data showed that cognitive appraisal of control was strongly correlated with the educational environment, in agreement with Pekrun's construct. However, the cognitive appraisal of value had little correlation with the educational environment and is possibly an intrinsic and independent characteristic of these students. Conclusion: These findings are of importance to chiropractic educators by demonstrating the importance of personal and social elements in the learning process. (This is a conference presentation abstract and not a full work that has been published.)

Correlation of mBESS scores and Sorensen's test scores: an investigational study

Richard Yu, Alexis Campos, Robert Cooperstein, Ed Feinberg

Objective: The modified Balance Error Scoring System (mBESS) test assesses balance in individuals with sports-related concussions. The Sorensen's test assesses trunk extensor endurance. The primary goal of this study was to determine whether mBESS scores and Sorensen's scores were correlated. Methods: A feasibility randomized clinical trial (reported elsewhere) examined the extent of spinal manipulation on balance. The present study was a secondary analysis of one module in which a convenience sample performed both the mBESS and Sorensen's tests. This secondary analysis used the Pearson's R statistic to determine whether these test scores were correlated. Results: A convenience sample of 29 asymptomatic college students were recruited. Inspection of the scatter plot of data points suggested negligible correlation between the mBESS and Sorensen's scores. This was confirmed by Pearson's r value: $r = -0.28403$ ($p = 0.14$). Conclusion: Sorensen's scores were not related to mBESS scores. The present study informs the power analysis to determine the appropriate number of subjects, clarify issues related to the washout period necessary to guarantee independent tests, and suggest more careful collection of baseline demographic data. (This is a conference presentation abstract and not a full work that has been published.)