
CONFERENCE PROCEEDINGS

Association of Chiropractic Colleges Research Agenda Conference 2022: Wellness and Health Promotion: Impact on Chiropractic Education, Clinical Practice and Research

Association of Chiropractic Colleges

ABSTRACT

This conference was convened by the Association of Chiropractic Colleges. This year the association celebrated its 28th meeting. The theme for this year's program was *Wellness and Health Promotion: Impact on Chiropractic Education, Clinical Practice and Research*. The 2022 program demonstrated the commitment of the conference organizers to provide the attendees with the best possible information from recognized experts in a variety of presentation formats.

Key Indexing Terms: Chiropractic; Education; Congress [Publication Type].

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INTRODUCTION

The Association of Chiropractic Colleges Research Agenda Conference is designed to meet the needs of the chiropractic academic and research community and provides an outlet for discussion of shared educational, scholarly and research-related enterprises. The meeting has become a major venue for the pre-publication presentation of new data from the educational, clinical, and basic science domains that comprise the chiropractic knowledge base. The conference organizers wish to thank the many reviewers for their wonderful and necessary service. Their work makes the program successful, and we are quite grateful. Thank you to:

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The presentations were delivered in either a platform or poster format. They are listed here in alphabetical order by first author's last name in either the platform or poster section, below.

PLATFORM ABSTRACTS

Prompt identification of symptomatic ganglion cyst with point of care ultrasound

Devon Ackroyd

Objective: Musculoskeletal sonography is increasingly utilized in chiropractic practices given its improved portability, affordability, and advancing diagnostic accuracy. This case demonstrates the use of point of care ultrasound aiding in the accurate diagnosis of a symptomatic ganglion cyst mis-diagnosed in the primary care setting. **Clinical Features:** 21-year-old male presents to a chiropractic teaching clinic with insidious onset of intermittent right dorsal wrist pain of two years duration localized over the distal radioulnar joint with referral into D3/4 carpal joints. Current presentation described as severe 8/10 on the VNPS. Previous primary care visits diagnosed a chronic insidious wrist sprain with a negative radiographic evaluation. **Intervention and Outcome:** Patient was referred for same day diagnostic ultrasound evaluation at the chiropractic teaching clinic revealing a small hypoechoic fluid collection dorsal to the scapholunate joint consistent with a Ganglion Cyst. Placement of the ultrasound probe superficially over the fluid collection recreated the patient's chief complaint. **Conclusion:** Ganglion cyst are common findings presenting in wrist and hands under ultrasound evaluation with majority presenting asymptomatic. Presence of a symptomatic ganglion cyst demonstrates the usefulness of point of care ultrasound in a chiropractic clinic for aiding in accurate diagnosis and subsequent management. (This is a conference presentation abstract and not a full work that has been published.)

Quantifying the impact of COVID-19 on the utilization of musculoskeletal-related healthcare services: a comparison of insurance claims from 2019 to 2020

Brian Anderson, Steve McClellan

Objective: Examine insurance claims related to musculoskeletal diagnoses to determine the change in quarterly healthcare utilization and insurance reimbursement from 2019 to 2020. We hypothesized that the onset of COVID-19 would correspond to a decrease in both outcomes. **Methods:** Retrospective analysis of insurance claims (n=141,992) from a single, self-insured Fortune-500 company covering approximately 50,000 lives. Specific services evaluated included Evaluation & Management, Surgery, Injection procedures, Imaging (x-ray, CT/MRI), Emergency Department visits, Physical Therapy evaluations, Chiropractic Manipulative Therapy, and Insurance Reimbursement. Chi-square and independent samples t-test were utilized to evaluate differences in mean quarterly (q) claims for each service and log-transformed insurance reimbursement. **Results:** Statistically significant (p-value <0.05) decreases in quarterly healthcare utilization were as follows (2020 vs 2019): Evaluation and Management, Injection and Surgery (q4); Xray (q2); Emergency Department visits (all quarters); Chiropractic Manipulative Therapy (q1-2). Log-transformed allowed reimbursement was significantly lower in the first quarter of 2020 vs 2019, and significantly higher in the third quarter of 2020 vs 2019. **Conclusion:** As expected, a decreased utilization of healthcare services and insurance reimbursement was observed when comparing 2020 vs 2019. However, these decreases did not all correspond to the onset of COVID-19 as we hypothesized. (This is a conference presentation abstract and not a full work that has been published.)

A case of triquetral fracture with concomitant scapholunate ganglion with dynamic sonography

Jessica Billham, Ashley Ruff, Patrick Boylan, Norman Kettner

Objective: Our purpose is to describe a case of triquetral fracture and scapholunate ganglion identified with ultrasonography (DXUS). Radiography was utilized to confirm fracture. Secondly, this is a novel observation with dynamic DXUS of continuity between ganglion and joint. **Clinical Features:** A 34-year-old female presented with 3 days post-traumatic right wrist pain over the dorsal radiocarpal joint and triquetrum. Flexion, extension, and ulnar deviation were provocative and restricted. DXUS and radiography were performed. **Intervention and Outcome:** At sonography, the dorsal triquetral cortex was disrupted with associated hyperemia and adjacent hypoechoic collection consistent with triquetral fracture and hematoma. Additionally, a hypoechoic fluid collection was present dorsal to the scapholunate ligament. Upon ulnar deviation, hyperechoic bubbles were seen deep to the ligament and then pass through to the ganglion. The patient was prescribed a brace for 6 weeks and then gradual return to activity. Full recovery was achieved. **Conclusion:** Triquetral fractures are uncommon and radiography is insensitive in detecting them. DXUS has shown utility identifying post-traumatic carpal fractures, but there is little literature describing DXUS evaluation of the triquetrum. Additionally, there is no literature demonstrating continuity between joint and ganglia on dynamic DXUS. (This is a conference presentation abstract and not a full work that has been published.)

A rare case of a patient presenting with acoustic neuroma and a Temporomandibular Joint Disorder treated with chiropractic and dental care: a case report

Thomas Bloink, Charles Blum

Objective: Acoustic neuromas (AN) are rare tumors of the eighth cranial nerve and due to their symptoms are sometimes inappropriately diagnosed as temporomandibular joint disorders (TMD). This case is the first in the literature where a TMD might be a possible contribution to an AN presentation and contributing to confusing differential diagnosis. **Clinical Presentation:** A 38-year-old Asian female presented with TMD, right-sided facial numbness, mild hearing loss, and tinnitus. The patient was seen by an ENT who referred her

to this office and for a MRI, which demonstrated a 6mm right-sided AN. Intervention and Outcome: While the AN was monitored by ENT, Chiropractic cranial/TMJ, Sacro-Occipital Technique[®], and dental occlusal splint therapy was instituted for her severe TMD pain and associated disorders possibly related to coincidental/causal relationship to AN and/or TMD. She was seen for 16-visits over 3-months and her pain and associated disorders gradually diminished. Follow-up MRIs at 6-month (stable 6mm) and 1-year revealed a 50% decrease in tumor size (3mm) and surgery was canceled. Conclusion: Co-managed care is essential with any AN since most commonly symptoms are associated with the tumor and any TMD related presentations are secondarily associated with mimicry syndromes. (This is a conference presentation abstract and not a full work that has been published.)

Chronic refractory adductor tendinitis treated with pelvic blocks/wedges for a sacroiliac joint sprain, myofascial release to hip joint capsule, and therapeutic exercises: a case report

Charles Blum

Objective: To explore chiropractic treatment of a patient with refractory adductor tendonitis. Clinical Features: A 28-year-old female patient presented with a chronic left-adductor tendonitis unsuccessfully treated over 3-years with 2-tendonotomy surgeries. At the first-office-visit she reported for years she was unable to walk over one-block without severe pain yet was visiting the United States with the goal of hiking in Zion National Park. She was assessed with a Sacro-Occipital Technique[®] category-two (sacroiliac joint sprain), reduced left-hip/thigh internal range of motion, posterior left-fibular head, and compensatory inversion left-calcaneal positioning. Intervention and Outcome: Treatment was over 5-visits for 1-month. Deep tissue release to posterior left-hip joint capsule was performed, left fibular head was adjusted P/A, and left calcaneus was manipulated into a neutral position and supported with athletic tape. She was treated with supine category-two block placement which eliminated her chronic pubic bone adductor tendon insertion sensitivity. A modified Pilates mermaid-pose therapeutic exercise was performed multiple-times-a-day to increase her left-hip internal rotation. Following the 4th-visit she was hiking in Zion 6-8 miles a day without pain. Conclusion: Further research is needed study what subsets of patients with adductor tendonitis might respond to this conservative chiropractic care. (This is a conference presentation abstract and not a full work that has been published.)

Benign joint hypermobility and sensory processing sensitivity syndromes: a survey of patients over 5 years

Charles Blum

Objective: To review a survey of a specific subset of patients presenting to this clinic for chiropractic care. The subset [n=238] was represented by a group of patients assessed for benign joint hypermobility syndrome (BJHS) by responding in the affirmative to the Hakim et al questionnaire or determined by manual ranges of motion assessment. Methods: A survey of patients (5-years) seeking care at a chiropractic clinic found that 20-30% of the patients presented with BJHS and of those patients questioned whether they had characteristics of sensory processing sensitivity syndrome (SPSS). Results: 90% [n=213] of the BJHS patients reported they had SPSS characteristics, with 5% [n=11] not sure, and 5% [n=12] saying they did not. Due to this BJHS/SPSS relationship these patients were treated with chiropractic care that had a focus on stabilization and given information on SPSS coping exercises. Conclusion: Based on the finding of this survey an extensive survey of SPSS and BJHS patients is suggested to determine what degree of relationship might exist. Since the chiropractic profession has a tendency to view spinal imbalance as being a fixation, understanding BJHS and its implications (e.g. dysautonomia, SPSS, etc.) can be an important consideration. (This is a conference presentation abstract and not a full work that has been published.)

Sacro-Occipital Technique[®] assessment and treatment of two patients pre and post bilateral hip replacement surgery: two case reports

Charles Blum

Objective: Pain and limited hip range-of-motion are factors used to determine the need for hip-replacement surgery. While ranges-of-motion improve following hip-replacement surgery with some patients the same patterns of hip-joint restricted motion necessitating the joint replacement appear 2-years post-surgery. Clinical Features: Two-female patients, 65-year-old (patient for 30-years) and 62-year-old (patient for 15-years), had histories of pain (QVAS 8/10) and asymmetrical internal hip/thigh rotation (one side 75% reduced internal rotation and other 75% reduced external rotation) appearing related to chronic sacroiliac-joint-instability (SIJI) and associated piriformis/iliopsoas muscle splinting. Intervention and Outcome: For years these patients were treated with Sacro-Occipital Technique[®] protocols addressing SIJI (category-two) and asymmetrical hip/thigh rotation. While this care reduced pain and improved function, hip/thigh rotation asymmetry persisted compromising the local hip-joint surfaces. Hip-replacement surgery was performed on both patients, with reduced pain and normal ranges of hip-rotation in the initial 2-years. Following 2-years post-surgery the pain (QVAS 5/10) and asymmetrical hip/thigh-rotation patterns returned. Treatment and rehabilitative exercises were reinstated to successfully decrease pain and restore hip-joint symmetrical function. Conclusion: Hip-joint replacement surgery may help the local joint tissues however complementary chiropractic care might still be necessary to ensure post-surgery kinematic chain and myofascial balanced function. (This is a conference presentation abstract and not a full work that has been published.)

A retrospective pre and post-assessment of cervical spine ranges-of-motion in 32-patients following the cervical stairstep technique intervention

Charles Blum, Sunny Kierstyn

Objective: The cervical stairstep technique (CST) developed by DeJarnette in 1971, is an integral part of the Sacro-Occipital Technique[®] assessment and treatment for the cervical spine. CST's presumed function is to treat hypermobile/hypomobile cervical spine segmental dysfunction. It is currently taught in many chiropractic colleges as an alternative for the HVLA diversified cervical adjustment. No studies have assessed whether the CST might demonstrate a change in pre and post-cervical ranges-of motion. Methods: Pre and post-assessment of cervical ranges-of-motion were performed with a validated inclinometer (JTECH Dualer Plus) on 32-patients in one-day by a chiropractor trained in Sacro-Occipital Technique[®] using the CST as the primary intervention. IRB approval was attained through Cleveland University Kansas City (#90721-1). Results: Of the 32 patients in this retrospective study 24 patients demonstrated significant improvement in cervical ranges of motion post-CST intervention with 8 patients demonstrating no change or an incremental decrease in ranges-of-motion. Conclusion: This retrospective study represents the first attempt of

validating the CST, which is commonly utilized in the chiropractic profession. Greater studies are needed with controls and sham interventions as a means to more thoroughly assess this novel method of assessing and treating the cervical spine. (This is a conference presentation abstract and not a full work that has been published.)

Military sexual trauma among veterans: a scoping review with implications for the care of chiropractic patients

Gina Bonavito-Larragoite, Julie Johnson, Stacie Salsbury

Objective: To describe the published literature on veterans with military sexual trauma (MST). Method: We conducted a scoping review of the prevalence and impact of MST among veterans, including the potential implications for chiropractic clinical practice. Results: Military sexual trauma is defined by the U.S. Department of Veteran Affairs (VA) as repeated and/or threatening sexual harassment or physical assault of a sexual nature. MST is a prevalent trauma, impacting 1 in 3 women and 1 in 50 men according to the VA's national screening program. Veterans with MST may present with physical complaints associated with chronic pain and musculoskeletal conditions including back pain and headaches. Psychological health issues including anxiety, depression, post-traumatic stress syndrome (PTSS) and increased suicide risk are prominent. Clinical practice recommendations across health professions advise education, awareness, training and responsiveness in both a physical and clinical approach to avoid re-traumatization. Conclusion: Trauma-informed clinical care for veterans with MST is recommended. Additional research is needed to explore the unique needs of veterans with a history of MST within the context of chiropractic clinical care. (This is a conference presentation abstract and not a full work that has been published.)

A case report of two patients presenting to a chiropractic clinic for treatment of lumbar spinal stenosis with concomitant cervical spondylotic myelopathy

Patrick Boylan, Jessica Billham

Objective: Present two cases of patients reporting to a chiropractic clinic for evaluation and treatment of Lumbar Spinal Stenosis (LSS), during which the initial evaluation raised suspicion of Tandem Spinal Stenosis (TSS). Cervical Spondylotic Myelopathy (CSM) was confirmed with MRI in both cases. Clinical Features: Two male patients, aged 79 and 77, presented with low back and leg symptoms consistent with LSS. In each case, history and neurologic evaluation revealed findings that raised suspicion of CSM. Intervention and Outcome: The patients were treated with lumbar mobilizations and flexion based exercises for their low back symptoms and were referred for a cervical MRI, which confirmed the presence of CSM in both cases. Both patients reported improvement of low back and leg symptoms with conservative treatment. Each was referred to a neurosurgeon and are awaiting surgical consult. Conclusion: TSS is present in up to 60% of patients with spinal stenosis (1). These cases highlight the importance of being aware of TSS as a clinical entity and evaluating LSS patients for possible concomitant CSM. (This is a conference presentation abstract and not a full work that has been published.)

Visualizing and analyzing research networks: preliminary analysis of the Global Chiropractic Research Enterprise database

Brian Budgell, Mark Fillery, Shari Wynd

Objective: The Global Chiropractic Research Enterprise Initiative (globalchiropracticresearch.com) is a collaboration involved in mapping and analyzing the global corpus of research literature which underpins the discipline of chiropractic. Methods: Using social network mapping and linguistic analysis applications, the interactions of the global chiropractic research community are mapped and analyzed to identify the behaviours of successful researchers and research producing organizations (RPOs). Results: To date, a database of publications attributable to 16 chiropractic RPOs demonstrates a spectrum of productivities when assessed by numbers of publications and citations. Conclusion: There appears to be a number of personal and institutional strategies which are associated with some measures of success in research - one size does not fit all. Nonetheless, increased inter-institutional collaboration appears to be a predictor of higher productivity as assessed by numbers of publications. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractic care for fall prevention in our aging society: rationale, state of the evidence, and a research agenda

Wren Burton, Weronika Grabowska, Matthew Kowalski, Cynthia Long, Robert Vining, Anthony Lisi, Dennis Munoz Vergara, Peter Wayne

Objective: Falls in older adults are a significant and growing public health concern. There are multiple risk factors associated with falls that may be addressed within the scope of chiropractic training and licensure. Few attempts have been made to summarize existing evidence on chiropractic care and fall risk mitigation. Methods: Systematic review was conducted following PRISMA guidelines. Databases searched included PubMed, Embase, and Cochrane Library. Eligible study designs included randomized controlled trials (RCT), prospective non-randomized controlled, observational, and cross-over studies in which chiropractic manipulation or multimodal care was the primary intervention and changes in gait, balance and/or falls were outcomes. Risk of bias was also assessed. Results: The original search yielded 445 articles; 22 met final eligibility including 12 RCTs. One study directly measured the frequency of falls (underpowered secondary outcome) while most studies assessed short-term measurements of gait and balance. The overall methodological quality of identified studies and findings were mixed, limiting interpretation regarding the potential impact of chiropractic care on fall risk. Conclusion: Little high-quality research has been published to inform how chiropractic care can best address and positively influence fall prevention. We outline a proposed research agenda to address current evidence gaps. (This is a conference presentation abstract and not a full work that has been published.)

A retrospective review of patients referred from geriatric services to the chiropractic department at the Veterans Affairs Palo Alto Healthcare System

Robert Butler, Robert Walsh, Annie Babikian, Alec Schielke, Anna Pendrey Guillen, Christine Gould

Objective: To provide a quality improvement review of a specialized cohort of geriatric patients, referred from the VA's GRECC department, seen in a VA chiropractic clinic. Analysis of interventions, safety, and determinations of successful care were reviewed consistent with Age-Friendly Health Care's 4M's: Mobility, Mentation, Medicine, Matters Most. Clinical Features: Eleven geriatric veterans averaging a Charlson Comorbidity Index score of 6.4, who failed traditional pain management services, and who are at a high risk for

other pain interventions or surgical considerations. Intervention: Typical interventions by VA chiropractors profiled in this review include HVLA SMT, acupuncture, active care, and soft tissue therapies. Outcome: Of the eleven patients referred, zero chiropractic related adverse events were found, and successful clinical outcomes were achieved in majority of cases. Case by case commentary provided. Conclusion: The cases reviewed highlight a successful collaboration between a geriatric specific clinic and chiropractic department for alternative pain management options. Interventions provided by VA chiropractors are appropriate and safe. Study outcomes are reflected by current literature and is an underutilized service. (This is a conference presentation abstract and not a full work that has been published.)

Lower extremity multiple thromboses presenting as sciatic leg pain: a case report

Tara Chevront, Adam Sergent

Objective: The purpose of this report is to explain the management of a patient with lower back pain and right-sided lower extremity pain that originated from multiple undiscovered deep vein thromboses. Clinical Features: A 24-year-old female collegiate runner with right gluteal and thigh pain for a period of 2 weeks presents to a chiropractic clinic with lower back pain and right sided lower extremity pain. Intervention and Outcome: This patient was evaluated in a chiropractic clinic and she was determined to have a possible deep vein thromboses. An immediate referral was placed to have the patient further evaluated and treated at an emergency room. Conclusion: In this case, a physical exam identified a concerning "red flag" for serious pathology contributing to this young woman's acute lower back pain and associated right lower extremity pain. We recommend clinicians stay mindful of all factors contributing to low back pain combined with lower extremity radicular symptoms. In this case, consideration of additional pathologies resulted in the identification of multiple deep vein thromboses as a source of right lower extremity pain, imitating sciatic symptoms. (This is a conference presentation abstract and not a full work that has been published.)

Sonography of spondylolisthesis: technique identification and verification study

John Cho, Christopher Smoley, Whitney Graff, Nicole Zipay

Objective: To describe identification and verification of L5 pars interarticularis (L5PI) using diagnostic ultrasound (DUS). Methods: For identifying L5PI, an asymptomatic 10-year-old male subject was scanned for baseline image acquisition. Linear array transducer was placed over the L5/S1 facets, then a long-axis cephalad glide was followed to capture both superior (SAP) and inferior articulating processes (IAP) of L5. The contiguous cortical region between the SAP and IAP was assumed to be the L5PI. For verification, two steps were involved: 1) In-vivo technique using two spine models (plastic, human spine) were scanned to verify authors' assumption. Metal paperclip was placed over L5PI then DUS image captured. 2) Subject with radiographic diagnosis of spondylolisthesis was scanned and the appearance of L5PI was compared. Results: L5PI localized with the metal paperclip on two spine models were identical to the baseline in-vivo DUS image. Spondylolisthesis demonstrated an abrupt step-off defect at L5PI compared to in-vivo image. Conclusion: From the findings of this study, DUS protocol may be implemented for a spondylolisthesis work-up. We report the first technique identification and verification of the L5PI using DUS. (This is a conference presentation abstract and not a full work that has been published.)

Spontaneous regression of extruded lumbar disc herniation: a case report

Munyeong Choi, Sean Olenek

Objective: To report spontaneous regression of extruded lumbar disc herniation in a 31-year-old male, evidenced by the comparison between the initial and the 13-month follow-up MRI. Clinical Features: A 31-year-old male chiropractic student complained of chronic low back pain that had recently been exacerbated. The initial pain, which had started approximately 13 months before this current flare-up and was attributed to large extruded lumbar disc herniation at L5-S1 based on MRI scan, had markedly improved after 3 months of conservative care. The follow-up MRI was compared with the previous study. Intervention/outcome: The initial MR images of the lumbar spine demonstrates a large left-sided paracentral disc herniation at L5-S1, measuring approximately 11.4-mm by 7.02-mm in transverse and anteroposterior dimensions, extending caudally by 14.9-mm. The follow-up MRI revealed no evidence of the herniated disc fragment. Conclusion: Clinical symptoms resulting from lumbar disc herniation may diminish or even resolve over time with conservative therapy. However, little is known about the physical aspect of the natural history of lumbar disc herniation. The comparison of the two lumbar MRI studies of a 13-month interval demonstrates that there was a spontaneous regression of lumbar disc herniation. (This is a conference presentation abstract and not a full work that has been published.)

A pilot study of annotation methods to identify patient reported outcome measures in clinical text notes from Veterans Health Administration chiropractic clinics

Brian Coleman, Kelsey Corcoran, Anthony List, Alicia Heapy, Cynthia Brandt

Objective: To pilot natural language processing (NLP) methodology for identifying patient reported outcome measures (PROMs) in text notes from Veterans Health Administration (VHA) chiropractic visits. Methods: A random national sample of notes (n=250) for visits between October 1, 2018 and September 30, 2019 was split into three sets (n1=50, n2=100, n3=100). Two reviewers annotated each set, based on an iteratively revised annotation guide, for two classes: the PROM type and its resulting score. Inter-annotator agreement (IAA) was measured as the number of matches of either class in each sample divided by the total number of annotations. The baseline rate of PROM use was calculated as the number of notes with any PROM divided by the total number of notes. Results: IAA for each set was good to excellent and increased with each iteration (IAA1=78.8%, IAA2=84.5%, IAA3=86.1%). Any PROM use was identified in 62.8% of notes. The numerical rating scale was the most used (58.8% of notes). Any other PROM was present in 12.8% of notes. Conclusion: PROMs can be identified in text notes with strong inter-annotator agreement. The validated annotation methodology will facilitate NLP evaluation of PROM use during VHA chiropractic care. (This is a conference presentation abstract and not a full work that has been published.)

The lumbar intervertebral disc in new perspectives: pathoanatomy, MR imaging, and guidelines for management

Stacey Cornelson, Norman Kettner

Objective: To review recent literature of lumbar pathoanatomy, imaging techniques, and clinical management of intervertebral disc degeneration and herniation. Methods: Pubmed search including disc degeneration and disc herniation, magnetic resonance imaging, spinal

manipulation, physiotherapy, and surgery search terms were including in this narrative review. Results: Disc herniations are commonly seen in chiropractic practice. Even though they are well-visualized on standard MR imaging, they are often of questionable clinical relevance. New MR images sequences, such as diffusion-weighted imaging, T1p MR spectroscopy, sodium MRI, T1 and T2 relaxation mapping, magic echo MRI, chemical exchange saturation transfer MRI, ultrashort time-to-echo MRI, and MR elastography, may establish the diagnosis of degenerative disc disease in an earlier and more informative manner than conventional MRI. Conclusion: Low back pain is a common and morbid complaint amongst the general population. Our efforts in this review have been to provide state-of-art concepts in pathoanatomy, MR imaging, and guidelines for management of the lumbar intervertebral disc herniation. Although, there is conflicting evidence on whether herniation and degenerative discs are pain generators, pain is correlated with imaging evidence of nerve compression and displacement. (This is a conference presentation abstract and not a full work that has been published.)

Multimodal treatment of chronic low back status post-labral surgery: a case report

Berch Fritz, Heather Meeks, Jeffrey Remsburg, Nathan Hinkeldey

Objective: To describe the management of chronic low back pain following left hip labral repair in a male maintenance worker. Clinical Features: A 43-year-old male presented to a hospital-based chiropractic clinic with chronic low back pain following hip labrum repair. Subsequent hip surgery did not resolve the pain. Interventions and Outcome: Tried interventions included a combination of spinal manipulation, extra-spinal mobilization, soft tissue therapy (manual and instrument assisted) and rehabilitative exercises without sustained relief. Dry Needling was trialed on visit 4 and provided immediate and significant subjective improvement in pain, with relief lasting for 2 weeks. Acupuncture repeated on visit 5 abolished pain in this area and reduced the PROMIS PI 6B score (22 to 15). Conclusion: The use of dry needling resulted in symptom resolution and improvement of hip and chronic low back pain. This report aims to describe a case of utilization of alternative therapeutic management strategies in treatment of refractory pain following surgical intervention. Additionally, this case demonstrates the value of re-evaluation and trailing different treatment options after a patient has failed to respond to trialed modalities. (This is a conference presentation abstract and not a full work that has been published.)

Splenic calcifications in a patient with Systemic Lupus Erythematosus

Alessia Galante, Lauren Tollefson

Objective: To describe the case of a patient with known systemic lupus erythematosus (SLE) who presented with multiple splenic calcifications, an uncommon, yet important, radiographic finding. Clinical Features: A 47-year-old female patient presented to a chiropractic clinic with right-sided lower back and right hip pain she described as sharp, constant, and rated its severity as a 5 out of 10. She also noted intermittent facial paralysis and numbness in her hands and feet. No facial rash or other clinical manifestations were evident. Intervention and Outcome: A standard lumbar spine radiographic series performed at a chiropractic clinic demonstrated innumerable calcifications within the spleen. The calcifications were distinct, round nodules measuring 2-3mm in diameter. The patient was referred to her primary care physician for co-management of the splenic findings and continues to be treated by a chiropractor for her musculoskeletal complaints. Conclusion: This patient had no evident cause for the splenic calcifications except for her known SLE. While this finding is still rare in patients with SLE, splenic calcification predisposes patients to pneumococcal infections. Therefore, patients with this finding should be co-managed with the primary care provider for pneumococcal vaccination and to manage any concurrent systemic manifestations. (This is a conference presentation abstract and not a full work that has been published.)

Transient synovitis of the hip in a child: a case study and review

Rachel Gilmore, Mark Pfefer, Juhuyuk Do, Lucia Archuleta, Reagan Jirak

Objective: Pediatric transient synovitis is a benign, self-limiting condition diagnosed after the exclusion of more serious causes of hip pain and dysfunction related to septic or malignant causes. The aim of this case study was to encourage awareness among chiropractors regarding assessment and use of evidence-based clinical predictors for pediatric patients presenting with painful hips. Clinical Features: A 3-year-old presented to the chiropractor, refusing to walk for 1 day, with difficulty sleeping, and apparent pain in the right hip. Intervention and Outcome: The patient was referred to a local pediatric hospital emergency room. All imaging and lab testing was normal and the patient was afebrile. The patient was admitted to the hospital for observation and pain management. Conclusion: Clinical predictors should be used to assess an irritable hip in children. Kocher described 4 highly predictive clinical predictors of septic arthritis, including fever, inability to bear weight, elevated ESR and elevated white blood cell count; CRP was later added. A high index of suspicion and close observation of patients at risk should be maintained, even in the presence of negative clinical predictors. Timely medical referral of pediatric patients with septic or malignant hip is critically important. (This is a conference presentation abstract and not a full work that has been published.)

Postural Orthostatic Tachycardia Syndrome (POTS) after concussion: a case study and review

Rachel Gilmore, Mark Pfefer, Ehtan Peterson, Tyler Sexson, Juhuyuk Do

Objective: Postural Orthostatic Tachycardia Syndrome (POTS) is recognized as a complication of concussion. Individuals with POTS have symptoms including dizziness, lightheadedness, cognitive dysfunction, fatigue, headache, chronic pain, nausea, activity intolerance, syncope, and tachycardia. The aim of this case study is to raise awareness of this condition for chiropractors, review salient features, and describe a case study. Clinical Features: A 30-year-old female presented to a chiropractor 3 months after a motor vehicle collision with refractory symptoms including headaches, lightheadedness, chest pain, tachycardia and chest palpitations. The patient performed exercise several times per week and participated in recreational volleyball; currently unable to tolerate any exercise. The patient consulted a cardiologist and was advised to see a physical therapist or chiropractor for manual therapy and an graded exercise program. Intervention and Outcome: Initial chiropractic interventions included cervical mobilization and progressed to Diversified spinal manipulation. Early intervention also included graded, subthreshold activity and recumbent bicycling. The patient was treated for 8 weeks with significant improvement in symptoms and exercise tolerance. Conclusion: Post-concussion chiropractic patients could experience POTS and demonstrate refractory symptoms, especially including exacerbation with orthostatic activity. The approach should include graded, subthreshold and recumbent exercise. (This is a conference presentation abstract and not a full work that has been published.)

Evaluating chiropractic use by female patients within the Veterans Health Administration

Sarah Graham, Brian Coleman, Anthony Lisi

Objective: To describe national trends in use of total outpatient visits and chiropractic visits by female patients in the Veterans Health Administration (VHA). **Methods:** Using administrative data from the VHA Corporate Data Warehouse, we identified the number of unique patients by sex receiving any outpatient visits and chiropractic visits during fiscal years (FY) 2006 through 2020 (October 1, 2005 through September 30, 2019). We calculated the percentage of female users for each FY and its change over time. **Results:** From FY2006 to FY2020, the percentage of females receiving any outpatient visits increased 44%, from 8.15% to 11.73%. FY to FY changes ranged from -1.90% to +6.88%. Concurrently, the percentage of female patients receiving VHA chiropractic visits increased by 41%, from 12.02% to 16.95%. FY to FY changes during this time had a wider range, from -3.24% to +9.73%. In any FY, the proportion of females using chiropractic care was approximately 55% higher than that of the overall population. **Conclusion:** The percentage of female patients that used VHA outpatient care increased markedly over the past 15 fiscal years. Of patients that used chiropractic care, females comprised a higher proportion relative to general outpatient care. (This is a conference presentation abstract and not a full work that has been published.)

Manual therapy by chiropractors for infants with musculoskeletal-related suboptimal infant breastfeeding: a pilot study

Cheryl Hawk, Dawn Harrell, Brellyn Malone, Sharon Vallone, Jessie Young, Valerie Lavigne

Objective: to assess one-week outcomes of manual therapy by chiropractors for infants with musculoskeletal dysfunction and suboptimal infant breastfeeding (SIB), using the MIBAQ (Musculoskeletal Infant Breastfeeding Questionnaire). **Methods:** This was a descriptive cohort study. Volunteer chiropractors who frequently treat infants with musculoskeletal dysfunctions enrolled eligible infants within a 2-month study period. Mothers of infants < 3 months currently or recently breastfeeding presenting for care in the participating office were eligible. Mothers who declined to participate were excluded. The primary outcome was MIBAQ change from pre-treatment to one week later. A secondary measure was the Patient's Global Impression of Change. **Results:** A total of 72 participants from 6 chiropractic offices completed the pre-survey; 35 (49%) completed both pre- and post-survey. The MIBAQ scores improved highly significantly ($p < .000$) from pre- to post and were significantly correlated with the PGIC (Pearson correlation= $.408$; $p=.021$). **Conclusions:** These Results demonstrate that the MIBAQ appears to be clinically responsive to changes in SIB-related symptoms and could facilitate larger practice-based research studies of infants with musculoskeletal dysfunction contributing to SIB. In this study, significant clinical change was reported by mothers of infants with SIB after one week of chiropractic manual therapy. (This is a conference presentation abstract and not a full work that has been published.)

The state and trait anxiety and its correlation with academic achievement in the first year of chiropractic students

Xiaohua He, Niu Zhang

Objective: To assess the anxiety level of the 1st-year students and its correlation with academic achievement. **Methods:** There were 406 participants. The Spielberger State-Trait Anxiety Inventory (STAI) was administered to all participants in the 1st quarter first and the 3rd quarter 6 months later. Students with STAI scores 47 or above and below 47 were assigned to the high-anxiety and low-anxiety groups, respectively. Total scores from the 1st quarter anatomy and the 3rd quarter immunology-endocrinology courses were used as dependent variables. **Results:** The mean State-Anxiety (STAI-S) score and Trait-anxiety (STAI-T) score were 35.03 and 35.19 in the 1st quarter and subsequently 34.54 and 35.54 in the 3rd quarter. There were no significant differences in mean STAI-S and STAI-T scores between the two assessments. The range of high STAI scores was between 13.3% and 16.5% in both assessments. There was a statistically significant negative correlation between STAI-S and STAI-T scores with students' grades ($r=-.076$ and $r=-.069$ respectively, $p < .05$). **Conclusion:** The Results of this study confirmed a negative correlation between anxiety level and academic performance among students. This suggests that anxiety management should be incorporated into the chiropractic curriculum to achieve better academic outcomes. (This is a conference presentation abstract and not a full work that has been published.)

Blood flow restriction training: a narrative review

Chantiel Hevel, Mark Pfefer, Stuart McIntosh, Steven Reece, Garrett Zajicek, Sadie Engelken, Chris Todden, Mitch Ludwig, Anne Maurer

Introduction: Low-load, high-repetition exercise training with blood flow restriction (BFR) can increase muscle strength and may offer an effective approach for musculoskeletal rehabilitation. The aim of this umbrella review was to systematically appraise high level, published evidence regarding the effectiveness and safety of this training approach. **Methods:** A search was conducted of medical literature using MEDLINE, CINAHL, SportDiscus, and Cochrane central register. All eligible articles were reviewed then scored using the methodology for Joanna Briggs Institute (JBI) Umbrella Reviews. Two independent reviewers performed the scoring of articles. **Results:** Twelve review articles were considered eligible for this JBI Umbrella review. No class I evidence is available regarding the effectiveness of BFR. Evolving research suggests that BFR is safe if inclusion criteria are followed. BFR can be an effective muscle strengthening and rehab approach, especially early in rehabilitation when low loading is needed. **Conclusion:** BFR training is effective, even while using low loads. BFR is likely a good option for use as a rehabilitation approach following an injury. (This is a conference presentation abstract and not a full work that has been published.)

Development of individual-level chiropractic assessment scale using practice analysis of chiropractic 2020 data

Igor Himelfarb, Nai-En Tang

Objectives: In the last twenty years, there has been an increased interest in physicians' individual performance for improving the quality of healthcare. However, the individual performance assessment needs to be further refined. The Objectives of this study were to develop an assessment instrument using data collected by the Practice Analysis of Chiropractic Survey, establish psychometric properties of the instrument, and present this for evaluation to the chiropractic community. **Methods:** Factor analytic procedures were applied to two independent samples in order to arrive at the model representing the data (exploratory analysis) and cross-validate the factorial structure (confirmatory analysis). The

reliability and validity of the scale were established. **Results:** A six-factor model was developed and warranted with analytic procedures. The domains on the scale included: Physical Examination, Diagnostic Imaging, General Case Management, Specialized Assessment, Laboratory Results, and Self-Care Recommendations. **Conclusions:** The Individual-Level Chiropractic Assessment scale was developed, validated, and psychometrically tested across all six domains of chiropractic care represented by the model. This scale may be useful for improving the quality of care by focusing on the core healthcare provider - the doctor. (This is a conference presentation abstract and not a full work that has been published.)

Examining the consistency of chiropractic treatment modalities: a latent profile analysis

Igor Himelfarb, Nai-En Tang

Objectives: With the rising popularity of chiropractic, the public needs assurance that treatment modalities are consistent within the profession. The Objective of this study was to investigate the consistency of chiropractic treatment modalities across practicing chiropractors in the United States. **Methods:** The sample consisted of 2,441 participants and was nationally representative. To investigate the heterogeneity among U.S. chiropractors' use of treatment modalities, a latent profile analysis was conducted with the 12 treatment tasks selected as indicators of latent classes. Controlling for the sample's demographic characteristics, items assessing risk associated with the treatment tasks were included as distal outcomes in the final model. **Results:** Two distinct classes emerged as a result of the statistical class enumeration process. The frequencies of performing treatment tasks were similar across classes, with the exception of acupuncture (with needles) and dry needling. The level of pre-chiropractic education was predictive of class membership. Controlling for demographics, class membership was predictive of the attribution of risk to acupuncture-related items. **Conclusions:** Although the analysis identified two separate classes of chiropractic practitioners, the frequency of utilization of treatment modalities were similar in both classes for all variables except acupuncture (with needles) and dry needling. (This is a conference presentation abstract and not a full work that has been published.)

Exploring the unobserved heterogeneity within the chiropractic profession: are chiropractors scientifically oriented?

Igor Himelfarb, Nai-En Tang

Objectives: The current research aimed to investigate the degree of scientific orientation among practicing chiropractors in the United States. For this, we used the recent Practice Analysis 2020 data. We employed Latent Class Analysis to disaggregate the chiropractors into latent classes based on their responses to questions associated with scientific orientation. With this analysis, we hope to introduce some clarity about chiropractors being scientifically oriented. **Methods:** Three types of statistical models—unconditional latent class enumeration, latent regression using demographic predictors, and latent class model with distal outcomes were fit to the responses collected by the Practice Analysis Survey. Statistical model fit to the data was evaluated. **Results:** Three distinct classes emerged from the statistical modeling. The latent class membership was successfully predicted by years after receiving their DC degree, and the level of pre-chiropractic education. Scientifically oriented chiropractors were more likely to seek the consultation of professionals outside of chiropractic and to be members of interdisciplinary teams. **Conclusions:** This study is an attempt to provide an Objective look into the chiropractic profession using state-of-the-art statistical methodology. Based on our findings, there is clear evidence that the chiropractic profession is progressively moving towards greater scientific orientation. (This is a conference presentation abstract and not a full work that has been published.)

Healthcare sciences educational assessment: a pilot study

Igor Himelfarb, Bruce Shotts

Objectives: The NBCE is embarking on a mission to develop a Healthcare Sciences Entrance Assessment (HSEA). This will be a multipurpose assessment to be used by college admissions counselors to evaluate applicants of different educational background. For the chiropractic profession, the main purpose of the HSEA is to assist in diagnosing areas of insufficient knowledge or educational deficiencies that could be improved, thereby increasing applicant's chance for programmatic success. **Methods:** Using mixed Methods (qualitative and quantitative) the NBCE developed a test map. A focus group was conducted ($n = 8$) using chiropractic educators, chiropractic specialists, test developers, and practicing chiropractors to decide the content area that should be represented on the new assessment. Next, using Delphi method, the content map was validated with chiropractic college faculty. **Results:** The HSEA is to have five domains: Chemistry (20%), Physical Sciences (17%), Social Sciences (18%), Biology (25%), and Miscellaneous (20%). The Miscellaneous domain will include the following subdomains: Principles of Research, Scientific Method, Reading comprehension & Communication, and Medical Terminology. **Conclusion:** The HSEA will deliver an Objective measure for the colleges to provide supplemental coursework or study, and properly place the student in an appropriate academic schedule. (This is a conference presentation abstract and not a full work that has been published.)

Medical resident perceptions of chiropractic providers in an urgent care setting: an opportunity for collaboration

Melissa Hirschman, Ross Mattox, Jason Napuli, Matthew Knieper, Michael Cole

Objective: To investigate the perceptions and attitudes of medical residents of various specialties regarding chiropractic care and Whole Health Program as well as the collaboration of care with a doctor of chiropractic in a VA urgent care setting within a single VA Health Care System. **Methods:** A 10-item survey was distributed anonymously via Survey Monkey to a sample of medical residents and health professional trainees rotating through the urgent care clinic. Participants were surveyed on their past experience and understanding of chiropractic care and Whole Health, in addition to their confidence in their ability to evaluate and treat musculoskeletal conditions. The benefits of collaborating with chiropractic physicians within this setting was also surveyed. **Results:** Survey Results indicated a wide variety of responses from medical residents in the categories of past experience, collaboration with chiropractic physicians, and evaluation of musculoskeletal disorders. Details of the Results will be reported in depth. **Conclusion:** Based on the survey Results, we are able to identify the barriers and opportunities for chiropractic physicians within an urgent care setting. Additionally, the impact of collaboration with medical residents relating to chiropractic care and Whole Health was positive but requires further investigation. (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 after double mastectomy: a case study

Jesse Hodges, Marc Lucente

Objective: To describe the chiropractic care and rehabilitation combined with myofascial release of a patient following double mastectomy. **Clinical Features:** A 67-year-old female presented with bilateral radiating numbness into her hands after a breast cancer diagnosis and double mastectomy to remove all cancerous lymph nodes. All shoulder range of motion was decreased bilaterally. Wrights hyperabduction test was positive bilaterally. All motor and reflex findings were normal. Upper extremity sensation was decreased bilaterally. **Intervention and Outcome:** Passive Myofascial Release Technique® was performed bilaterally on the infraspinatus and pectoralis minor muscles along with prone diversified chiropractic adjustment to restore motion to the cervicothoracic junction of the spine at C7 and T1. An immediate increase in all shoulder and scapular range of motion was noted. The patient was treated once a week for 4 weeks and given stretches for the shoulders and pectoralis minor muscles to be performed 3-5 times per day. **Conclusion:** Symptoms decreased from daily to once per week after two treatments and no symptoms were reported after 4 treatments. This case demonstrates that chiropractic care along with myofascial release and rehabilitation can potentially improve the quality of life of a patient after major surgery. (This is a conference presentation abstract and not a full work that has been published.)

Trends in multiple therapy consultation in conjunction with chiropractic care at a Veterans Healthcare Administration facility: improving pain management pathways

Leah Hutchison, Laurie Pfeiffer

Objective: A multimodal approach in the management of chronic pain is largely supported in clinical practice guidelines. The purpose of this study is to analyze trends in consultation at a Veterans Health Administration (VA) facility in conjunction with chiropractic care to improve patient centered outcomes in integrated health. **Methods:** A cross-sectional analysis of electronic health record data of patients with a referral for chiropractic services from August 2021 to November 2021. The primary outcome measure was a referral for the same diagnosis to another service: physical therapy, pain management, alpha stimulation, whole health, and yoga. **Statistical analysis** compared trends and time frame between consultation of services(s). **Results:** Veterans with a consultation to chiropractic care within this time frame numbered 353. Of those, 138 (39%) also received consult for physical therapy, 60 (17%) received consult for pain management, and 25 received consult for alpha stimulation, respectively. The most common time frame between consultation was within 30 days (42, 28%) and same day (32, 22%). **Conclusion:** These Results may be relevant to process improvement to establish a single point of consultation or fully integrative approach for the most commonly consulted therapies for pain management. (This is a conference presentation abstract and not a full work that has been published.)

Rotational magnitudes of supine cervical thrusts performed on mannequins

Mackenzie Keller, Brent Russell, Ed Owens, Ron Hosek

Objectives: Supine cervical adjustments (SCAs) are frequently used by chiropractors but there has been little study of their movement characteristics. As part of a larger project to investigate angular kinematics during SCAs, the primary aim of this pilot was to determine how well Methods previously developed with human patients could be used with a mannequin specifically designed for palpation and adjustment training. **Methods:** The mannequin was outfitted with inertial measurement units (IMUs) overlying the forehead and sternum. Ten DC students with patient care experience performed 4 SCAs at the C3 level: 2 right-hand thrusts, 2 left-hand thrusts. Data were analyzed in Excel. **Results:** For 40 SCAs, axial rotation at the peak of thrust averaged 33.3° (8.2). Dominant and non-dominant hand thrusts averaged 36.1° and 30.4°, respectively ($p=0.504$). The mean difference between 1st and 2nd right-hand thrusts was 5.3° ($p=0.28$); for left-hand thrusts, 5.6° ($p=0.42$). **Conclusions:** The IMU system worked well with the mannequin. Rotational magnitudes were similar to previous findings with human patients (mean 32.4°). Additional investigation will include licensed DCs and students with less training, to examine the impact of experience, and will extend analyses to other motion characteristics. (This is a conference presentation abstract and not a full work that has been published.)

Integrating social determinants of health training into one doctor of chiropractic program: a protocol for implementation, assessment, and continuous improvement with didactic and experiential learning

Jevinne Khan, Patrick Battaglia, Jordan Gliedt, Joseph Pfeiffer

Objective: To describe 1) Methods for integrating social determinants of health (SDOH) education into an existing chiropractic curriculum, 2) necessary clinical expansions for experiential learning, and 3) quality improvement for student learning and faculty engagement. **Methods:** A narrative literature search including scoping reviews, curricular toolkits, and validation studies, was conducted to investigate established SDOH training in various health profession programs. One Doctor of Chiropractic program (DCP) was surveyed by examining program details published on its website to identify areas for integration and the necessary institutional support required to sustain integration efforts. **Results:** Based on existing pedagogies, curricular design, and institutional initiatives, a roadmap was created outlining program components encompassing admissions, orientation, student affairs, extra-curricular activities, didactic lectures, experiential learning, and administrative support. This roadmap details various Methods for integrating SDOH training and assessment into the respective components of the DCP. **Conclusion:** As chiropractic continues to integrate within diverse healthcare settings, the inclusion of more SDOH training within DCP is vital. This protocol demonstrates how SDOH might be integrated into a DCP, allowing for its various domains to permeate the pre-clinical and clinical curriculum, extra-curricular activities, and institutional policies. (This is a conference presentation abstract and not a full work that has been published.)

Utilization of health promotion and prevention in chiropractic clinical practice and student perspectives on its importance: a perceived cornerstone of chiropractic practice?

Lisa Killinger

Objectives: The ACC and NBCE both included health promotion in respective definitions of chiropractic practice. 95% of NBCE surveyed DCs regularly participate in health promotion and prevention (HPP) activities such as recommending better nutrition and physical activity. But, do chiropractic value HPP? This literature search led to a survey aiming to assess the perceived value placed on HPP by chiropractic students. **Methods:** An evaluation of current

literature and NBCE reports on chiropractic and HPP found a high value and increased utilization of HPP in chiropractic practice over the past 10 years. This inspired a survey of 2 student cohorts (pediatrics and geriatrics classes), asking student to rate the importance of HPP in practice, and if they felt that patients were more receptive to HPP today compared with 10 years ago. **Results:** In the geriatrics class cohort: 98% of students rated HPP as 5/5 in importance and 2% rated it 4/5. (Pediatrics cohort: 92% rated 4 or 5/5) Also, 99 % felt that older patients are more receptive to HPP now (Pediatrics cohort 92%). **Conclusion:** HPP is perceived as a highly valued cornerstone of chiropractic practice by this chiropractic student cohort and leading chiropractic organizations. (This is a conference presentation abstract and not a full work that has been published.)

Caution in employing chiropractic care in patients taking fluoroquinolone antibiotics: a narrative review

Sean Kono, Mark Pfeifer, Megan Schellert, Devin Henderson, Sara Wilson

Introduction: Fluoroquinolone (FQ) antibiotic use has been associated with artery dissections and tendon ruptures. The aim of this project was to review published literature regarding adverse events associated with FQ use and encourage chiropractors to be aware of risks and contraindications that could be associated with manual therapy interventions and spinal manipulation. **Methods:** A search was conducted of medical literature using MEDLINE, CINAHL, and Cochrane central register, and Index to Chiropractic Literature. All eligible articles were reviewed then scored using the methodology for Joanna Briggs Institute (JBI) Umbrella Reviews. Two independent reviewers performed the scoring of articles. **Results:** Ultimately, 16 articles were considered eligible for this review. There is strong evidence of harms associated with use of FQ. Harms of particular interest to chiropractors and other manual therapists include artery dissections and tendon ruptures associated with oral and parenteral administration of FQ antibiotics. **Conclusion:** Evidence-based consensus guidelines should be developed for chiropractors regarding patients who are currently or recently taking FQ antibiotics. It is likely that concurrent or recent use FQ antibiotics should be considered a contraindication for spinal manipulation and other manual therapies. (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 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 basis, with implications for the quality of education for 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 onto department committees; 130 HPEs in Community of Practice; workshops at 10/14 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, a successful research grant application and a growing Community of Practice. (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

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

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 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 (HPCPCS). 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 similar. There were no significant between group mean differences in change on HPCPCS. 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 impact collaborative attitudes. 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.)

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

Deborah Kopansky-Giles, Lindsay Beavers, Lori Whelan, Fok-Han Leung, Kari White, Norman Dewhurst

Objective: At St. Michael's Hospital (SMH), 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. ReQuLST QI 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.)

Chiropractic students' perception of online learning during the COVID-19 pandemic

Eniabitobi Kuyinu, Stephanie Sullivan, Emily Drake, Kate Hayes, Austin Galinghouse

Objective: To understand chiropractic students' perceptions of online learning during the COVID-19 pandemic. **Method:** Following a mandatory period of online education, a 32-question, mixed Methods online survey was distributed to a single-campus chiropractic student body through multiple communication channels. Demographic variables, self-reported learning challenges, technology skills, and perceptions of online and on-campus learning delivery modalities were gathered. **Results:** 136 individuals completed the survey (66.9% female) with 76.5% aged 18-34. Self-identified learning challenges were present in 41.2% of participants, of which 80% were ADHD/ADD. Over 75% of individuals agreed they were proficient with technology (learning management system, note taking, typing, and computer use). For classes with a lecture and lab component, 65.4% preferred in-person labs and online lectures, and 56.6% of individuals thought that in-person lectures were not a good use of time. Remote lectures and in-person labs were considered a good use of time, 77.2% and 82.4% respectively. Learning challenges and retention and use of information by online or in person was significantly different (Chi squared) between learning challenge/no challenge presentation ($\alpha=0.01$). **Conclusion:** Chiropractic students preferred online and on-campus education differentially for labs and lectures. Overall, students favored online lectures and in-person labs. (This is a conference presentation abstract and not a full work that has been published.)

Diagnosis and management of Pronator Teres Syndrome after misdiagnosis: a case report

Spencer Lindholm, Harold Olson

Objective: This case study presents findings of a patient with bilateral pronator teres syndrome initially misdiagnosed as carpal tunnel syndrome (CTS). The key Objective of this case study is to discuss the significant overlap and distinct differences in symptom presentation and clinical features between median nerve entrapment at the carpal tunnel and pronator teres. **Clinical Features:** A 40 year old male former bodybuilder with bilateral numbness and tingling in the first 3.5 digits as well as bilateral forearm pain. Previously diagnosed by a neurologist as CTS. No increased symptoms at night. Tenderness to palpation and anterior forearm pain. Increased symptom presentation with strength training and prolonged computer use. **Intervention and Outcome:** The patient participated in 8 visits consisting of interventions including manual therapy, dry needling with electrical muscular stimulation, and a home exercise program consisting of progressive loading and ROM exercises. **Conclusion:** CTS may be misdiagnosed in cases where median nerve entrapment symptoms are similar to symptom presentation and diagnostic findings from other median nerve entrapment sites. The patient met the majority of diagnostic findings associated with CTS. A small number of clinical diagnostic differentiators can aid clinicians in providing proper diagnosis and interventions. (This is a conference presentation abstract and not a full work that has been published.)

Adoption of telemedicine during the COVID-19 pandemic: perspectives of primary healthcare providers

Joe Lintz

Objectives: This study examined the major barriers to adoption of telemedicine among primary healthcare providers at a primary care clinic in north Texas during the pandemic. **Methods:** A self-administered questionnaire was mailed to 67 primary healthcare providers at a primary care clinic in north Texas, with a 70% percent response rate ($n = 47$). Multiple logistic regression was conducted to determine characteristics related to use of telemedicine. Chi-square tests were also performed to examine the relationship between the number of perceived barriers and telemedicine usage. **Results:** Results revealed that the lack of reimbursement was a significant obstacle to telemedicine adoption. Plus, the number of perceived barriers to telemedicine usage was negatively associated with using telemedicine. **Conclusion:** The findings suggested that the barriers to using telemedicine existed across an array of situations and that decreasing these obstacles would be critical in encouraging future telemedicine adoption among providers during and after the pandemic. This will especially be the case for primary care practices where scarce financial resources have been a traditional problem for such providers. This complicity is likely to be amplified owing to the inimical effects of the pandemic, after its potential containment. (This is a conference presentation abstract and not a full work that has been published.)

Radiographic identification of a bariatric surgery complication and frequent cause of gastroesophageal reflux

Tracey Littrell, Michelle Drover

Objective: This case report describes an established cause of gastroesophageal reflux and a frequent bariatric surgery complication not previously described in the Index to Chiropractic Literature (ICL) database. **Clinical Features:** A 61-year-old female with a history of breast cancer and mastectomy reported low back pain, inability to stand upright, and concurrent gastroesophageal reflux. She underwent a diagnostic imaging examination of full spine sectional radiographs which revealed esophageal dilation greater than twice the average 2 cm esophageal diameter and a laparoscopic adjustable gastric banding (LAGB) device. **Intervention and Outcome:** Differential diagnoses for esophageal dilation include achalasia, esophageal spasm, and secondary causes of esophageal dysmotility, including opioid-induced and LAGB. Esophageal dilation complications may present in nearly half of LAGB patients. Symptoms of esophageal dilation include gastroesophageal reflux, esophagitis, dysphagia, and emesis. The patient was referred for consultation for revision of the gastric band. **Conclusion:** Obesity is an independent risk factor for gastroesophageal reflux, a condition commonly seen in chiropractic offices. With bariatric surgery frequency increasing, nearing 300,000 procedures in 2020, chiropractors should consider LAGB complications in cases of new or worsening gastroesophageal reflux, esophagitis, dysphagia, or emesis. (This is a conference presentation abstract and not a full work that has been published.)

Wellness knowledge, attitudes, and behaviors of chiropractic students

Marc Lucente, Jeffrey Krabbe

Objective: The aim of this study was to determine the relationships between wellness knowledge, attitudes, and behaviors in a chiropractic student population. **Methods:** Students at a chiropractic college were administered a validated Wellness Knowledge, Attitude, and Behavior Instrument (WKABI). The WKABI instrument measures knowledge, attitudes, and behaviors in the intervention areas of physical activity, nutrition, and stress management. Scores were tabulated for each section. Demographics were included as part of the instrument. Spearman's Rho correlations, standard deviation, and mean were used to analyze the data. **Results:** Knowledge scores were significantly correlated with attitude scores and were also significantly correlated with behavior scores. Attitude scores were significantly correlated with behavior scores as well. Mean scores for all subjects on the knowledge, attitude, and behavior sections were 77.3%, 86.6%, and 65.9% of the highest possible scores, respectively. **Conclusion:** Significant relationships exist between wellness knowledge, attitudes, and behaviors of students at a chiropractic college. Further research will be required in this population to identify what other factors may influence wellness behaviors. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractors' views toward e-health for spine care among aging adults: a qualitative analysis

Michele Maers, Stacie Salsbury, Anna Marie Zeigler

Objective: Health technology increasingly supplements in-person care, including for spinal health. This IRB-approved qualitative study explored chiropractor's views about e-health interventions and how technology might augment chiropractic care for aging adults. **Methods:** Eleven chiropractors from two U.S. metropolitan areas participated in 60-minute individual interviews to ascertain providers' experience with and perspectives about e-health and the use of this technology among older patients. Content analysis of transcribed audio-recordings grouped themes within questions and across providers. **Results:** Most participants used some e-health technology, including electronic health records, text reminders, virtual appointment systems, and online exercises and self-care. While utilized across patient groups, providers suspected e-health was less readily adopted by older adults. The prevailing sentiment was e-health could be a useful adjunct for chiropractic practice, although some suggested limited application within a "hands-on" profession. Perceived usefulness included monitoring condition change; tracking compliance with recommendations; communication; and patient retention. Concerns included internet access; screen size of handheld devices; translation for non-English speakers; and reimbursement. Desired features of e-health technology should consider simplicity, accessibility, and customization to patient needs. **Conclusion:** Chiropractors were amenable to using e-health to augment care of older adults with spine-related complaints, but with limitations. (This is a conference presentation abstract and not a full work that has been published.)

Comparison of standard and patient-centered cases on student empathy

Alexander Margrave, Lia Nightingale

Objective: To assess the impact of standard and patient-centered cases on student-reported empathy. **Methods:** In this cross-sectional study, the Toronto Empathy Questionnaire (TEQ), Interpersonal Reactivity Index (IRI), and a demographic survey were administered to a cohort of students enrolled at a chiropractic institution in March 2021. Participants were randomized into two equally weighted groups who completed seven clinical case quizzes. The control group received the standard case with a brief patient history. The patient-centered cases provided significantly more information about that patient's individual and social determinants of health and included a patient photograph. Students were re-surveyed in June 2021. Descriptive statistics, Pearson's correlation, and repeated measures ANOVA were used to evaluate responses. **Results:** Twenty-five students completed the project (6 male, 19 female). Data was normally distributed. The intervention did not significantly impact any outcome measures (Toronto Empathy Score, Personal Distress, Fantasy, Perspective, and IRI Empathy Scores). Pearson correlation between Toronto Empathy Score and IRI Empathy Score was 0.783 for pre-test Results and 0.750 for post-test Results, both of which were statistically significant ($p < 0.001$). **Conclusions:** Both measures of empathy were found to be highly correlated, although student empathy was not impacted by patient-centered cases. (This is a conference presentation abstract and not a full work that has been published.)

Acupuncture and chiropractic spinal manipulation for migraine: a case study and review

Anne Maurer, Eric Waltemate, Reagan Jirak, Devin Henderson, Mark Pfefer

Introduction: Headaches are among the leading, disabling complaints in an outpatient setting. Over 12% of chiropractors describe acupuncture as a focus of their practice. Little research has been published regarding combining acupuncture and chiropractic care as an intervention for migraine and other types of headaches. The aim of this case study is to describe the treatment of a patient with chronic, disabling migraine using a combination of acupuncture and chiropractic care. **Clinical Features:** A 24 y/o female presented for care to a chiropractor possessing advanced training in acupuncture. The patient described chronic migraine headaches (unilateral, frontal throbbing pain) with increased frequency/intensity within the last 8 months. **Intervention and Outcome:** Chiropractic Diversified spinal manipulation was applied to the thoracic spine. Needle acupuncture was applied primarily to SP 8, ST 5 and ST 45 with supplementing technique. Other acupuncture points treated included LI 20, ST 1, and SP 5. The patient had a clinically significant improvement in frequency and intensity of headaches. **Conclusion:** This case describes clinically significant improvement in a patient with a long-term migraine problem. Additional research is warranted to evaluate the effects of adding acupuncture to chiropractic spinal manipulation in the treatment of headache disorders. (This is a conference presentation abstract and not a full work that has been published.)

Accuracy of using tuning-fork tests in diagnosing bone fractures: a narrative review

Anne Maurer, Mark Pfefer, Stuart McIntosh, Chantiel Hevel, Sara Wilson, Kirsten Abbott, Megan Schellert

Introduction: Chiropractors sometimes use tuning forks to initially screen for bone fractures, especially when engaged in on-field management of athletes. The aim of this project was to review and evaluate published literature regarding accuracy of tuning fork tests for screening and diagnosis of bone fractures. **Methods:** A search was conducted of medical literature using MEDLINE, CINAHL, SPORTDiscus, Index to Chiropractic Literature, and

Cochrane Central Register. All eligible articles were reviewed then independently scored by 2 independent reviewer using instruments developed by the Scottish Intercollegiate Guidelines Network (SIGN) to evaluate previously published RCTs and review articles. A primary interest was evaluation of sensitivity and specificity of tuning fork tests. Results: Ultimately five articles were scored including patients of varying ages. Sensitivity of tuning fork tests is generally high but specificity is highly variable over several studies. Conclusion: Tuning fork tests have some value in ruling out fractures. Caution should be applied in ruling in fractures using tuning fork tests. Use of tuning fork tests should not be used as a stand-alone test to evaluate fractures in routine clinical practice. The small sample size of the studies and the observed heterogeneity make a generalizable conclusion difficult. (This is a conference presentation abstract and not a full work that has been published.)

Implementation of a firefighter wellness initiative during record wildfires and a global pandemic

John Mayer, Joe Verna, Charity Lane

Objective: Firefighters have elevated rates of cardiovascular, musculoskeletal, and sleep disorders. However, specific guidance on implementing interventions to address these conditions is largely unavailable. The purpose of this project was to implement a firefighter wellness initiative targeting obesity, musculoskeletal injuries, and sleep disorders. Methods: An observational cohort project was conducted in 429 career firefighters from 15 California departments. Assessments included anthropometric, fitness, and patient-reported outcomes that are known health risk indicators. Physical fitness, injury prevention, and educational interventions were customized and triaged according to needs, goals, and risk levels. Interventions were delivered over 9-18 months in one-on-one and group settings, via face-to-face and telehealth sessions. The initiative was implemented during record wildfires and the COVID-19 pandemic, which disrupted delivery. Results: 127 firefighters completed 9-month follow-up assessments. For those at highest risk at baseline, significant improvements ($p < 0.05$) were observed in waist circumference, muscular endurance, functional movement, exercise frequency, dietary intake, and sleep quality. Conclusion: Improvements in key health risk indicators were observed in firefighters who participated in a wellness initiative. While the relatively low adherence may limit generalizability, the unprecedented environment provided an opportunity to inform future implementation of occupational wellness programs. (This is a conference presentation abstract and not a full work that has been published.)

Percussion therapy devices: a scoping review

Stuart McIntosh, Steven Reece, Mitch Ludwig, Garrett Zajicek, Monique Mossop, Mark Pfefer

Introduction: Handheld electronic percussive massage devices have gained popularity and are commonly used by manual therapists and by private individuals with the goal of increasing strength, increasing performance, and enhancing recovery after exercise. The aim of this scoping review is to assess and synthesize the current published evidence related to this emerging intervention. Methods: The online search was performed in PubMed, SportsDiscus, Google, and Google Scholar. Any studies or articles regarding percussion therapy devices and pain, recovery, performance, and range of motion were included in this review. Results: Numerous non-peer reviewed articles and equipment reviews were found online but only 3 peer-reviewed articles were located. It appears that range of motion may increase, and movement velocity may decrease with use of a percussion massage. Limited evidence is available regarding enhanced recovery associated with percussion therapy device. Conclusion: Handheld percussion therapy devices are readily available and can be a novel approach for therapists and for self-care. Percussion massage devices are generally safe, although some people with pre-existing health conditions should use caution before using these devices. Additional research is needed to evaluate effects and to explore treatment timing and dosage. (This is a conference presentation abstract and not a full work that has been published.)

Clinically integrated educational opportunities offered through United States doctor of chiropractic programs

Kevin Meyer, Omar Al-Ryati, Gina Bonavito-Larragoite, Clinton Daniels

Objective: The primary Objective of this study is to assess, summarize and compare the current integrative clinical learning opportunities offered for students within United States (US) Doctor of Chiropractic (DC) programs. Methods: Two authors independently searched all accredited US chiropractic school handbooks and websites for clinical training opportunities within integrated settings. The two data sets were then compared, with any discrepancies resolved through discussion, or when necessary, extracted and adjudicated by a third author and with group consensus. We extracted for preceptorships, clerkships, and/or rotations within Department of Defense, Federally Qualified Health Centers, multi/inter/transdisciplinary clinics, private/public hospitals, and Veterans Health Administration (VHA). Results: Information on clinical opportunities was primarily located on program websites. Of the 17 schools reviewed, all but five DC programs listed at least 1 integrated clinical experience, while 40 was the most available. There was a mean of 5.6 (median 3.0) opportunities per school, in a mean of 1.8 (median 1.0) different types of settings. Approximately two-thirds (62.5%) of integrative opportunities were within VHA, followed by private/public hospitals (10.4%). Conclusion: A spectrum of available integrative training opportunities exist for DC students dependent upon the school they attend. (This is a conference presentation abstract and not a full work that has been published.)

A chiropractic practice-based survey designed to evaluate patient COVID-19 symptoms and severity in relation to patient characteristics, health practices, and chiropractic care use

Salvatore Minicozzi, Margaret Sliwka, Emily Drake, Kate Hayes, Stephanie Sullivan

Objective: This survey was intended to evaluate COVID-19 symptoms and severity in relation to patient characteristics, health practices, and chiropractic care use. Methods: A 147-item survey was circulated December 1, 2020 through April 7, 2021 to chiropractic patients assessing: demographics, frequency of chiropractic care, health habits, underlying health issues, COVID-19 diagnoses, COVID-19 testing, symptomatology after contracting COVID-19, and use of personal protective equipment. Descriptive data and Chi-squared analyses were performed in Python. Significance was set at 0.01. Results: Among the 348 respondents, 63% had at least one high-risk condition and 20% indicated they had contracted COVID-19. Of this 20%, fatigue ($n=57$), headache ($n=50$), and muscle aches ($n=47$) were the most common symptoms reported. The longest lasting symptoms were shortness of breath ($n=27$; days=9.5), difficulty with stairs ($n=15$; days=8.6), and loss of taste/smell ($n=35$; days=7.7); the most severe symptoms were fatigue ($n=57$), vomiting ($n=7$), and loss of taste/smell ($n=35$). Chi-squared analysis revealed no statistically significant relationship between COVID-19

contraction and frequency of chiropractic care. Conclusion: This survey provided initial insight into chiropractic patient COVID-19 symptoms, severity, and practices; phase II survey and additional analyses are in progress. (This is a conference presentation abstract and not a full work that has been published.)

Patient characteristics and clinical outcomes associated with conservative treatment for spine pain in socioeconomically disadvantaged women

Sophie Morham, Amber Reichardt, Audrey Toth, Gerald Olin, Katie Pohlman, Steven Passmore

Objective: Financial barriers to conservative treatments exist for socioeconomically disadvantaged women with spine pain. The present study explored chiropractic care provision in a publicly funded setting, the Mount Carmel Clinic (MCC), in Winnipeg, Canada. Methods: Utilizing a prospective quality assurance database we explored patient demographics and clinical outcomes for women in the chiropractic program. Pain scores were reported on an 11-point Numeric Rating Scale (NRS). Baseline and discharge NRS scores were compared for each spinal and extremity region through Student's paired-sample t-tests to determine if clinically meaningful or statistically significant differences were present. Results: The sample population attained was 348 primarily middle aged ($M=43.0$, $SD=14.96$), obese ($BMI=31.3\text{kg/m}^2$, $SD=7.89$) women, referred to the MCC chiropractic program by their primary care physician (65.2%) for an average of 15.6 ($SD=18.49$) treatments. Clinically meaningful baseline to discharge changes in pain by spine region were observed ($CS=-2.22$, $TS=-2.34$, $LS=-2.40$, $SI=-2.72$), each of which yielded statistical significance ($p<.001$). Conclusion: A retrospective analysis found that the MCC chiropractic program serves socioeconomically disadvantaged middle aged and obese women. Pain reductions were reported, regardless of the region of complaint, temporally associated with a course of chiropractic care, a finding that warrants future prospective study. (This is a conference presentation abstract and not a full work that has been published.)

Photobiomodulation treatment of Anosmia and Dysgeusia: a case report

Shawn Neff, Devinder Singh

The pandemic of Coronavirus Disease 2019 (COVID-19) has caused a vast disaster throughout the world. There is increasing evidence that olfactory dysfunction can present in COVID-19 patients. However, the pathogenic mechanism of olfactory dysfunction and its clinical characteristics in patients with COVID-19 remains unclear. Multiple cross-sectional studies have demonstrated that the incidence rate of olfactory dysfunction in COVID-19 patients varies from 33.9-68% with female dominance. Anosmia and dysgeusia are often comorbid in COVID-19 patients. Anosmia has been associated with depression and decreased quality of life. A 48 year old female with post-COVID loss of her sense of smell and taste of five months duration presented to a chiropractic clinic. She was treated with photobiomodulation three times over a week to her nose and tongue and regained 90% of her sense of smell and taste. The improvement was durable over 5 months following treatment with no additional treatment. (This is a conference presentation abstract and not a full work that has been published.)

Metastatic carcinoma masquerading as a rib fracture

Aidan O'Brien, Ashley Ruff, Diann Bischof, Norman Kettner

Objective: This case report identified the clinical and diagnostic imaging features of a malignant rib lesion in a patient with a history of subacute rib trauma. Her clinical diagnosis was rib fracture. Clinical Features: A 54-year-old female patient with a history of breast cancer, right mastectomy and axillary lymphadenectomy presented with a 2.5-month duration of left anterolateral chest wall pain and history of fall on the right side. An initial bilateral rib radiographic series was performed which identified an aggressive lesion within the left 5th rib. A sonographic examination confirmed the findings of 5th rib destruction and pleural deflection but without pathologic fracture or pneumothorax. The patient was referred for a chest CT and oncological examination. Intervention and Outcome: The patient was referred to her oncologist following initial imaging of the rib lesion. The lesion was identified as metastatic spread of her breast carcinoma and she is currently being treated with chemotherapy. Conclusion: It is important for clinicians to understand the radiographic presentation of aggressive rib lesions, correlate this with patient history, and be aware that this pathology may present clinically as a simple rib fracture. (This is a conference presentation abstract and not a full work that has been published.)

Assessing biomechanical performance measures for lumbar spinal manipulation in novice chiropractic students

Paul Osterbauer, Rebecca Katchmark

Objective: Force sensing feedback and knowledge of Results are becoming widely adopted but require refinement based on the instructional setting. Our Objective was to determine whether students' lumbar spinal manipulation performance improved at the end of a course using a set of biomechanical measures. Methods: Data from a convenience sample of 37 4th trimester/10 students enrolled in our lumbo-pelvic adjusting course were collected. Side posture adjustments delivered to a secured manikin, were recorded the beginning and end of the term, using Force Sensing Table Technology™ (CMCC). Mean values were compared to empirical goals, based on the learning Objectives: Preload $< 25\text{N}$, Peak Forces= 400 & 800N, Time to Peak (speed), $< 200\text{ms}$. The protocol was approved by our IRB Chair, as an Exempt Category 4. Results: None of the pre/post scores were significantly different. It is noteworthy that approximately 25% of students mean scores were in the goal range (eg. Preload $\pm 10\text{N}$, Peak Force $\pm 50\text{N}$). Average Time to Peak scores were 160.5ms for 400N, and 161.1ms for 800N, respectively, and well below our goal of 200ms. Conclusion: While no significant improvements were noted, the process provides an opportunity to refine our instruction based upon data. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractic management of persistent leg paresthesia following lumbar microdiscectomy: a case report

Kevin Percuoco, Brandon Wedig, Spencer Lindholm

Objective: The purpose is to describe and discuss the management of chronic leg paresthesia following lumbar microdiscectomy. Clinical Features: A 61-year-old male sought chiropractic care for episodic low back pain and persistent leg paresthesia consistent with the S1 dermatome. Symptoms began 20 years earlier, ultimately resulting in partial lumbar microdiscectomy for a disc herniation. Post-surgically, lower leg and foot paresthesia remained unchanged for 20 years despite non-pharmacologic interventions. Intervention and Outcome: Chiropractic management included repeated end-range loading, neurodynamic (neuro mobilization) exercises, and spinal manipulative therapy of the lumbar spine for 12

visits over 3 months. The patient reported paresthesia symptoms shifting from constant to intermittent over 8 treatments and full resolution of leg and foot paresthesia at 12 treatments. Conclusion: This case describes non-pharmacological management of persistent leg and foot paresthesia following post-surgical lumbar spine microdiscectomy. End-range loading, neurodynamic (neuro mobilization) exercises, and spinal manipulative therapy of the lumbar spine resolved symptoms in this case. (This is a conference presentation abstract and not a full work that has been published.)

Management of bilateral foot pain in a 60-year-old female with high-grade achilles tendinopathy, peritonitis and plantar fasciopathy

Leslie Reece, Jake Halverson

Objective: To demonstrate the effect of chiropractic care and rehabilitation on foot pain intensity in a patient with history of ankle fracture with surgical repair and Achilles tendon pathology. Clinical Features: 60-year-old female presented complaining of bilateral plantar foot pain of four months duration. At the initial visit, bilateral pain intensity was 8 out of 10 on the Verbal Numeric Rating Scale. Patient had recent history of left fibular fracture corrected with open reduction internal fixation. Diagnostic ultrasound findings included high grade Achilles tendinopathy, Achilles peritonitis, heterotropic bone, plantar fasciopathy and pre-Achilles bursal effusion. Intervention and Outcome: The patient underwent a 6-week course of care consisting of soft tissue therapy, tarsal mobilization and eccentric loading exercises. Following treatment, pain intensity was 2 out of 10 on the VNRS with significant reduction in pain frequency. Conclusion: Conservative management of plantar foot pain utilizing manual therapy techniques and rehabilitative exercise was effective in reducing pain intensity in a patient with history of ORIF and multiple Achilles tendon pathologies. (This is a conference presentation abstract and not a full work that has been published.)

Visceral or somatic chronic abdominal pain: a case report

Jeffrey Remsburg, Jordan Mitzel, Nathan Hinkeldey, Heather Meeks

Objective: To report a case of chronic unresolved abdominal pain and diarrhea that responded favorably to manual therapy and therapeutic exercise through collaboration between physical therapy and chiropractic clinics within a rural Veterans Affairs Clinic. Clinical Features: A 34-year-old male with a 9+ year history of right sided abdominal pain, hip pain, and testicular pain with associated diarrhea, irritable bowel syndrome, and gastritis presented to a hospital-based chiropractic clinic and physical therapy clinic for evaluation. Previous evaluations by primary care and specialty care gave no definitive diagnosis or explanation for the pain. Diagnostic imaging was unremarkable for etiology of symptoms. Intervention and Outcome: The veteran completed five visits of physical therapy, including core stabilization and hip mobility exercises, and three visits of chiropractic care, including instrument assisted soft tissue mobilization over the right abdominal wall. Following treatment, he reported subjective improvements of over 90% pain reduction and 60-70% reduction in diarrhea occurrences. Conclusion: Interdisciplinary collaboration between chiropractor and physical therapist resulted in subjective improvements in pain and reduction of diarrhea for one patient. While more research is needed, this case study shows a possible causal relationship between musculoskeletal issues and gastrointestinal symptoms. (This is a conference presentation abstract and not a full work that has been published.)

Lifestyle medicine and chronic spine pain

Christopher Roecker

Objective: Using a purely biomechanical approach to managing chronic spine pain often falls short. Lifestyle medicine is an emerging healthcare approach that uses behavioral interventions to treat and prevent chronic disease. The purpose of this review is to introduce and overview the role of lifestyle medicine in the context of chronic spine pain. Methods: This narrative review outlines the evidence for chronic back and neck pain management and prevention from the perspective of the 6 pillars of lifestyle medicine, which include: diet, physical activity, stress management, sleep, social connectivity, and the avoidance of harmful substances (e.g., tobacco and alcohol). Results: There is evidence that healthy nutrition (diet), multidisciplinary rehabilitation or conventional exercise (physical activity), and mindfulness-based stress reduction or cognitive behavioral therapy (stress management) may improve chronic spine pain. Other aspects of lifestyle medicine, such as restorative sleep, social connectivity, and minimizing substance abuse, have less well-established connections with chronic spine pain management, but associations are hypothesized. Conclusion: Incorporating the pillars of lifestyle medicine into the management of chronic spine pain may allow for a novel, evidence-based, and truly holistic approach to addressing these persistent conditions. (This is a conference presentation abstract and not a full work that has been published.)

Cognitive impairment in adults: an integrative review of screening and prevention for manual therapy providers

Casey Rogers, Jaime Ayuso, Madeleine Hackney, Charles Penza

Objective: The aim of this review is to examine current literature and evidence-based approaches to recognizing risk factors for cognitive impairment together with addressing best screening, treatment, and prevention modalities. Methods: Through a literature search of medical databases including PubMed, CINAHL, AMED, and Medline we will review current screening practices including functional exams, imaging, and laboratory testing. We will also review current preventative measures being implemented in practice. Results: Imaging and Laboratory testing are not useful in screening for cognitive impairment. The Montreal Cognitive Assessment (MoCA) and Mini Mental State Exam (MMSE) remain a top choice for screening tools. The AD8 Dementia Screening Interview is an emerging screening tool that can be beneficial in virtual use, given COVID-19 limitations. Promotion of healthy active living through physical and mental activities remains the most evidence-based approach to prevention of cognitive decline. Conclusion: Cognitive decline impacts a large population. Recognizing signs and symptoms starts with individuals, caretakers, family members, and healthcare providers. While imaging and lab testing yields little valuable information for cognitive decline, screening tools are available for provider use. Promotion of healthy physical and mental activities remains the most evidence-based approach to prevention of cognitive decline. (This is a conference presentation abstract and not a full work that has been published.)

Osteoporosis: clinical considerations, screening, and prevention strategies for chiropractors

Casey Rogers, Geoff Holloway

Objective: To explore clinical considerations, screening, and prevention strategies for patients presenting to a chiropractic clinic with osteoporosis or antecedent risk factors. Methods: An

online database search of PubMed, AMED, CINAHL, and Medline was performed to extract articles containing "chiropractic", "screening", and "prevention" combined with "and osteoporosis." Articles prior to 2010, case-studies, and author determined non-relevant studies were excluded. Results: There is a significant gap concerning literature directed specifically to chiropractors for screening, treatment, and prevention of osteoporosis. Overall risk factors include postmenopausal women, a low body mass index (BMI), physical inactivity, chronic glucocorticoid use, smoking, and being of white/Asian race. Bone mineral density (BMD) testing remains the gold standard in diagnosis of osteoporosis. Management strategies include calcium and vitamin D supplementation, encouragement of healthy lifestyle choices, weight-bearing and muscle strengthening exercises, and joint/soft-tissue mobilization. Conclusion: Osteoporosis remains a significant public health concern disproportionately impacting white and Asian females. Despite being a contraindication to high velocity spinal manipulation, there are various pathways the chiropractor can mitigate osteoporotic symptoms and contribute to primary and secondary preventative methodologies for patients with high risk factors. Further investigation of chiropractic intervention efficacy on secondary symptoms is warranted. (This is a conference presentation abstract and not a full work that has been published.)

Patient perspective on office hygiene and COVID-19: pre and post-pandemic

Erika Evans Roland, Devon Ackroyd, Leslie Reece

Objective: Healthcare offices were directly affected by the COVID-19 pandemic. This research report presents data from a questionnaire on how COVID-19 may have affected patient outlooks on healthcare dress code and facility hygiene, specifically in a chiropractic setting. Methods: A longitudinal quantitative study was conducted on patients comparing the preference on their provider's attire, wearing a clinic coat, using hand sanitizer, and cleaning tables prior to and after the onset of the COVID-19 pandemic. Patient preferences on future use of surgical masks, providers and all individuals entering the building being vaccinated, and continued social distancing were recorded. Results: Results revealed that while patient preference on provider attire did not change, preferences have shifted to seeing the provider use hand sanitizer and wipe down tables. There was not a preference for continued mask wearing however continued social distancing was preferred. Results on a preference of vaccinations for providers and everyone entering the building were inconclusive. Conclusion: Operating procedures in health care offices before the pandemic compared to current and future dates have changed in several ways. Surveyed patients' perspectives suggest some office hygiene changes are preferred to stay. (This is a conference presentation abstract and not a full work that has been published.)

Identifying predictors of virtual chiropractic care in the Veterans Health Administration during the COVID-19 pandemic

Gregory Roytman, Kei-Hoi Cheung, Harini Bathulapalli, Christine Goertz, Cynthia Long, Anthony Lisi

Objective: To assess patient demographics that predict use of virtual (video and telephone) and face-to-face (F2F) visit types in Veterans Health Administration (VHA) chiropractic prior to and during the COVID-19 pandemic. Methods: We extracted administrative data from two consecutive 12-month periods (3/1/2019 - 2/28/2020 [Pre-COVID] and 3/1/2020-2/28/2021 [Post-COVID]), including patient demographics and the number of F2F and virtual visits. Data were analyzed using multivariable logistic regression. Results: We identified 73,323 chiropractic patients in the Pre-COVID period (73% white, 83% male, and 50% >56 years-old); and 62,652 in the Post-COVID period (72% white, 82% male, and 45% >56 years-old). There were 334,643 total visits Pre-COVID (99.91% F2F) and 212,586 (87.33% F2F) Post-COVID. In the post-COVID period, age <40 years [adjusted odds ratio (OR) = 1.21 (95% confidence intervals (CI) = 1.16-1.26)], female sex [OR = 1.15 (95% CI = 1.11-1.19)] and Black race [OR = 1.15 (95% CI = 1.11-1.19)] were more likely to be associated with use of virtual chiropractic care. Conclusion: Younger, female, and Black patients were more likely to participate in virtual chiropractic care. More research is needed to understand differences in demographics, outcomes, and patient perceptions between virtual and F2F visits. (This is a conference presentation abstract and not a full work that has been published.)

Analysis of the first six months of recorded chiropractic electronic health record template data in a multisite randomized clinical trial

Gregory Roytman, Kei-Hoi Cheung, Harini Bathulapalli, Christine Goertz, Cynthia Long, Anthony Lisi

Objective: To obtain a preliminary picture of patient clinical characteristics of initial chiropractic visits in the Veterans Response to Dosage in Chiropractic Therapy (VERDICT) Trial captured by an electronic health record (EHR) template. Methods: For this multi-site pragmatic trial, we created the VERDICT EHR Template (VET). Patients with chronic low back pain in four chiropractic services within Veteran's Health Administration (VHA) participated. We extracted diagnosis, procedure, and other detailed information from initial encounters using VET from March 1, 2021 to September 1, 2021. Results: Across all sites, VET was used by 7 chiropractors for 83 participants. Local pain was documented in 55.4% of initial visits, while 32.5% specified radiating pain. Of all initial visits, 9.6% documented positive straight leg raise, 60.2% pain with lumbar facet provocation, and no patients had motor weakness. Lumbar manipulation and myofascial release were delivered in under 50% of visits (47.0% and 43.4%, respectively) and therapeutic exercise in 24% of visits. Conclusion: Results show our EHR template is used by providers and produces intended data capture. Continued use of VET during VERDICT will describe VHA chiropractic care in more detail than has been previously practical, and can inform future template implementation. (This is a conference presentation abstract and not a full work that has been published.)

Sciatic neuralgia caused by nerve sheath tumors diagnosed with ultrasonography

Ashley Ruff, Kari Horn, Meagan Hinzman, Daniel Haun, Norman Kettner

Objective: This is a rare case of sciatic neuralgia caused by intra-neural sciatic lesions. Clinical Features: A 48-year-old female presented with a palpable mass in the posterior thigh and right sided sciatic neuralgia for 7 months duration that was not improving with treatment. Squatting, trail racing, and sitting on hard objects reproduced the symptomatology with radiation down the hamstring into the calf, which progressed to the lateral and medial aspects of the heel. Intervention and Outcome: Ultrasonography (US) revealed two fusiform heterogeneous lesions in the right sciatic nerve, with internal echoes that were eccentrically located playing the fascicles. There was minimal through transmission enhancement and no hyperemia. Magnetic Resonance Imaging (MRI) confirmed the US findings and demon-

strated very mild contrast enhancement after contrast administration. The patient is waiting for a neurosurgical consultation for treatment options. Conclusion: Peripheral nerve sheath tumors of the sciatic nerve are a rare cause of sciatica, but should be a differential consideration, especially if the patient is not responding to a trial of care. (This is a conference presentation abstract and not a full work that has been published.)

Assessment of arm swing symmetry in walking: establishment of methods

Brent Russell, Claude Maysonet, Stephanie Sullivan, Kate Hayes, Ronald Hosek

Objective: As part of a longer-term project to analyze multiple motion aspects of the upper extremities during walking, we first tested analyses of shoulder flexion and extension and their most relevant spinal motion, thoracic rotation. Many previous studies of walking have disregarded upper extremity movements. Methods: 7 healthy volunteers walked on a treadmill while outfitted with inertial measurement units to track movement. Applications written in Python and R were used to identify cyclic maximums and minimums. Symmetry was determined using an established Symmetry Index formula. Results: Mean shoulder flexion was 12.6° and 4.1° for the left and right sides, respectively; extension was -9.6° and -8.0°; and total ranges were 22.1° and 12.2°. Flexion, extension, and range were asymmetrical for all participants, with mean indexes of 101.0%, 17.3%, and 58.0%, respectively (> 6% is asymmetrical.) Thoracic rotation to the left and right (both means 1.5°) typically preceded left and right shoulder flexion, respectively. Conclusions: Magnitudes and asymmetry of shoulder flexion and extension were consistent with previous studies, but out-of-phase thoracic rotation was unexpected. This study provides a foundation for additional investigation, including future analysis Methods of other body regions, establishment of norms, and chiropractic care studies. (This is a conference presentation abstract and not a full work that has been published.)

Health technology in the chiropractic encounter: a descriptive survey of aging adults and doctors of chiropractic

Stacie Salsbury, Anna Marie Zeigler, Michele Maiers

Objective: Health technologies, such as telehealth, apps, and wearables, are becoming integral components of the healthcare experience. This IRB-approved descriptive survey explored how midlife and older adults and doctors of chiropractic (DCs) incorporate health technology into everyday life and the chiropractic encounter. Methods: Convenience samples of DCs (n=37) and chiropractic patients age 50+ years (n=67) from two midwestern communities completed investigator-designed questionnaires via SurveyMonkey. Descriptive statistics compare responses across groups. Results: DCs reported communicating with patients using desktops/laptops (82%), printouts (71%), smartphones (57%), practice websites (57%), email/online newsletters (43%), tablets (39%), postal mailings/newsletters (36%), health websites (21%), and television-based programs (18%). Patients reported substantial use of desktops/laptops (88%), smartphones (81%), and tablets (46%), with limited use of e-readers (15%), smartwatches (15%), and wearable (4%) or non-wearable medical devices (10%). Most DCs and patients reported no telehealth (86% v. 97%) or telephone consultation (40% v. 83%). While DCs endorsed use of printouts (89%), websites (75%), and health apps (40%) for patient education, patients reported receiving no such recommendations (51%, 70%, and 93%). Conclusion: Aging adults incorporate many health technologies into their lives, which may offer DCs new ways to engage patients in their spine health. (This is a conference presentation abstract and not a full work that has been published.)

A descriptive comparison of an evidence-based diagnostic checklist for low back pain and a low back exam checklist used in a chiropractic teaching clinic

Kara Shannon, Zacariah Shannon, Ronnie Boesch

Objective: To compare a current evidence-based exam for diagnosing low back pain (LBP) to a low back exam checklist in a chiropractic teaching clinic. Methods: Two authors independently identified procedures from a published, evidence-based, diagnostic exam for LBP. The authors then independently compared the procedures against those included in a chiropractic teaching clinic evaluation form. Evidence-based exam procedures were categorized as present or absent on the teaching clinic checklist after consensus. Results: The teaching clinic checklist included all evidence-based exam procedures for identifying lumbar radiculopathy. Gaps in the student exam checklist included the omission of the extension rotation test for facet joint pain, repeated motion testing for discogenic pain, sensory testing for neuropathic pain, palpation to identify myofascial pain and piriformis and thoracolumbar syndromes, ankle brachial index test for vascular claudication, and four of six SI joint cluster tests. Conclusion: Discrepancy existed between teaching clinic and evidence-based exams. Chiropractic teaching clinic leadership should consider reconciling teaching exam checklists with current evidence-based tests for LBP. This may improve learning when students consistently conduct exams using procedures with known diagnostic accuracy and offer more reliable information to inform case management. (This is a conference presentation abstract and not a full work that has been published.)

The association between sleep disturbance and multi-site musculoskeletal pain: a systematic review and meta-analysis

Zacariah Shannon, Azeez Alade, Kara Shannon

Objective: To systematically evaluate the association between sleep disturbance and multi-site pain, a treatment-resistant condition that drives disabling pain. Methods: We conducted a systematic literature search of Pubmed and Embase from inception to 02/2021. One author screened articles using inclusion/exclusion criteria. Two authors independently abstracted data and assessed risk of bias using the Newcastle-Ottawa scales. Results: Seven studies, including two at low risk of bias, four at moderate risk, and 1 at high risk, met inclusion/exclusion criteria and were included in the analyses. Sleep disturbance was associated with higher odds of multi-site pain (pooled OR=1.78, 95%CI=1.39-2.28). This relationship was consistent in subgroup analyses of cross-sectional studies (pooled OR=2.04, 95%CI=1.53-2.72) and cohort studies (pooled OR=1.54, 95%CI=1.13-2.11), which established a temporal relationship. There was moderate heterogeneity (I²=57%, p=0.03) in the overall analysis, with less in cross-sectional studies (n=4, I²=3%, p=0.38), compared to cohort studies (n=3, I²=67%, p=0.04). The funnel plot indicated potential publication bias with few published studies showing no or small effect. Conclusion: There is a moderate association between sleep disturbance and multi-site pain. To address heterogeneity, future studies would benefit from a unified definition of multi-site pain and standardized instruments for measuring sleep disturbance. (This is a conference presentation abstract and not a full work that has been published.)

Differences in history-taking skills between male and female chiropractic student interns

Michael Sheppard, Stephanie Johnson, Victor Quiroz, John Ward

Objective: To determine if there was a difference in performance metrics between male and female chiropractic student interns while performing a patient history assessment. Methods: 2,039 patient histories by student interns were analyzed over a 3-year data collection window. Student interns were assessed by chiropractic college clinicians on Reasoning (ability to derive information from the OPPQRST mnemonic), Communication, and Professionalism using a 1-4 modified Dreyfus model scoring system. A MANOVA was used to compare the impact of student sex on the 3 dependent variables. Results: For the ability to ask OPPQRST questions and effectively garner important patient information the scores were 2.82 +0.53 Males and 2.83 +0.54 Females (mean + SD; p=0.516). Communication scores were 2.86 +0.51 Males and 2.94 +0.51 Females (F= 12.35, p=0.000). Professionalism scores on the clinic exam were: 3.04 +0.58 Males and 3.08 +0.56 Females (p=0.098). The tests of between-subjects effects for "Communication" demonstrated female students scored significantly higher than male students. Conclusion: Female chiropractic student interns scored higher than male interns on Communication skills during a history-taking patient encounter. This supports the trend seen amongst female medical school students and female physicians that females score higher on communication-related assessments. (This is a conference presentation abstract and not a full work that has been published.)

Content validation of the chiropractic basic and clinical sciences exams: a delphi study

Bruce Shotts, Igor Himelfarb, Andrew Gow

Objective: This study presents Results of a content validity study conducted to evaluate the Part I, II, and Physiotherapy exams. Method: A structured communication technique known as Delphi method was utilized to connect with chiropractic colleges and solicit responses to the number of hours each subject area taught in an annum and its perceived importance. Each college designated a subject matter expert for the domains on Parts I and II, and the Physiotherapy exams. It took two iterations to achieve agreement. A panel of NBCE's internal subject matter experts (N = 8) reviewed and implemented recommendations provided by the colleges. Results: In round 1, responses from 98 experts were received and analyzed. In round 2, 14 independent responses were received. At the end of the first iteration, an agreement of importance was reached in all domains of the Part I exam, except Chemistry, all domains of Part II, and the Physiotherapy exam. The percentages of importance of each content area in the exams were calculated and compared to the existing test plans. Conclusion: This study helped to validate the content of the NBCE's exams as it reflects with the chiropractic college curricula. (This is a conference presentation abstract and not a full work that has been published.)

A systematic review of multidimensional well-being instruments

Stephanie Sullivan, Samantha Schonhardt, Rebecca Shisler Marshall, Taylor Keenan

Objective: There is limited consistency in the assessment of well-being. Therefore, the aim of this review was to identify measures of multidimensional well-being, categorize and group the dimensions, and develop standardized definitions based on the literature. Methods: Following Preferred Reporting Items for Systematic Reviews and Meta-analyses criteria, the databases Web of Science, MEDLINE, and PsychINFO were searched using key words wellbeing, well-being, and wellness from 1990 to 2020. Search Results were reviewed by two independent researchers. Two researchers sorted the dimensions into categories, first based on shared terms, then by definitions. Definitions for the categories were created from the dimensions. Results: The search resulted in 2,452 non-duplicated relevant articles, 26 instruments met inclusion criteria. In all, 205 dimensions were identified and defined based on the conceptualizations provided by the original creators of the measures. The 205 dimensions fit into 12 categories: physical, social, spiritual, emotional, environment, mental/intellectual, occupational, energy, achievement, engagement, purpose/meaning, and competence. No measure included dimensions in all 12 categories. Conclusion: This review provides a better understanding of the dimensions currently in use in the measurement of well-being and may aid in creating a more encompassing, holistic, and uniform multidimensional measure of well-being. (This is a conference presentation abstract and not a full work that has been published.)

The neurologic physiological lesion: a scoping review

David Taylor

Objective: 1) Investigate the evidence of the neurological physiological lesion. 2) Evaluate the change of the lesion by nonpharmacological treatment. 3) Explore the evidence for clinical applications. Methods: A scoping review of Medline, Cumulative Index to Nursing and Allied Health Literature, and Index to Chiropractic Literature was performed. Search Results were reported by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Extension for Scoping Reviews (PRISMA-SCR) and charted in Excel format. Results: 377 titles and 186 abstracts were reviewed. 61 full text articles were included. This consisted of 22 randomized controlled trials and 7 systematic reviews & meta-analyses. Evidence of the existence of a neurological physiological lesion was demonstrated by various physiological and imaging technologies, which revealed that physiological lesions can be changed with application of nonpharmacological conservative care, especially manipulative therapy. There were plastic changes in the central integrative state of the population of neurons for a short duration of up to 60 minutes. Conclusions: The literature-based evidence supports the theory of the existence of the physiological lesion and the ability to create plastic changes. There is an evidence gap in demonstrating application for long term changes applied for specific clinical conditions. (This is a conference presentation abstract and not a full work that has been published.)

Critical versus urgent referral of hypertensive patients: an umbrella review

D'sjon Thomas, Mark Pfefer, Jon Wilson

Introduction: Hypertension is a sustained elevation of systemic arterial blood pressure. Chiropractors should initially and intermittently evaluate blood pressure as hypertension is a common condition that is related to significant morbidity. Recent guidelines increased the number of adults with hypertension to include up to 46% in the U.S. The aim of this umbrella review was to inform chiropractors about current evidence regarding when to refer patients for evaluation of hypertension and especially provide guidance regarding when to send a hypertensive patient urgently to the emergency room. Methods: A search was conducted of medical literature using MEDLINE, CINAHL, National Guidelines Clearinghouse and

Index to Chiropractic Literature. All eligible articles were reviewed then scored using the methodology for Joanna Briggs Institute (JBI) Umbrella Reviews. Results: Numerous recent review articles and guidelines were located that were scored highly by independent reviewers. Conclusion: High quality evidence exists to guide chiropractors in assessment and referral of patients with hypertension. Hypertension with consistent measurement greater equal to or greater than 180/120 without other symptoms of end-organ damage should be considered an urgent referral but when symptoms of potential end-organ damage are present then immediate referral to an emergency room is recommended. (This is a conference presentation abstract and not a full work that has been published.)

Mindful reading: a bibliotherapy-based reading program for college students and employees

Natalia Tukhareli

Objective: The increase in mental health problems in college students has intensified the search for effective ways to promote mental health and wellness in academic institutions. The study will describe an innovative bibliotherapy-based reading program for chiropractic students. Bibliotherapy is a recognized evidence-based practice to promote health, well-being, and resilience to diverse populations. Methodology: The methodology involved a comprehensive review of the bibliotherapy research and best practices. Based on its findings and the author's previous experience in facilitating bibliotherapy programs for healthcare providers, the themes, content and the format of reading sessions were identified. Results: The Mindful Reading program was launched in 2019 and involved shared reading and guided discussion in small groups. The content of thematic compilations facilitated discussion around mental health, resiliency, mindfulness and suggested the evidence-based stress-management strategies to students. The variety of texts of various genres appealed to individuals with diverse ethnic and cultural backgrounds. With the onset of the COVID-19 pandemic, the program was moved online and expanded to college faculty, clinicians and staff. Conclusion: The participants found the program to be beneficial and perceived it as a valuable addition to available support services, as consistent with previous bibliotherapy research. (This is a conference presentation abstract and not a full work that has been published.)

Assessing thoracolumbar fascia mobility with musculoskeletal ultrasound

Robert Vining, Elissa Twist, Stephen Onifer, Anna-Marie Ziegler, Kara Shannon, Sujatha Kedilaya, Katie Hoyt, Lance Corber, Brian Anderson, Anna Walden-Cobb, Cynthia Long

Objective: To report thoracolumbar fascia mobility (shear-strain) using musculoskeletal ultrasound (MSK-US) in participants with chronic low back pain (CLBP). Methods: We enrolled adults self-reporting CLBP for at least 1 year. Shear-strain (a measure of differential fascial layer displacement) was calculated from MSK-US data obtained lateral to L2-3 with participants prone on a motorized flexion-distraction table flexing to 150, cycling at 0.5 Hz. MSK-US imaging was obtained while participants raised the head slightly, contracting paraspinal muscles, and with the head relaxed to compare the influence of paraspinal contraction on fascia mobility. Results: Forty participants with mean (range) age of 41 (22–62) years and BMI (SD) of 32.5 (7.4) were enrolled. Twenty-one (53%) were female. Mean (SD) 7-day pain severity was 6.0/10 (1.4), mean Roland Morris Disability score was 7.6 (4.8), and mean PROMIS-Pain Interference was 61.5 (6.0). Overall mean (SD) shear-strain was 49.0% (17.0), and 43.5% (18.7) with paraspinal muscles contracted. Mean shear-strain for females (relaxed, n=21) was 51.0% (18.8) and 46.8% (14.8) for males (n=19). Conclusion: Overall shear-strain was lower than previously reported for people with CLBP and consistent with prior research reporting reduced shear-strain in males. Paraspinal muscle contraction may also temporarily reduce shear-strain. (This is a conference presentation abstract and not a full work that has been published.)

Postural Orthostatic Tachycardia Syndrome (POTS) in a patient as a consequence of a concussion along with occipital headaches, dizziness, and nausea: a case report

Caroline Vitez, Charles Blum

Objective: To investigate the synergetic benefits of combined noninvasive chiropractic protocols for treatment of post-traumatic POTS. Clinical Features: A 36-year-old female sought chiropractic care for POTS induced nausea/dizziness/palpitations, constant bilateral occipital headaches, neck and sacroiliac/sciatic pain, exercise intolerance and bloating. Patient history, physical examination, and active 10-minute stand test established that she met the criteria for POTS. Prior to her presentation at this office her symptoms had persisted for a year and were unresponsive to other interventions (medical care/over-the-counter-analgesics). Intervention and Outcome: Craniocervical and spinal misalignments, believed possibly leading to cerebral vasculature and connective tissue deformation, were balanced according to the Sacro-Occipital Technique® and Atlas Orthogonal upper cervical evaluation protocols. Specific POTS related therapeutic exercises, diet modifications, as well as ocular fixation exercises were also implemented. Orthostatic vital sign testing was regularly recorded to assess POTS patient's response to care. Following combined treatment and adjunct therapy, the patient no longer met the criteria for POTS, did not exhibit pain or orthostatic intolerance symptoms to postural change except for mild brief bouts of nausea. Conclusion: Further research is needed to determine what subsets of patients with POTS might also respond to this conservative chiropractic care approach. (This is a conference presentation abstract and not a full work that has been published.)

Perceived stress and patterns of autonomic function: a protocol development study

Savannah Voelker, Courtney Bliese, Taylor Keenan, Emily Drake, Stephanie Sullivan, Johnathon Moore

Objective: Heart rate variability (HRV) is an effective tool that researchers utilize to gain more insight into autonomic nervous system activity. The aim of this study was to evaluate protocols for assessment of perceived stress and HRV. Methods: Healthy volunteers completed verbal and written stress surveys, pre/post HRV assessments, and an online post-survey. HRV data were collected using electrocardiography, recorded for 7 minutes. Participants were randomized to 1 of 3 rest periods post simulated chiropractic care: 1, 2, and 3 minutes. Kubios was utilized to analyze HRV data (SDNN); descriptive statistics and t-tests were performed in SPSS. Results: 45 participants (34 female) mean age: 30.4 ± 10.9 completed the study. Verbal and written stress surveys produced similar Results for acute stress. No significant within group HRV differences were observed for any rest period: 1 (p=0.629), 2 (p=0.662), 3 (p=0.784). In the post survey, participants felt the stress surveys were an accurate representation of their stress 96% and their overall study experience was positive 100%. Conclusion: Within this study, rest period length did not affect HRV Results. This study provided a foundation for additional investigation, including future stress, HRV,

and chiropractic care studies. (This is a conference presentation abstract and not a full work that has been published.)

Favorable outcome found in gait mechanics in a hemi-paretic patient treated with electro-acupuncture and vibratory plate exercise

Ashley Vogt, Devon Ackroyd

Objective: Capillary hemangioma at T2-3 removal resulting in significant gait disturbance. Patient unable to ambulate without assistance of wheelchair or walker. Previous trials of physical therapy with pharmacological intervention yielded minimal improvement and patient presented seeking alternative approach. Clinical Features: 55-year old female presented to a chiropractic teaching facility with 3-month history of gait disturbances resultant from the surgical removal of a capillary hemangioma at T2-3. Dermatomal hypersensitivity noted L3-S1 on right. Gait analysis showed loss of medial arches and plantar flexion bilaterally with varus positioning of the right Achilles tendon. Following physical examination, moderate physical disability was demonstrated. A five repetition sit-to-stand test was completed in 38.56 seconds. Intervention and Outcome: Patient treated using vibratory plate exercise on high frequency/low amplitude settings in addition to electro-acupuncture stimulation on the lower extremities bilaterally over the course of five months. Following intervention, patient is able to walk independently with only minimal use of cane and sit-to-stand test improved to 10.41 seconds. Conclusion: Vibratory plate exercise and electro-acupuncture on the lower extremity is beneficial for improving gait and proprioception following spinal surgery. (This is a conference presentation abstract and not a full work that has been published.)

Review of methodological issues in studies on the impact of spinal manipulative therapy as a treatment for cervicogenic headache

John Ward

Objective: Review methodological issues in existing randomized controlled trials on the impact of spinal manipulation as a treatment for cervicogenic headaches. Methods: A literature search was performed using Cochrane, Medline, PubMed, and CINAHL databases with keywords "cervicogenic headache" and "spinal manipulation". For inclusion in this review randomized controlled trials had to include at least 2 study groups, study participants had to be diagnosed with a cervicogenic headache, and headache frequency and pain had to be recorded. Studies were evaluated for quality with the Physiotherapy Evidence Database (PEDRO) scale. Results: Several methodological factors were identified that impaired assessment of the relationship between spinal manipulation and cervicogenic headaches to include: lack of placebo, lack of control, using study participants with infrequent cervicogenic headaches, low sample size, failure to follow a power analysis, not reporting effect size, grouping several interventions together and claiming one singularly resulted in improved patient outcomes, and failure to use adequate statistical tests. Conclusions: It is recommended that future studies on the impact of spinal manipulation on cervicogenic headaches include greater methodological rigor as well as study design heterogeneity to increase external validity. (This is a conference presentation abstract and not a full work that has been published.)

Changes in students' research literacy knowledge and confidence during the course of their doctor of chiropractic program

Krista Ward, Dale Johnson, Barbara Delli Gatti, Donna Odierna, Monica Smith

Objective: Per the Council on Chiropractic Education, Doctor of Chiropractic Program (DCP) graduates should be able to "locate, critically appraise and use relevant literature." Our DCP scaffolds clinical research literacy (CRL) skills (including PICO, PubMed, and critical appraisal). Our aim is to evaluate CRL knowledge, confidence and attitudes at DCP entry vs. exit. Methods: In 2017-2018, we collected CRL data on 245 entering students. In 2021, we followed up with 36 students nearing the end of our DCP. With paired data for 36 DCP students at entry (2017-2018) and exit (2021), we conducted a paired t-test on the summary score of CRL knowledge and Chi-square tests comparing proportions of desired answers on individual questions. Results: The mean summary score of CRL knowledge at entry was 5.5 and exit was 6.64 on a scale of 10; p<.001. We observed statistically significant positive changes in students' confidence in finding patient care information (p=.002) and their abilities to identify the best resource for vetting chiropractic claims (p=.003) and to identify a meta-analysis (p=.001). Conclusion: Student research literacy and confidence improved during our DCP. Data collection and analyses are ongoing, as our study cohorts complete the DCP in 2021-2022. (This is a conference presentation abstract and not a full work that has been published.)

Survey of attitudes and perceived barriers to scholarship and research among doctor of chiropractic program faculty

Rebecca Wates, Mark Pfefer, Emily Ford

Introduction: Well-designed, systematic research is the foundation for evidence-based chiropractic care. The chiropractic literature lags medical training institution counterparts, both in size and substance, and there exist no chiropractic-focused "Research I" institutions. Resources (e.g., protected time, research funding, mentorship) available to chiropractic faculty are often limited. The aim of this study was to survey faculty exploring barriers, needs, and attitudes regarding faculty involvement in scholarship and research within a Doctor of Chiropractic program. Methods: A 9-item survey instrument was developed and administered to all full-time faculty at a single doctor of chiropractic program. Survey questions included demographic information and availability of time, mentorship, training, equipment, and research training opportunities. This survey was based upon a previous study surveying perceived barriers to research among pharmacy practice faculty. Results: Faculty identified adequate protected research time and mentorship as the top two most important factors for pursuing research. A majority of faculty agree faculty participation in research is important (87.5%), more training opportunities for research-related skills are needed (75%), and new research should be regularly incorporated into course content (87.5%). Conclusion: These findings suggest prioritizing investment in research training, over financial/capital investments, might empower chiropractic faculty research engagement. (This is a conference presentation abstract and not a full work that has been published.)

Exercise for the prevention and treatment of low back and/or pelvic girdle pain during pregnancy: a systematic review critical appraisal and exercise protocol summary

Carol Ann Weis, Leslie Verville, Pavan Matharu, Krupa Bhatt, Andrée-Anne Marchand, Carol Cancelliere

Introduction: The 2019 Canadian guideline for physical activity throughout pregnancy suggest that performing exercise throughout pregnancy and the postpartum period may help

to alleviate pregnancy-related back pain. One systematic review (SR) examined exercise for the prevention and treatment of low back, pelvic girdle and lumbopelvic pain during pregnancy. We aimed to: (1) critically appraise the SR and (2) extract the exercise protocols. Methods: Four reviewers independently appraised the SR using 'A Measurement Tool to Assess systematic Reviews' (AMSTAR2) checklist. Consensus was reached through discussion. Exercise protocols from the primary studies included in the SR were independently extracted by two reviewers and then verified by another. Results: The SR was rated moderate quality; indicating that it provided an accurate summary of the Results. We extracted the exercise protocols from 23 randomized controlled trials; and five non-randomized, three cohort studies, and one case-control study. Discussion: Healthcare providers and patients, through shared decision-making, can use resources, such as these protocols, to help tailor appropriate and acceptable physical activity programs. This may help to support and improve maternal and fetal health outcomes. Improved reporting of specific exercise protocols may further facilitate the implementation of evidence-based guidelines in clinical practice. (This is a conference presentation abstract and not a full work that has been published.)

Association between cervical artery dissection and spinal manipulative therapy among Medicare beneficiaries

James Whedon, Curtis Petersen, William Schoelkopf, Scott Haldeman, Todd MacKenzie, Jon Lurie

Objective: Our Objective was to evaluate the association between Cervical Spinal Manipulation (CSM) and Cervical Artery Dissection (CeAD) among Medicare beneficiaries. Methods: We employed case-control and case-crossover designs to analyze 2007-2015 Medicare claims data on individuals aged 65+. The primary exposure was CSM; secondary exposure was Evaluation and Management (E&M). The primary outcomes (cases) were occurrence of either vertebral artery dissection (VAD) or carotid artery dissection (CAD). Cases were compared to 3 different control groups: 1) matched population controls having at least one claim in the same year as the case; 2) ischemic stroke controls without CeAD; and 3) case-crossover analysis comparing cases to themselves in the time period 6-7 months prior to their CeAD. Results: The odds of CSM versus E&M did not significantly differ between VAD cases and any of the control groups at any of the timepoints. (ORs 0.84 to 1.88; $p > 0.05$) Results for CAD cases were similar. Conclusion: Among Medicare beneficiaries aged 65 and older who received CSM, the association with CeAD is no greater than that among the control groups. Among Medicare beneficiaries aged 65 and older, CSM does not appear to be a significant risk factor for CeAD. (This is a conference presentation abstract and not a full work that has been published.)

Clinical trials informing the American College of Physicians guideline recommendations for low back pain inadequately report social determinants of pain and chronicity

Timothy Williamson, Patrick Battaglia, Jordan Gliedi, Antoinette Spector, Joni Williams

Objective: To investigate representativeness of social determinant data in clinical trials informing the American College of Physicians (ACP) guideline for low back pain (LBP) treatment. Methods: Trials informing recommended interventions were reviewed for participant race/ethnicity, socioeconomic and other social determinant data. Results: Of 116 clinical trials, 34 reported on participant race/ethnicity. In those 34 trials, the following racial/ethnic cohorts were observed: non-Hispanic White/Caucasian = 59-96% of trial participants, Black/African 1-28%, Hispanic 2.3-36%, Asian 0.3-14%, and Native American 0.3-1%. Employment was described in 31 trials, while 24 trials reported education level and 10 trials reported income level. Marital status was reported in 16 studies, 2 trials reported on religious faith, 1 trial reported number of years lived in the country of study, and 1 trial required patients to live within one-hour from the trial location. No other social determinant data was reported. Incidentally, of the 116 trials, 76 originated outside the United States. Conclusions: There is a lack of social determinant data and underrepresentation of minority groups in clinical trials informing the ACP guideline for the treatment of LBP. Investigators of LBP interventions should recruit diverse study participants and report comprehensive demographic data. (This is a conference presentation abstract and not a full work that has been published.)

Seat position and academic performance

Niu Zhang, Charles Henderson

Objective: Examine the putative influence of classroom seat location on summative exam scores. Methods: The influence on mean final-exam scores of student self-selected vs randomly-assigned seating was examined in our chiropractic training program. We evaluated seat-row position, seat-column position, and distance-from-speaker-podium. Student-demographics and recall vs comprehension question formats were examined as possible moderators. Consenting students (286) across 4 classes during the 2017 academic year were seated at the beginning-of-term by self-selection or random-assignment. Seat location was checked regularly to ensure study compliance. Preferred-seat-location was also recorded. Linear-regression analyses were performed and standardized effect sizes with 95% confidence levels were calculated. Analyses were performed with the statistical computing environment R (version 3.4.1) Results: Statistically-significant self-selected vs. randomly-assigned seating effects ($\omega = -0.25$, $p = 0.032$) were demonstrated by both seat-row position ($\omega = -0.49$, $p < 0.000$) and linear distance-from-podium ($\omega = -0.23$, $p < 0.000$). Seat-column position was not statistically-significant ($p > 0.05$). There were no statistically-significant moderator effects ($p > 0.05$). Conclusion: These findings suggest that student academic performance is influenced by seat position within the classroom. This influence is not differentially affected by moderators such as exam question type (recall vs comprehension) or student demographics. (This is a conference presentation abstract and not a full work that has been published.)

Discrepant perception of biopsychosocial and active care recommendations between doctors of chiropractic and older patients: a descriptive survey

Anna Marie Ziegler, Stacie Salsbury, Michele Maiers

Objective: Clinical guidelines recommend biopsychosocial approaches, physical exercise, and stress management for spine health, in addition to spinal manipulation. This IRB-approved descriptive survey of doctors of chiropractic (DCs) and older adults identified perceived use of biopsychosocial strategies and active care recommendations during chiropractic clinical encounters. Methods: Chiropractic patients and DCs in 2 locations served as the convenience sample. Respondents completed investigator-designed surveys hosted by SurveyMonkey. Matched questions about components of chiropractic care compared group responses using

descriptive statistics. Results: Respondents included 67 patients (42 female) and 37 DCs (11 female). Patients and DCs agreed on the top reasons for seeking chiropractic care including pain management, wellness care, and physical function/rehabilitation. While DCs reported frequent engagement with biopsychosocial approaches, few patients reported regular discussions with DCs about the impact of emotional factors (23%) and beliefs/attitudes (33%) on spine health. Patients reported varied recommendations about activity limitations (2%), relaxation/stress reduction (33%), exercise promotion (68%), and other self-care strategies (43%) for spine health, which differed from consistently higher levels reported by DCs. Conclusion: In contrast to DC reports of treatment recommendations, older chiropractic patients perceived modest emphasis on biopsychosocial approaches and active care during chiropractic encounters. (This is a conference presentation abstract and not a full work that has been published.)

POSTER ABSTRACTS

Multimodal treatment of chronic neck pain with radiculopathy: a case report

Whitney Amos-McNary, Amanda Vozar, Lamar Dulin

Objective: The rationale behind this case study is to identify the benefit of conservative chiropractic care on a patient with a presentation of idiopathic multi-level radiating neck pain. Clinical Features: A 52 year old male presented with severe radiating neck pain with no known mechanism of injury. Patient stated he is experiencing numbness and tingling in the left arm to the fingers as well as decreased and painful cervical range of motion. Affected activities of daily living include cooking, sleeping, eating, driving, working overhead. Intervention and Outcome: Patient's treatment included cervical flexion/distraction, class IV cold laser, therapeutic ultrasound, axial decompression, shockwave, active rehabilitation and thoracic spinal adjustments. After 6 months of treatment, patient's VAS score decreased from a 9/10 to a 2/10. Patient had increased range of motion and no longer had any affected activities of daily living. Conclusion: The conservative care used had positive outcomes for the patient. This proves that this form of treatment is very effective for patients with multi-level disc herniations and associated radiculopathy. The result of decrease VAS, increase in range of motion, along with improvement with activities of daily living constitute a successful treatment plan. (This is a conference presentation abstract and not a full work that has been published.)

Effectiveness of spinal manipulation on a healthy population as assessed by balance and dual task performance analysis

Shannon Behrens, Emily Drake, Stephanie Sullivan, Margaret Sliwka, Shannon Good, Beatrice Borges

Objective: Pilot study observing the effect of a single-session of chiropractic care on standard and dual task balance in a healthy population assessed by Limits of Stability (LOS) and One-Leg Stance Test (OLST). Methods: Thirty participants ($M = 27.9$ years; $SD = 6.83$) randomized to a single-session chiropractic care ($n = 15$) or sham group ($n = 15$) were evaluated pre, immediate post, and one-week post with two conditions (standard and counting backwards by threes) of LOS and OLST. Within-group, within-condition Wilcoxon Sign Rank test analyses (Wilcoxon Sign test when appropriate) were performed in SPSS with significance set at 0.05. Results: Combined Wilcoxon pre-post and pre-week comparisons revealed a greater number of improvements for the chiropractic group ($n = 22$) compared to sham group ($n = 9$), including a greater number of improvements in the counting backwards by threes condition. Statistically significant improvements were noted in mean center of gravity sway velocity in the chiropractic group pre-post for the OLST regular condition on the right leg ($z = 1.664$; $p = 0.038$; $r = 0.43$) and left leg for the backwards by threes condition ($z = 2.021$; $p = 0.039$; $r = 0.52$). Conclusion: Additional improvements and significant changes were noted in balance performance post chiropractic care compared to sham condition. Additional research with larger sample sizes is needed. (This is a conference presentation abstract and not a full work that has been published.)

Intramedullary spinal cord tumor an unsuspected finding: a case report

Charles Blum

Objective: This study presents a very unusual case of a patient referred by her acupuncturist to chiropractic care for a slip and fall injury. Clinical Features: A 40-year-old female patient was seen for acute left-shoulder pain diagnosed by her orthopedist as a frozen shoulder, secondary to a slip and fall injury weeks prior. Her presentation at this office was considered unusual because while she had limited active ranges-of-motion, she had full passive ranges-of-motion, and had signs of benign joint hypermobility syndrome. Intervention and Outcome: Due to her hypermobility she was treated with Sacro-Occipital Technique® and cervical stairstep treatments. Her pain decreased in the cervical spine and shoulder but her active ranges of motion were still limited. The incongruence in her presentation suggested that an MRI be performed of the cervical spine to rule out anything unusual. Regrettably an intramedullary spinal cord tumor was found. It was challenging since her function and pain had improved but there was concern about the tumor, so ultimately surgery was performed, with a very poor outcome. Conclusion: When there are incongruences in patient presentations and response to care, more diagnostic studies and referrals to other healthcare providers are important considerations. (This is a conference presentation abstract and not a full work that has been published.)

Ovarian cyst pain and low back pain, causal, casual, or coincidental: a case report

William Boro, Charles Blum

Objective: Differentiating viscerosomatic contributions to low-back pain is challenging, sometimes the treatment outcome can assist with the differential diagnosis. Clinical Features: A 32-year-old nulliparous female presented to this office with low-back pain believed related to bilateral ovarian cysts detected by ultrasound. She reported bouts of painful cysts a couple-times-a-year, for years. This time she had unremitting pain for 2-weeks in the lower-abdominal and lower-back regions. Methods and Intervention: Treatment incorporated Van Rumpft cranial and spinal therapies for the patient's low back presentation. Van Rumpft and Chiropractic Manipulative Reflex Techniques (CMRT) to assess/treat uterine, ovarian, and liver viscerosomatic referred pain-patterns. Within 24-hours of the first treatment the patient's (low-back/ovarian) pain subsided, which was unusual since historically it took 4-weeks before she would have any relief. She was treated the following week but was no longer in pain and instructed to return on an as-needed basis. Conclusion: Chiropractic care of nonmusculoskeletal presentations are always challenging since it is difficult to determine causation. In this case the patient's historical body awareness of low-back pain associated with ovarian cyst pain suggested a relationship so

chiropractic care was performed treating both the vertebral and viscerosomatic components of the patient's presentation. (This is a conference presentation abstract and not a full work that has been published.)

Clinoptilolite in combination with green chlorella and collinsonia provides enhanced adsorbent properties for toxin binding

Weston Bussler, Jason Fotaides, Saradhadevi Varadharaj, Caroline Carlisle, Chinmayee Panda, Brandon Metzger

Objective: Test adsorption activity of clinoptilolite (a zeolite mineral with cation exchange properties), Chlorella vulgaris (historical detoxification support ingredient), and collinsonia root (herb traditionally used to support elimination) towards heavy metals in vitro, and test tolerance of the mixture in a clinical study. **Methods:** Binding capacity of clinoptilolite (C) vs. clinoptilolite + chlorella + collinsonia (CVC) was measured after incubation with a lead standard (100 mg/L). The percent recovery after incubation was measured with ICP-MS. Adsorption of CVC against naturally occurring heavy metals in a plant juice matrix after centrifugation was measured in the supernatant. Tolerance of the mixture was measured in 10 subjects in a 10-day open label intervention with a questionnaire and GI symptom assessment. **Results & Conclusion:** The percent of lead bound by treatment was significant in both C (94% ± 1%) and CVC (100% ± 4%). The CVC treatment bound a higher percentage of lead ions but was not significantly different from C (p=0.088). When tested in a food matrix, CVC showed strong selective binding of heavy metals (Hg>Cd>Pb>As). The mixture was well tolerated in the clinical study, 88% reported no GI symptoms, with the remaining 11% mild. (This is a conference presentation abstract and not a full work that has been published.)

Nail-Patella Syndrome: diagnosis and management as a portal of entry clinician

Katherine Clark, Julie Johnson

Objective: To describe the conservative management of a 6.5-year-old presenting with chronic knee pain. **Clinical Features:** A 6.5-year old male presented with consistent right knee pain primarily at night with no known mechanism of injury. He was evaluated using history, ortho/neuro eval, and x-ray. Patient was 3rd percentile, frequent UTI, headaches, visual disturbances, and constipation. Fingernails and toenails appeared normal. **Intervention and Outcome:** Overall knee function was normal. The lateral femoral and tibial condyles were prominent and tender. X-rays revealed agenesis of the patella. Family history revealed no known members with this condition. Additional family history included glaucoma, elbow joint dislocation and kidney health disorders. Referral for co-management of visual disturbance and UTI was given with home exercise recommendation to address continued biomechanical change in the knees. The patient responded to chiropractic intervention and age-appropriate exercises with a reported decrease in pain and dysfunction and continued to be monitored at each treatment visit for concurrent health issues. **Conclusion:** Early detection from portal of entry physicians can improve patient health outcomes when appropriate diagnosis and referral is utilized. (This is a conference presentation abstract and not a full work that has been published.)

The impact of integration of a chiropractor within a veterans affairs emergency department and urgent care setting on patient accessibility to chiropractic care

Michael Cole II, Ross Mattox, Melissa Hirschman, Matthew Knieper, Jason Napuli

Objective: We aim to show that having specialty providers such as chiropractors in the emergency department (ED) or urgent care (UC) setting improves care and decreases referral wait times in a Veterans Affairs (VA) hospital. **Methods:** Within a single VA hospital, average wait times were analyzed from referral to initial consultation compared with initial triage and referral from an urgent care or ED setting for a chiropractic consultation. Clinical wait times were evaluated and appropriateness of the referral process to streamline care coordination for neuromuscular and musculoskeletal conditions were reviewed. **Results:** Wait times from referral to initial treatment for patients evaluated in the ED or UC clinic who were initially evaluated by a chiropractor were significantly decreased compared to the traditional chiropractic referral pathway. **Conclusion:** Normally, referrals to the chiropractic clinic within the VA require longer appointment times, which may be limited due to the pandemic. Because the initial, time-consuming evaluation in these cases was already performed by a chiropractor in the ED or UC setting, the patients were scheduled into follow-up appointment times in the chiropractic clinic, resulting in shorter wait times and improved collaboration within this setting. (This is a conference presentation abstract and not a full work that has been published.)

Unique vascular injuries presenting to a chiropractic office: a report of 2 cases

Derrick Dube

Objective: There are many different vascular conditions which may be observed in a chiropractic setting. However, dangerous vascular conditions besides stroke may often be overlooked and subsequently mismanaged because of narrow diagnostic focus. The following cases illustrate two unique vascular cases presenting at a chiropractic clinic which should provide enlightenment on clinical reasoning and diagnostic skills necessary to properly identify and manage such potentially dangerous conditions. **Clinical Features:** Two patients presented to a chiropractic clinic with symptoms mimicking a stroke. **Intervention and Outcome:** In case 1, stroke was ruled out and chiropractic care was provided until the patient was hospitalized. He was diagnosed with and treated for spontaneous intracranial hypotension with sequela of subdural hemorrhage. Case 2 was immediately referred to the emergency department and diagnosed with an intimal tear of the subclavian artery. Both patients reported complete recoveries at follow up. **Conclusion:** Potentially serious conditions which mimic stroke may present at a chiropractic clinic. These conditions may be missed if physicians are not aware of their unique etiologies and fall into a narrow diagnostic focus. (This is a conference presentation abstract and not a full work that has been published.)

A case of brachioradial pruritis treated with chiropractic and acupuncture

Kathryn Golden, Ryan Diana

Objective: This case report demonstrates a positive outcome with chiropractic and acupuncture treatment of brachioradial pruritis and highlights the significance of integration within the healthcare setting. **Clinical Features:** The patient presented with sharp pain, burning, and itching at the bilateral upper extremities over the C5 and C6 dermatomes with acquired excoriations over the affected regions. Plain film radiographs revealed mild degenerative at the C4-C5 and C5-C6 levels. Postural evaluation observed anterior head

carriage with forward rounded shoulders. He had pain upon palpation and motion restriction in the cervical spinal region. **Intervention and Outcome:** Treatment consisted of manual cervical and thoracic spinal manipulation, manual cervical traction, prescription of a home exercise program, and acupuncture. As a result of this care, the patient's symptoms resolved and his acquired excoriations healed. **Conclusion:** Case reports and retrospective studies in the literature that examine non-medical conservative care options for the treatment of BRP show that targeting cervical spinal disease with conservative care options can be effective. This case study proves to be another piece of evidence to support the use of chiropractic care and acupuncture for managing this condition. (This is a conference presentation abstract and not a full work that has been published.)

Pudendal neuralgia: a case for chiropractic intervention

Chris Gouveia, Harold Olson, Chase Petersen

Objective: To describe the chiropractic management in a patient with 10 years of ongoing pudendal neuralgia symptoms. **Clinical Features:** A 25-year-old male presented into a chiropractic clinic with 10 years of ongoing pudendal neuralgia. The initial injury was brought on by repetitive salsa dancing and lunging exercises. Aggravating factors included most types of exercise. Unfortunately, traditional medical management, which included gabapentin, rest, alpha lipoic acid, B12, and pelvic physical therapy, failed to resolve his condition. Symptoms became manageable when physical activity was completely eliminated. **Intervention and Outcome:** Multimodal chiropractic care to include HVLA lumbosacral adjusting, manual therapy, neuromobilization and corrective exercises were utilized to manage patient's symptoms and return him to daily exercise. Care was focused on the location of the specific entrapment at the obturator internus/Alcock's canal. **Conclusion:** This case demonstrates alternative types of treatment, beyond medication management and traditional physical therapy, in which a clinician may utilize when looking to adequately manage and resolve pudendal neuralgia. (This is a conference presentation abstract and not a full work that has been published.)

Sacro-Occipital Technique® cranial therapy and nutrition for the treatment of autism

Rachel Hamel

Objective: A two-year-old male patient presented to this office with moderate-to-severe autism and stimming behaviors. **Clinical Features:** Following 12-14 month vaccinations the child's parents reported decreased motor skills, failure to meet milestones, make eye contact and name response, and ceasing of babbling. Stimming behaviors: side eye glancing, spinning in circles, head shaking side to side, only communicating with sign language, not interested in playing with other children/siblings. Open mouth breathing and teeth grinding at night. **Intervention/Outcome:** Examination revealed narrow upper-palate with teeth crowding, tongue-tie, right-occipital compression, right-sphenobasilar torsion, poor lip seal, low tongue resting position with nasal congestion, lack of eye tracking and convergence, and hypersensitivity to touch. Hypertonicity in mid-back thoracic spine muscles, with right sacral-base posteriority, and right gluteal hypertonicity. Treatment consisted of twenty-chiropractic treatments (20-weeks) incorporating Sacro-Occipital Technique® craniofacial adjustments and nutritional detoxification support. Following care, parent's reported significant reduction in all symptoms, able to make eye contact and laugh, sing, combining words, jumping, reduction in tantrums, able to be social (attend school) and 75% decrease in stimming behavior. **Conclusion:** Greater study is needed to identify if other children presenting with autism-spectrum type diagnosis might benefit from nutrition, sacro-occipital and cranial/craniofacial adjusting interventions. (This is a conference presentation abstract and not a full work that has been published.)

Health-related quality of life of post stroke patients receiving chiropractic

N Amber Harris, Stephanie Sullivan, Sherterica Hall, Akilah Johnson, Ashley Crittendon, Emily Drake

Objectives: Individuals who have had strokes often face suboptimal quality of life, despite rehabilitation. There is limited evidence of the benefit of chiropractic care for stroke survivors. Here we report our preliminary findings on the effect of chiropractic care on health-related quality of life, in post-stroke patients, as determined by an established questionnaire. **Methods:** Following screening, participants were assessed with electroencephalogram, motion-capture evaluation of finger-nose tests, and the self-reported Stroke Impact Scale questionnaire (SIS). Assessments were done at baseline and after 4, 8, and 12 weeks of chiropractic care. **Results:** The original plan for 30 participants was interrupted by COVID-19 lockdowns. Four participants completed care plans and SIS questionnaires, which demonstrated improvements in 7 of 9 SIS domains: 40% in strength, 40% in self-perceived recovery, 33% in ADLs, 25% in social participation, 17% in memory, 5% in emotion and 4% in communication; but no mean change in mobility or hand function. Extraneous participant body movements interfered with analysis of EEG and motion capture data. **Conclusions:** Our data demonstrate improvements in health-related quality of life for a small sample of post-stroke patients. We have planned a redesigned study with improved protocols for EEG and motion capture. (This is a conference presentation abstract and not a full work that has been published.)

24-hour heart rate variability: a proof of concept study

Charles Henderson, Dale Johnson, Krista Ward, Monica Smith

Objective: A primary focus of our institution is to provide chiropractic care that is wellness-focused and supports optimal human vitality and performance. While numerous biomarkers assess health status in the disease state, their performance in the non-disease portion of the healthcare continuum is largely unknown. We performed a "Proof of Concept" study of 24-hr Heart Rate Variability (HRV) as a wellness-informing biomarker. 1. Assess 24-hr HRV monitoring as a candidate wellness-informing biomarker. 2. Evaluate future-study procedures assessing HRV via a Holter monitor. 3. Identify problem issues associated with 24-hr HRV monitoring. **Methods:** Six subjects were recruited and provided informed consent. Twenty-four-hour HRV data was recorded with a DVS myPatch®sl Holter device. Subjects recorded written event-diaries during the 24-hr period. Four time-periods (Morning, Mid-day, Evening, and Sleep) and three challenge-conditions were evaluated (Resting, Treadmill-walking, and 1-min Paced-deep-breathing). **Results:** Descriptive summary and graphical analyses were reported; method and training procedures for future HRV studies were refined; problems were observed with subject-instructions, subject-compliance, and event-diary recording; technical problems associated with 24-hr HRV monitoring were identified and resolved. **Conclusion:** Promising time-period and challenge-condition related HRV changes were observed; further studies are warranted. (This is a conference presentation abstract and not a full work that has been published.)

Sleep assessment via heart rate variability and actigraphy: a proof of concept study*Charles Henderson, Dale Johnson, Krista Ward, Monica Smith*

Objective: A primary focus of our institution is to provide chiropractic care that is wellness-focused and supports optimal human vitality and performance. While numerous biomarkers assess health status in the disease state, their performance in the non-disease portion of the healthcare continuum is largely unknown. Numerous studies report strong correlation between sleep, optimal performance, and wellness. We performed a "Proof of Concept" study of Heart Rate Variability (HRV) and Actigraphy as sleep-associated biomarkers. 1. Assess HRV and actigraphy monitoring as wellness-informing sleep biomarkers. 2. Evaluate study Methods assessing sleep via concurrent HRV and actigraphy monitoring. 3. Identify problem issues when monitoring sleep via HRV and actigraphy. Methods: Six subjects were recruited and provided informed consent. HRV and actigraphy data was recorded concurrently with Holter (DVS myPatch®) and wrist-worn (ActiWatch®) devices. Subjects recorded sleep diaries (start and end of "bedtime", wake-up periods, problems experienced). Results: A descriptive summary and graphical analysis of all data was reported; several problems associated with HRV and actigraphy monitoring were identified. Conclusion: Graphical analysis suggests correlation between HRV and actigraphy sleep-period data; HRV and actigraphy parameters demonstrated substantial sleep-period changes; further study is warranted. (This is a conference presentation abstract and not a full work that has been published.)

Survey-based analysis of chiropractic utilization in a diverse multi-clinic population in terms of care duration, visit frequency, and reasons for visits*Ronald Hosek, Eric Plasker, Edward Owens, Angela Seckington, Stephanie Sullivan, Kate Hayes*

Objective: To study chiropractic utilization in a diverse population in terms of time-under-care (TUC), visit frequency and reasons for visits. Methods: A convenience sample of consenting patients from 28 clinics was surveyed to obtain a profile of their overall experience utilizing chiropractic. TUC and visit frequency were assessed via multiple choice questions. "Reasons for visits" were open-ended requiring written answers which were subjected to a keyword frequency analysis and then categorized by clinicians into one of three categories: "Problem", "Maintenance or 'Unclear". Results: The 537 completed surveys revealed a 65% female population with modal age of 45-50 and range 18-84. TUC mode was 3-6 years with range "first time" to "all my life" and 21% >20 years. Visit frequency ranged from "not regular patient" to 3x/week with the mode = 1x/week. Reasons given for initial visit were 90% problem-based, 5% maintenance-based, and 5% unclear. In contrast, reasons for today's visit were 63% maintenance-based, and 33% problem-based, with 4% unclear. This increase in Maintenance to Problem ratio was observed regardless of TUC. Conclusion: The transition from problem-based to maintenance-based visits suggests that patients value chiropractic care beyond initial problem-based care, potentially perceiving wellness-based Results. (This is a conference presentation abstract and not a full work that has been published.)

The effect of Sacro-Occipital Technique® on sensorineural and myogenic tinnitus: a case study*Tian Ying Huang*

Objective: To investigate the effect of Sacro-Occipital and cranial Technique® chiropractic care on sensorineural and myogenic tinnitus. Clinical Features: Patient is a 41-year-old female, presented into clinic suffering from high pitch tinnitus in the right ear, and three different sound distortion tinnitus in the left ear. The cause of the tinnitus happened one year ago after an acoustic trauma at her workplace. The tinnitus onset was immediate after the acoustic trauma, causing her to have sleep deprivation and an increase in intensity of her hyperacusis. She was diagnosed with hyperactivity of the stapedius muscle on the left by multiple EENTs as the cause of her different sound distortion tinnitus. Intervention and Outcome: Over the course of six-weeks, the patient went through a series of treatments 12 treatments, using Sacro-Occipital and cranial Techniques® with chiropractic manipulation, which helped to resolve her right ear tinnitus and two of her sound distortions in the left ear. Conclusion: The patient's condition was unresponsive to other interventions and her quality of life was suffering greatly before initiating care at this office. Further study into care of patients with hyperacusis/tinnitus utilizing conservative chiropractic Sacro-Occipital and cranial Techniques® is indicated. (This is a conference presentation abstract and not a full work that has been published.)

Facilitator's guide and literature review: teaching motivational interviewing skills and the SBIRT method in the management of a chronic pain patient with Concomitant opioid use disorder through an interprofessional learning activity*Jeffrey Kamper*

A literature review was conducted as a needs assessment for a Facilitator's Guide for a Simulated Clinical Learning Experience titled: Teaching Motivational Interviewing Skills and the SBIRT Method in the Management of a Chronic Pain Patient with Concomitant Opioid Use Disorder Through an Interprofessional Learning Activity. The review investigated the public health impact of Opioid Use Disorder, the role of interdisciplinary health care delivery and its relation to interprofessional education, and to determine the extent chiropractic student are engaged in interprofessional education experiences. This literature review supports the premise that Opioid Use Disorder is a public health concern of near epic proportions; Schuckit (2016), reported four million individuals were as using opioids for non-medical purposes and Whiteford et al. (2013) determined by 2010 the global burden of opioid-related disease approached eleven million life-years lost. The review also suggests an interdisciplinary care model prototype improved the quality of care, better controlled costs, and both patients and care teams assessed their needs as being better met (Reid and Coleman et al., 2010). Furthermore, health care providers with IPE clinical simulation training experiences may be more effective interdisciplinary team members. (Hammick et al., 2007 & Bridges, 2011). (This is a conference presentation abstract and not a full work that has been published.)

Managing lumbar spinal stenosis with Logan Technique: a case report*Lisa Klaus, Breanne Wells, Sarah Bowen*

Objective: To discuss chiropractic management of chronic spinal stenosis. Clinical Features: A 32 year old male reported with a 9 year history of low back pain and right and left leg pain. In 2013, an MRI confirmed spinal stenosis and an L5-S1 disc bulge. He had a laminectomy which helped the symptoms until 2017, when an additional MRI showed spinal stenosis from L3-S1. He had surgery on L3-L5 to remove the spinous and lamina. In 2020, the pain

returned. He started chiropractic care in 2021. His initial Back Bournemouth was 50/70. Intervention and Outcome: He had Thompson drop care once a week for 4 weeks. He then had psaos Active Release Technique® once a week for 2 weeks. Next, he received flexion distraction on L3-L5. After no improvements, he had L4 P, sacrum P-R, and a Right PIIN ilium adjusted using the Logan technique. He came in 3 times a week for 6 weeks. His back pain reduced after one visit with Logan. His follow up Back Bournemouth was 15/70. He is now getting adjusted once a week. Conclusion: Chiropractic care with the Logan technique may lead to improvement in patients with spinal stenosis. (This is a conference presentation abstract and not a full work that has been published.)

Conservative treatment of suspected Tarsal Tunnel Syndrome*Shawn LaCourt, Trevor Shaw, Yahaira Roman*

Objective: The purpose of this case reported is to describe conservative treatment of an adult male with tarsal tunnel syndrome of the right foot. Clinical Features: A 28-year-old male presented with right ankle pain that began approximately 3 months prior to initial visit. Initial examination demonstrated pronation with loss of arch and flared foot when walking. Restricted AROM of dorsiflexion and plantarflexion of the right ankle with pain. Tinel's test was positive for recreation of symptoms of the right foot. Radiographic findings concluded no structural abnormalities detected. MRI was later ordered and determined possible thickening of the posterior tibialis tendon near insertion. Intervention and Outcome: The patient underwent 6-weeks of conservative care including rehabilitative exercises and passive modalities. The treatment demonstrated improved gait and ankle strength without foot flare or pronation of the right foot. However, pain-based symptoms did not resolve therefore patient was referred to the orthopedist for further consultation. Conclusion: Failure of conservative treatment of suspected tarsal tunnel syndrome of an adult male. This case was interesting due to the overall improvement in gait and foot function, despite lack of pain improvement in a case that should have otherwise show resolution. (This is a conference presentation abstract and not a full work that has been published.)

A case report of chiropractic and occupational therapy co-management within one FQHC for a patient with chronic musculoskeletal conditions*Kelsey Lewis, Bernadette Sheffield, Patrick Battaglia*

Objective: Describe co-management between chiropractic and occupational therapy (OT) for a patient with chronic low back pain (LBP) and carpal tunnel syndrome (CTS) following new approval for coverage of these services within one federally qualified health center (FQHC). Clinical features: A 56-year-old woman was referred to chiropractic from her primary doctor for management of chronic LBP. She later reported symptoms of CTS impairing her work performance and was referred by chiropractic to OT. All referrals were made within the same FQHC. Intervention and Outcome: Regarding LBP, the patient was treated with education, manual therapy, and home rehabilitation. She met her functional goals and improved 8/24 points on the Roland-Morris Disability Questionnaire. Regarding CTS, OT emphasized home and work modifications along with rehabilitation. The patient was able to keep working, and her QuickDASH improved 13.6 points. Conclusion: In this case, multidisciplinary care resulted in reduced disability and improved quality of life. The care approach utilized for this patient was consistent with current guidelines. As chronic musculoskeletal conditions represent a tremendous burden, increased coverage for multidisciplinary nonpharmacologic care within the primary medical home may reduce health inequities. (This is a conference presentation abstract and not a full work that has been published.)

Adapting a conference on teaching and integrating EBP into curricula: PIE2021 for CIH educators*Katherine Pohlman, Kathryn Hoyt, Craig Jacobs, Dana Lawrence, Dana Madigan, John Stites, Anthony C Tibbles, Zakary Monier, Cynthia Long*

Objective: The 3-day, 2-track (teaching/administrative) conference, "Process of Integrating Evidence (PIE)," was the 3rd biennial, first virtual event aimed at training complementary and integrative healthcare (CIH) faculty and administrators in EBP principles and promoting exchange of teaching Methods and curricula. Methods: PIE2021's plenary sessions, workshops and administrative presentations were pre-recorded with live Q&A. Plenary sessions on foundational EBP principles and eight interactive workshops allowed attendees to dive deeper into EBP concepts of interest. Participants were further divided into a teaching track with facilitated small group sessions where each participant prepared and delivered an EBP teaching module and an administrative track with large and small group break-out discussions on curricular development strategies. A post-conference electronic survey was administered. Results: There were 145 registrants with 93% representing chiropractic organizations. Of the 70% of participants responded to the survey, all rated the overall quality of the conference as good or outstanding. While areas of improvement were noted for future events, all components of the event met the expectations of the responding attendees. Conclusion: The virtually-adapted PIE2021 provided a supportive environment for participants to enhance their EBP skills and empowered them to integrate EBP into their curricula. (This is a conference presentation abstract and not a full work that has been published.)

Conservative biofeedback and psychological intervention in the treatment of complex regional pain syndrome: a narrative review*Olivia Poppen, Melissa Hirschman, Michael Cole, Jason Napuli*

Objective: This review aims to outline the mechanisms by which neuromodulation can occur using mirror therapy, graded motor imagery, cognitive behavioral therapy, and hypnosis to treat complex regional pain syndrome and summarize the current literature. Methods: A literature review including PubMed and MEDLINE Complete databases from 2015 to 2021 of systematic reviews, meta-analyses, reviews, randomized controlled trials, and case reports involving the use of mirror therapy, graded motor imagery, cognitive behavioral therapy, and hypnosis as treatment for complex regional pain syndrome were included. Results: Twenty-one articles met the inclusion criteria. Current literature supports the use of mirror therapy and graded motor imagery through systematic reviews, randomized controlled trials, reviews, and case studies. While the literature pertaining to cognitive behavioral therapy and hypnosis provided mixed Results, more recent randomized controlled trials provided support of their use in complex regional pain syndrome. This differs from previously published systematic reviews. Many included articles did not utilize selected therapies as singular interventions, but rather a complementary therapy. Conclusion: Mirror therapy and graded motor imagery appear effective in treatment of complex regional pain syndrome, though cognitive behavioral therapy and hypnosis need further evaluation to determine their effectiveness. (This is a conference presentation abstract and not a full work that has been published.)

Improving the objective assessment of professionalism in chiropractic colleges

Jeana Voorhies

Objective: To describe the design, implementation, and revision of a rubric used in assessing professionalism that was in alignment with CCE Meta Competency 5.C Expected Professional Conduct. **Methods:** The rubric was designed using a grading scale, 0 to 4, by which students needed to meet all criteria to earn full points for each defined dimension of professionalism. A comments section allowed for explanation of deductions and/or comments on exceptional behavior. Comments on professionalism were collected on a log during the trimester and used to populate the rubric. After initial use, the rubric was revised to incorporate criteria that hadn't initially been included and to allow for greater point deductions for multiple/repeat infractions or egregious behavior. Feedback from other faculty was also gathered during in-service presentations of the rubric and taken into consideration. **Results:** From 2016 to 2020, the average professionalism grade increased from 94.1% to 98.9% with grades ranging from 70% to 100%. Professionalism grade was 10% of the course grade. These data describe a quantitative motivation for students to engage professionalism. **Conclusion:** In training students on professionalism and expected behaviors, Objective measures of assessing professionalism provides useful feedback and highlights opportunities for improvement. (This is a conference presentation abstract and not a full work that has been published.)

Chiropractic management of patient with atypical presentation of Trigeminal Neuralgia: a case study

Amanda Vozar, Meredith Meyers, Je'Ne Jordahl

Objective: To describe the successful chiropractic management of a patient with atypical presentation of Trigeminal Neuralgia. **Clinical Features:** A 45-year-old female patient presented with right sided jaw pain and numbness in the tip of the nose. Symptoms had been present for a month prior to treatment. **Intervention and Outcome:** Patient's right temporomandibular joint was adjusted via light force Activator[®] 9 times over a two-month period resulting in full resolution of symptoms. **Conclusion:** Treatment of atypical trigeminal neuralgia with chiropractic manipulation with Activator[®] resulted in the resolution of jaw pain and nose numbness and allowed the patient to return to normal activities. (This is a conference presentation abstract and not a full work that has been published.)

Evaluating the impact of healthcare professional students' participation in gardening volunteerism

Krista Ward, Loretta O'Brien, Donna Odierna, Monica Smith

Objective: As part of a public health assignment, students in a doctor of chiropractic program volunteer at community gardens. Previous studies have assessed the outcomes of gardening for primary and secondary students however little is known about how gardening impacts higher education students. Our study **Objective** was to answer: How does gardening volunteerism impact chiropractic students' knowledge and attitudes about nutrition, food systems, gardening, and public health? **Methods:** We collected 31 essays between Spring 2017 and Winter 2018 from students who volunteered at a community garden. We analyzed the identified essays using deductive and inductive coding with two raters independently coding 10 essays. **Results:** The majority of essays described a change in students' thoughts, knowledge, or behaviors. Quotes included: "Normally I would never buy fava beans...but this opportunity allowed me to add a new vegetable into my diet." "[The garden] provided me with an understanding that to become an advocate for positive public health policies, it takes a community of dedicated individuals from various backgrounds to achieve a unified goal." **Conclusion:** Community garden service learning has the potential to positively influence health professional students' knowledge and attitudes about nutrition, food systems, gardening and public health. (This is a conference presentation abstract and not a full work that has been published.)

Use of online spaced formative quizzes to enhance long-term retention of knowledge in chiropractic students

Niu Zhang, Megan Franklin

Objective: To assess if the online spaced quizzes affect academic performance and retention. **Methods:** A total of 251 3rd-quarter students participated in the study across 4 consecutive class. Each student was assigned to one study cohort. The students in cohort 1 were required to do Web-based weekly Immunology quizzes while the students in cohort 2 were required to do weekly Endocrinology quizzes. Two topic-specific exams were given at the conclusion of each topic (immunology or endocrinology), 1st summative exam was given at the end of course, and 2nd summative exam was given at beginning of quarter 6. **Results:** The mean scores of immunology exam and immunology part of 1st summative exam in cohort 1 were statistically greater than those scores in cohort 2 ($p < .001$). There were positive relationships between the quiz participation rate and scores of topic specific exams and the 1st summative exam ($p < .05$). The correct answer rates of the 2nd summative exam in both cohorts were lower than 65% although the cohort 2 endocrinology exam scores were greater than the cohort 1 scores ($p < .05$). **Conclusion:** The online spaced quizzes improved academic performance, but long-term retention was unaffected. (This is a conference presentation abstract and not a full work that has been published.)

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About the organization

The Association of Chiropractic Colleges is comprised of accredited chiropractic educational programs in North America and affiliate member institutions worldwide. The Association of Chiropractic Colleges serves to advance excellence in education by leading a mutually supportive chiropractic academic community, and by supporting student learning, research and evidence informed practice. Contact information may be found at <https://www.chirocolleges.org/>.

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