
ABSTRACTS OF ACC CONFERENCE PROCEEDINGS

Platform Presentations

Subluxation-Based Chiropractic Care of a Pediatric Patient with Myasthenia Gravis

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The purpose of this report is to describe the chiropractic care of a pediatric patient with complaints associated with myasthenia gravis.

CLINICAL FEATURES

A 2-year-old girl was provided chiropractic care at the request and consent of her parents for complaints of ptosis and generalized muscle weakness (i.e., lethargy), particularly in the lower extremities. Prior to entry to chiropractic management, magnetic resonance imaging of the brain and acetylcholine receptor antibody tests were performed with negative results. However, the Tensilon test was positive and the diagnosis of myasthenia gravis was made by a pediatrician and seconded by a medical neurologist.

INTERVENTION AND OUTCOME

The patient was cared for with contact-specific, high-velocity, low-amplitude adjustments (in the manner of the

Gonstead technique) to sites of vertebral subluxation complexes in the upper cervical and sacral spine. The patient's response to care was positive and after 5 months of regular chiropractic treatment, her symptoms abated completely.

CONCLUSION

There are indications that patients suffering from disorders "beyond low back pain" as presented in this case report may derive benefits from subluxation-based chiropractic intervention/management.

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Sacral Rib

A Cadaveric Case Report

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Sacral (pelvic) ribs are rare congenital anomalies with fewer than a dozen cases being reported. Another similar, and rare, congenital anomaly is the pelvic digit, with fewer than two dozen cases being reported. The vast majority of the case reports for sacral ribs and pelvic digits come from incidental findings on radiologic examinations.

CASE REPORT

During the course of a gross anatomy human dissection laboratory at a chiropractic school, students discovered what appeared to be an osseous structure within the right gluteal muscle mass of one cadaver. Upon further dissection, it was noted that an elongated bone, attaching proximally to the sacrum and running inferolaterally, had developed within the right gluteus maximus muscle. The bone was approximately 15 cm long and the expanded portion of it that attached to the sacrum was approximately 4 cm × 2 cm. The anomalous bone attached to the sacrum at the level of the 3rd and 4th sacral segments to the right of midline. No capsular ligament was apparent upon gross examination. There was no connection, neither osseous nor soft tissue, between the anomalous bone and the femur. Other than accommodating for the presence of the anomaly, the gluteus maximus muscle appeared normal, and no muscle fibers attached to the anomalous bone. Anteroposterior and lateral lumbo-pelvic radiographs were taken of the cadaver. On these images, the osseous structure of the anomalous bone appeared normal.

When the bone was removed from its attachment site on the sacrum, no articular cartilage was apparent on either bony surface, and both surfaces were of a roughened nature, especially that of the anomalous bone. The sacrum appeared to be of normal morphology. No abnormalities of the coccyx were noted.

Histologic examination of the soft tissue located between the anomalous bone and the sacrum showed that it consisted mostly of dense regular collagenous connective tissue. One small area had some characteristics of fibrocartilage.

DISCUSSION

The distinction between a sacral rib and a pelvic digit is nebulous at best. In fact, a couple of the reports use

the terms interchangeably. Pelvic digits have been described as attaching to various other sites, besides the sacrum (e.g., iliac crest, anterior inferior iliac spine, and ischial tuberosity). Since ribs are normally associated with the axial skeleton, while digits are not, and the anomalous bone described in this report attached to the sacrum in the region of the “costal” portion of the sacrum, it was concluded that this anomaly is most accurately described as a sacral rib.

Radiographically the association between the sacral ribs/pelvic digits and the normal bone has been described as a pseudoarticulation in most cases. The histologic evidence in the present case suggests that the articulation between the sacral rib and sacrum was mostly of a syndesmotic nature. However, since there was a small portion of the soft tissue between the sacral rib and the sacrum that had the characteristics of fibrocartilage, portions of this junction could have been more like a symphysis. It is clear that the junction was not a synovial joint.

The clinical significance of sacral ribs/pelvic digits is mostly of a diagnostic nature. Radiographically these congenital anomalies need to be distinguished from acquired anomalies, such as pelvic avulsion injuries or myositis ossificans. In one reported case, the sacral rib had a ligamentous attachment to the femur and interfered with normal hip movement. Typically, though, these anomalies cause no problems and are usually not surgically treated.

CONCLUSION

A cadaveric case of a sacral rib is presented. Because of its location, this anomaly has been distinguished from a pelvic digit. The articulation of this sacral rib with sacrum has been histologically identified as mostly of a syndesmotic nature, although a small portion of the connection had the characteristics of a symphysis.

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A Model for the Development and Implementation of a Clinical Compliance Program at a Chiropractic College Teaching Clinic

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In order to satisfy rules and regulations concerning federal healthcare programs established by the federal government through the Department of Health and Human Services and enforced by the Department of Justice, a chiropractic college teaching clinic generated a model for the development and implementation of a clinical compliance program.

METHODS

A group of clinic faculty and administrators at a mid-western chiropractic college was charged with developing a clinic compliance program. After the formation of a Clinic Compliance Committee, a review of the literature relative to clinic compliance was performed. The Department of Health and Human Service's *Office of Inspector General (OIG) Compliance Program Guidance for Individuals and Small Group Physician Practices* proved to be the primary document utilized in creating goals, objectives, and project timelines.

Committee members were charged with creating text for specific sections in the unfolding compliance document. In selecting the sections to be included in the compliance program document, the committee used the OIG document. Essential components for a successful compliance program are outlined in the OIG document. These essential elements are: (a) conducting internal auditing and monitoring, (b) implementing compliance in practice standards, (c) designating a compliance officer, (d) conducting appropriate training and education, (e) responding appropriately to detected offenses and developing corrective action, (f) developing open lines of communication, and (g) enforcing disciplinary standards through well publicized guidelines.

As sections were completed in draft format, a rough handbook began to take shape. Drafts were shared with committee members via e-mail and hard copy. Members were asked to provide suggestions and recommendations for revision and changes were made by consensus at subsequent meetings.

When the final draft had been completed, it was reviewed by administrators including the college's judicial officer, the human resources department, and a college attorney. The committee is currently awaiting final approval by the college administration.

RESULTS

The creation of the program produced a heightened awareness of noncompliance, a review of pre-established programs and documents, and the awareness that a compliance officer was needed to manage the compliance program. A compliance document was completed with the following sections: (a) Mission Statement, (b) Standards of Conduct, (c) Policies and Procedures, (d) Training and Education, (e) Auditing and Monitoring, (f) Disciplinary Guidelines, and (g) Corrective Action. All detected acts of noncompliance require a response by the Compliance Committee.

DISCUSSION

Although clinic compliance programs are voluntary, they provide a check and balance system in recognizing problem areas and in helping employees to avoid nonintentional acts of noncompliance. Compliance programs also provide for a compliance officer who has knowledge in all aspects of clinical practice and understands the business aspects of third-party pay and government regulations.

CONCLUSION

The benefits of an effective compliance program ensure correct and honest business practices, thereby building and maintaining relationships with third-party payers. They also set an example for chiropractic students who will consider compliance issues in their own practices. It is important not only for chiropractic college clinics to maintain a compliance program but to communicate with students to assist them in maintaining an atmosphere in which compliance is an expectation. The ultimate result of a compliance program should be to enhance patient care by increasing the awareness of healthcare providers and business personnel toward greater efficiency and consciousness.



Project Report on the Immunization Information Web Site A Resource for Chiropractors and Patients

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This paper describes a collaborative public service project by the members of the Chiropractic Health Care Section of the American Public Health Association. The purpose of this project is to establish an Internet-based immunization information resource. The Web site compiles annotated bibliographies of citations from the scientific "immunization literature," as well as other authoritative peer-reviewed information sources. The intent is to create an information resource for healthcare professionals that is current, accurate, objective, evidence-based, and as user-friendly as possible.

METHODS

Members of the American Public Health Association Chiropractic Health Care section convened an informal "working group" to address this issue. The group developed plans for disseminating information about the Web site to the chiropractic profession and the public, and for periodically reviewing and updating Web site content.

PROJECT OBJECTIVES

The three primary objectives for this Immunization Information Web site project are to: (a) identify and describe authoritative sources of scientific evidence-based information about immunization; (b) provide a current indexed bibliography of important topics in immunization; and (c) to highlight important considerations regarding patient counsel on the topic of immunization policy and vaccination.

PROJECT OUTCOMES/RESULTS

The Immunization Information Web site includes primary, secondary, and tertiary scientific evidence-based and peer-reviewed information. The bibliography contains links to online (Pub MED) citations of scientific literature, sorted by four categories, summarized as follows: Epidemiology of Vaccine-Preventable Diseases (VPDs); Normal Sequela of Vaccine-Preventable Diseases (VPDs); Adverse Effects of Vaccines; and Sociology, Ethics and Related Issues of Vaccination and Mandatory Vaccination Policies. The Patient Counsel section of the Immunization Information Web site summarizes important considerations regarding scope of practice, patient/consumer information and empowerment, and scientific vs. legal evidence.

DISCUSSION AND CONCLUSION

The creation of this Web site is an attempt to dispel confusion and dissemination of misinformation about immunization policy and vaccination by providing easy access to accurate science-based information. It was developed by consensus of the authors, and will be posted online as a public service resource of information from the American Public Health Association Chiropractic Health Care section (APHA-CHC). One of our main objectives was a balanced presentation of the important current issues in applied immunology and public health.



Evaluating the Predictive Validity of CCAT Scores in Preclinical Chiropractic Education

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The Chiropractic College Assessment Test (CCAT) is a newly developed standardized test designed to augment the paucity of known factors currently available to predict

student success within a given chiropractic curriculum. The ability to predict success more accurately will provide students with added information about their personal success

within the program. In addition, these data may be useful information to administrators and policymakers concerned with student admittance, graduation and retention rates, and distribution of scarce resources within their institutions. The purpose of this study is to evaluate the ability of CCAT to explain academic success within a chiropractic basic science curriculum, beyond that offered by prechiropractic grade point average (GPA).

METHODS

A convenience sample of 197 (89%) students was identified from a pool of 221 students recently accepted to a large, midwestern chiropractic college. Study participants completed the newly developed CCAT examination, and released proprietary student records allowing researchers to gather past and future academic records and selected demographic variables (i.e., age, sex, and race). Following the calculations of descriptive statistics, zero-order Pearson correlations were used to examine for associations between the prechiropractic GPA, CCAT scores, and basic science GPA. Multiple regression techniques were applied to determine the predictive potency of CCAT scores on basic science GPA.

RESULTS

Preliminary results indicated statistically significant correlation between prechiropractic GPA, CCAT scores ($r = .348$, $p < .001$), and basic science GPA ($r = .559$, $p < .001$). Significant correlation was also noted between CCAT scores

and basic science GPA ($r = .536$, $p < .001$). Using multiple regression, together the variables (CCAT and prechiropractic GPA) accounted for a significant portion ($R^2 = .438$, $p < .001$) of the total variance in basic science GPA. Further, the CCAT scores accounted for significant unique explanation (change $R^2 = .135$, $p < .001$) beyond that offered by the traditionally used prechiropractic GPA.

DISCUSSION

As the contributions of the chiropractic profession to the healthcare system increase in demand and acceptance, a growing number of students will seek admission to chiropractic programs. Chiropractic colleges should provide all information relevant to success in their programs to applicants, who must make informed and costly decisions regarding a career path.

Specifically, past investigation has identified the basic science curriculum as a notable barrier to student persistence within the chiropractic program. According to the current research, the CCAT examination provides a valuable a priori indicator of success within the basic science curriculum of a chiropractic program. Consideration should be given to adopting the CCAT exam as one of a number of heuristics that students and college officials use in making enrollment decisions.

Moreover, the ability of a student to become integrated into institutional life has been shown to be key in student persistence. In the future, this research will expand to examine the impact of demographics, cocurricular activities, and noncognitive variables leading to the development of predictive models of student success.



A Prospective Case Series for the Chiropractic Treatment of Temporomandibular Disorders

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Many chiropractors claim to treat temporomandibular disorders with good results but there is little documentation to support that contention. There have been several published case histories indicating positive results in isolated cases. One experimental study has been reported with 12 participants. However, no significant difference in patient outcomes was found between diversified treatment of the cervical spine and a sham treatment. None of the studies identified used the chiropractic protocol developed by Activator Methods, Inc. The objective of this study was to determine if there is basis

for studying this chiropractic treatment for use in patients with articular temporomandibular disorders.

METHODS

Nine participants with articular temporomandibular disorders were recruited for this prospective case series from the chiropractic practice of an advanced proficiency rated Activator Methods clinician. Eight subjects completed

outcome assessments. Six were female (ages 21–45) and two were male (ages 21 and 47). The outcome variables used were change from baseline to outcome assessment of visual analog scale (VAS) for temporomandibular joint pain and maximum active mouth opening without pain. Participants received the normal full spine and temporomandibular joint adjusting used by the clinician in accordance with the advanced protocol of Activator Methods. Participants were typically seen 3 times per week for 2 weeks and according to individual progress thereafter for 6 more weeks.

RESULTS

The median duration of symptoms was 6.5 years with a range of 1–40 years. The median number of treatment visits at the time of the outcome assessment was 6.5 with a range of

3–17. The median baseline VAS score was 72 (range, 49–85). The median VAS decrease was 45 mm (range, 21–71) with all patients experiencing improvement. The median baseline mouth opening was 32.5 mm with a range of 16–55. The median increase of mouth opening was 9 mm (range, 1–15) with all showing improvement.

CONCLUSION

The results of this prospective case series indicated that the temporomandibular disorders symptoms of these participants improved following a course of treatment using the Activator protocol. Consequently, further investigation of this chiropractic treatment protocol for patients with the articular type of temporomandibular disorders is warranted.



Establishment of Chiropractic Services in a Geriatric Inpatient Rehabilitation Hospital A Pilot of One Model of Integration

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With the increasing acceptance and utilization of chiropractic services by the medical community, various models of integration have begun to emerge. The role of chiropractic services in the hospital setting has yet to be fully evaluated. Furthermore, the possible role and scope of chiropractic treatment of the inpatient geriatric patient population has yet to be elucidated. Thus, it is evident that models of chiropractic/medicine collaboration and integration in the hospital setting are clearly needed at this time. The purpose of this report is to describe one such model of integration of chiropractic services in a university-based geriatric inpatient rehabilitation hospital. A qualitative description of the model and the results of the first 6-months of operations are presented.

METHODS

A collaborative experimental chiropractic clinic was established at a university-based 566-bed geriatric chronic care facility. The experiment took place in a private university medical school-based geriatric hospital that is supported by a Health Resources and Services Administration (HRSA) geriatric education center grant. Basic algorithms for patient selection criteria, diagnostics, and treatment were developed. Chiropractic services were placed in the algorithm for the evaluation and treatment of neuromusculoskeletal pain syndromes. The director of chiropractic services, the medical

director of the hospital (authors, respectively), and a select group of chiropractic interns performed weekly ward rounds. The experience was designed not only to allow student interns the opportunity to interact with patients exhibiting a wide array of pathology, but also to serve as the initial encounter for possible intake into the chiropractic department. Once patients were identified from those examined during rounds, they were invited to undergo an evaluation and treatment in the chiropractic clinic located within the division of consultative services. A qualitative assessment of this model was performed 6 months after the initiation of chiropractic services. A thorough discussion of the design and implementation is presented. The SF-12 instrument was utilized in an effort to assess potential changes in quality of life for this unique patient population. In addition, records were kept to document any post-treatment adverse effects or complications in all patients. Another qualitative parameter evaluated included the follow-up of patients receiving chiropractic treatment while undergoing a concurrent regimen of anticoagulant therapy, as this is often viewed as a confounding factor in the chiropractic management of the geriatric patient.

RESULTS

To date, the integrative model described herein has resulted in the evaluation and treatment of over 22 inpatients. The age

of patients treated ranged from 48 to 97. Various comorbidities such as coronary artery disease, cerebrovascular accident, multiple sclerosis, diabetes mellitus, and amyotrophic lateral sclerosis were encountered. No significant adverse effects were encountered as a sequel to chiropractic treatment procedures. No adverse events were encountered in the patient cohort that was receiving spinal manipulation concurrently while on a regimen of anticoagulant therapy. SF-12 quality-of-life indices reveal a trend toward an overall improvement in scores post-treatment. Student interns have also noted that their participation was of value to them and their clinical training experience.

CONCLUSION

The currently described model of integration of chiropractic services in a geriatric chronic care hospital appears to offer promise as a first step toward future, and perhaps more full integration in the management of the chronic care and geriatric patient. This model also appears to be a viable method of advanced clinical training of chiropractic interns in a hospital setting. Furthermore, significant concerns with respect to patient safety and adverse effects as a sequel to chiropractic treatment in this patient population appear to be unfounded based on the results of this pilot evaluation.



A Grand Rounds Program in a Chiropractic College Outpatient Clinic Setting

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Providing high-quality educational opportunities in a busy clinical setting is one of the great challenges of teaching in health science programs. One major obstacle to this is a lack of time on the part of clinical faculty.

Life Chiropractic College West (LCCW) has initiated a "Grand Rounds" program, held four times a quarter. Faculty present advanced topics in diagnosis, case management, or radiology. Also, interns present interesting cases with the assistance of faculty. These do not involve a great deal of faculty time, yet are high-quality programs of educational value and may be advantageous to other chiropractic colleges.

The presentations are made by interns who are managing the cases. The interns are assisted in their preparation by their faculty advisor as well as by other faculty. The interns write up the cases in "case study" format so they may later be submitted for possible publication in the health science literature.

The Grand Rounds program at LCCW serves a number of valuable educational purposes. It encourages outside study and research by the interns on the case being presented. It provides a setting for the presenting interns to develop speaking and presentation skills. It provides a forum for interaction between faculty from different departments in the college. It provides a vehicle to extend the educational value of interesting cases to all the interns in the health center. It builds the reputation of the clinic on campus as students see and appreciate the variety of conditions diagnosed and managed there. It provides another avenue of quality assurance review on difficult and unusual cases. It creates a library of interesting teaching cases from our own facility for use in other areas of the educational program. It creates the possibility

of submitting prepared cases for publication in the clinical literature.

The Grand Rounds program we have developed has a number of specific components in regard to the cases presented by the interns. These include case selection methods, case writing methods, literature review, visual aids, presentation format, participation/evaluation process, exploring publication possibilities, and creating a case library.

We are presently in our third quarter of this program and have made several observations. Every presentation by the interns has been well prepared and presented and has received high marks from all attendees and participants. We have found the interns to be enthusiastic and active participants. We now have interns volunteering their cases for consideration for inclusion in the program. It seems to build their self-esteem as interns to have the opportunity to contribute directly, with their own clinical experience so far, to a larger venue of clinical learning. It has also raised their awareness of the large number of interesting and challenging cases being seen in the health center. We are also finding that, with the simple direction, assistance, and materials that we provide them in their preparation, they "carry the ball" very well in preparing the cases and making the presentations. The faculty has found that their workload in regard to assisting them is minimal and has not added a burden of extra work.

In conclusion, the Grand Rounds program has contributed positively to the educational program within our health center and the college as a whole. As the students/interns see actual cases from our health center which embody the issues and subject matter that they are studying and learning about in their other classes, they see the relevance and value of what they are studying more clearly.



Force Production Variability and Rate of Thrust Development During Thrust Procedure Simulation

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Traditional teaching methods of manipulative skills involve a learner receiving qualitative feedback from either an instructor or classmate. Quantitative feedback, however, provides the learner with an external measure of error detection, enabling the use of different error correction mechanisms relative to manipulative skills. Measurement of force production utilizing a simulator provides quantitative feedback.

The purpose of this study was to develop an instrument used for teaching and assessing simulation of manipulation. A 2 (type of feedback) \times 4 (procedure experience) \times 2 (type of practice) \times 3 (level of force) analysis of variance with repeated measures on the last two factors was used.

METHODS

Using a simulator, 33 chiropractic students performed high-velocity, low-amplitude thrusts using a crossed bilateral pisiform contact. Three force goals (80%, 55%, and 35%) determined by maximum thrusting ability were simulated. For acquisition learning, the different force levels were presented in blocked and random order. Subjects received either visual feedback or knowledge of performance feedback during acquisition. Random and blocked variable practice was followed by serial retention tests without feedback.

Analysis included variable error of peak force production as well as average and peak rates of thrust development.

RESULTS

The relative timing of preload and thrust was maintained along the force-time history. Peak force variability and rates of thrust development varied with participant level of experience with the procedure and force goal. Peak force variability increased linearly to approximately 55% of maximum thrusting ability and then decreased. When combined with random variable practice, visual feedback produced significantly lower error scores in serial retention compared to verbal feedback (knowledge of performance). Participants with the least amount of knowledge of high-velocity, low-amplitude spinal manipulation performed with significantly less accuracy.

CONCLUSION

Competency of a simulated manipulative skill can be enhanced by quantitative feedback.



Cervical Range of Motion in Asymptomatic Subjects Following Spinal Manipulative Therapy A Double-Blinded Randomized Clinical Trial

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The purpose of the study was to measure the active cervical range of motion following spinal manipulative therapy (SMT) in subjects with lower end range of normal motion. A double-blinded randomized clinical trial was performed at the Institute of Sports Science and Clinical Biomechanics, University of Southern Denmark, Denmark.

METHODS

A total of 49 asymptomatic females volunteered through a poster advertisement. Twenty-three females with lower end range of normal cervical active motion fulfilled the

inclusion criteria. Half the subjects received cervical spinal manipulative therapy treatments and the control group received a sham manipulation (Activator). A total of six treatments over 3 weeks were given. Cervical active range of motion using the CROM device was measured twice during the baseline, once a week during the intervention, and once after 1-week follow-up. A total of six measurements were taken over 5 weeks.

RESULTS AND CONCLUSION

The mean active cervical range of motion (ROM) for rotation and lateral flexion showed no statistically significant differences between the control and SMT group. It was determined that cervical spinal manipulative therapy does not increase active ROM on asymptomatic females with lower end range of normal ROM.



Pocket-Sized Assessment Using the PDA as an Assessment Tool

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The purpose of the study was to develop an efficient, reliable method to document clinical performance evaluation data observed during the patient encounter.

collecting and managing data, an electronic data collection system using personal digital assistant (PDA) technology was implemented to record student performance data observed during patient encounters in an ambulatory care setting.

METHODS

With ever-increasing emphasis being placed on competency-based clinical education, a multipronged approach of competency assessment tools was implemented. As a part of this assessment system, attending clinician evaluations were included as a vital part of the plan. Due to difficulties in

DISCUSSION

Early results have demonstrated a significant increase in utilization of assessment tools by clinical faculty, thus providing more performance feedback to students.



The Efficacy of Manipulation in the Management of Chronic Achilles Tendonitis

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Achilles tendonitis is the most common injury in sporting activities, and most frequently affects mature males who are involved in running and jumping activities. Published studies have failed to identify a cost-effective conservative treatment. The purpose of this study was to investigate the efficacy of manipulating foot and ankle joint fixations compared to placebo in the treatment of chronic Achilles tendonitis.

Forty patients completed the study. Sixty-three percent of the patients were 35 years or older, and 63% were male. The most frequent joint dysfunction found in the manipulated group was long axis distraction of the mortise joint (38%). Both groups received six interventions over 4 weeks. Outcomes were measured in terms of the McGill Short-Form Pain Questionnaire, the Numerical Pain Rating Scale 101, algometer readings, and goniometer readings in terms of ankle dorsiflexion.

METHODS

Fifty-one patients with chronic Achilles tendonitis were randomly divided into two groups, one of which received manipulation of any fixations found in any joints of the foot and/or ankle, the other group receiving detuned ultrasound.

RESULTS AND CONCLUSION

There were no statistically significant differences between the two groups in terms of the outcomes measured at the

first consultation. Statistically highly significant differences ($p < .001$) for all outcomes were found between the two groups at the end of the study. It was therefore concluded

that manipulation of joint dysfunctions of the foot and ankle should be an important part of the management of chronic Achilles tendonitis.



Coadministration of Thiamine, Pyridoxine, and Cyanocobalamin Inhibits Hyperalgesia Following Primary Sensory Neuron Injury in the Rat

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Administration of vitamins B₁ (thiamine), B₆ (pyridoxine), and B₁₂ (cyanocobalamin) and combinations (clinically used as Neurobion) as an analgesic adjuvant has demonstrated clinical efficacy in the treatment of various painful conditions. Previous studies using experimental models of pain have revealed that B vitamins produce antinociceptive and anti-inflammatory effects. Although much is known about the antinociceptive efficacy of B vitamins in previously established models of pain, relatively little is known about efficacy in animals with pain due to primary sensory neuron injuries. Here we provide experimental evidence supporting the clinical use of B vitamins in the treatment of chronic pain due to primary sensory neuron injury produced by artificial intervertebral foramen stenosis (IVFS).

METHODS

Experiments were performed on adult, male Sprague-Dawley rats ($n = 88$, 220–220 g at the start of experiment). IVFS was produced in 48 anesthetized rats by surgically implanting stainless steel rods unilaterally into the intervertebral foramen at L4 and L5. Another group of sham ($n = 16$) and unoperated ($n = 24$) rats were used as controls.

Thermal hyperalgesia was evidenced by the significantly ($p < .05$) shortened latency of foot withdrawal to noxious heat stimulation of the plantar surface. Postoperative tests were conducted 1, 3, 5, 7, 10, and 14 days after surgery and then once weekly for 10 weeks and on the 3rd day after surgery (i.e., 0.5, 2, 4, 6, 12, and 24 hours after treatment for long-term and short-term effects, respectively).

Vitamin B was prepared to contain 330 mg of B₁ and B₆ each, and 5.0 mg of B₁₂ in 10 mL of physiological saline, which was orally administered (0.25 mL/100 g). In another group of rats, vitamin B was administered by intraperitoneal injection with doses of 0.1 mL/100 g-wt containing B₁ and B₆, 3.3 mg, respectively, and B₁₂, 0.05 mg in 1 mL of physiological saline. For long-term treatment, vitamin B was

administered immediately after surgery and then once daily for 7 days. For short-term treatment, vitamin B was administered with one dose on the 3rd day after surgery.

RESULTS

Oral administration of B vitamins significantly inhibited thermal hyperalgesia following IVFS, evidenced by reversal of the shortened latency of foot withdrawal to noxious heat stimulation. One dose of B vitamins induced a rapid-onset inhibition of hyperalgesia, which started 2 hours after treatment and declined within 24 hours failing to demonstrate long-term effects. However, repetitive administration of B vitamins for 7 days produced long-term inhibitory effects on thermal hyperalgesia. Thermal hyperalgesia was inhibited up to 80% during 1–2 weeks and recovered ~4 weeks later. In contrast, thermal hyperalgesia lasted for several weeks in rats that received physiological saline. B vitamins did not change the latency of foot withdrawal to noxious heat in control rats. B vitamins administered by intraperitoneal injection exhibited similar antinociceptive effects on thermal hyperalgesia with shorter latency of onset of inhibition (30 vs. 120 minutes after treatment) and duration of inhibition (declined within 12 hours) of hyperalgesia.

CONCLUSION

The present study demonstrated that coapplication of complex B vitamins significantly reduced severity and duration of hyperalgesia following IVFS, suggesting that B vitamins can modulate neuropathic pain transmission in such painful conditions. In addition, these results provide evidence in support of the clinical use of B vitamins in the treatment of chronic pain due to similar injuries of the nervous system in humans.



Student Evaluation of Teaching Changing Focus, Tackling Biases, Improving Procedures

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Student ratings of teaching are the most commonly used method of faculty evaluation in higher education. Unfortunately, biases are possible, including the lack of student anonymity, the instructor's presence during the ratings, or students knowing the results will be used for personnel decisions. Other potential biases include student interest in the subject matter, the instructor's age and experience, the grades received, the academic field, and whether a course is an elective. Additional factors include whether students "like" the faculty member, students' attendance during the course, and/or evaluation and student disinterest.

At New York Chiropractic College the current process was focused on a faculty member and evaluations were done on his/her teaching duties. Student evaluations used instructor-focused Likert-style items and general open-ended questions and were performed once a year.

Some of the above biases and other problems such as students giving the same response for all rating items or having open-ended questions come back unanswered or with personal comments became a concern. Recently improving course and curriculum integration also became important. Subsequently, a thorough review of the student course evaluation process was undertaken in order to minimize biases, change focus, and improve student feedback.

METHODS

A subcommittee of an ad hoc Faculty Evaluation Committee was formed to review the current student evaluation process. A list of issues was drawn up through brainstorming and receiving input from faculty and students. Changes were recommended and these were discussed with faculty, supervisors, and staff. Once agreement was gained, a pilot study was run to test some of the proposed changes.

RESULTS

First, a change in the focus from faculty member-centered to course/curriculum-centered evaluation was instituted. For the Likert items, the word "instructor" was minimized in the new questions. The open-ended questions were similarly

refocused and the format was also changed. A list of 14 questions was developed and up to 5 questions would be used: 2 chosen by the supervisor, 2 by the faculty member, and a final question mutually agreed upon.

The method of performing student evaluations was changed so that the course would be the evaluation trigger. All instructors would now be included and a subsection for each on the ratings form was added. The format of distributing the questions was changed so that half of the students would receive the Likert questions (with space at the end for comments) and half would receive the open-ended questions. Additionally, instructors were now required to help distribute the forms, read a prepared statement, and then leave. Finally, an 80% attendance requirement was put into place.

In laboratories, a shorter evaluation form was designed so that all faculty members could be evaluated and comparisons and improvements could be made. To assess the proposed changes, pilot studies were run on two different technique courses in the second and third trimesters.

DISCUSSION

From the pilot study it was agreed that the new format and questions yielded better information. Student frequency responses were more varied on Likert items; therefore, biases related to the instructor or academic field appeared to be lessened. Open-ended questions generated more numerous and insightful responses and this is believed to be a result of giving only some students the new course-focused questions. The staff members reported that students took their time and that there was less student negativity, presumably due to increased participation by the faculty member and the new, more engaging questions.

CONCLUSION

The outcomes suggest that while faculty evaluation issues are potentially large, with diligence, cooperation, insight, and a carefully guided plan, any institution can identify its weaknesses and improve its student evaluation of teaching.



Predicting Success on the National Board of Chiropractic Examiners Part I

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The purpose of the study was to determine if any preadmission academic and personal variables or grades from the first year of the Palmer College of Chiropractic West (PCCW) Doctor of Chiropractic program exist that predict success on Part I of the National Board of Chiropractic Examiners examination (NBCE I).

METHODS

A cohort of 100 students at PCCW who had completed NBCE I were studied. Stepwise linear multiple regression was used to measure the results.

RESULTS

The single most powerful predictor variable for all sections of NBCE I was the Palmer College of Chiropractic West cumulative year one (Y1GPA) which yielded R^2 values ranging from .429 to .616. Y1GPA was a statistically significant regression model with a $R^2 = .560$ for predicting NBCE I general anatomy scores. NBCE I spinal anatomy scores could be predicted with a $R^2 = .675$ using a regression model combining Y1GPA and grades from the Histology/Cellular Physiology and Microbiology PCCW courses. NBCE I physiology scores could be predicted

using a regression model combining Y1GPA, prechiropractic college biology GPA (BioGPA) and grades from the General Pathology, Principles of Chiropractic Analysis, and Chiropractic Philosophy & Practice I PCCW courses, yielding $R^2 = .717$. NBCE I chemistry scores could be predicted using a regression model of Y1GPA and grades from the Histology/Cellular Physiology and Gastrointestinal & Renal Physiology PCCW courses, yielding $R^2 = .602$. NBCE I pathology scores could be predicted with $R^2 = .458$ using a regression model combining Y1GPA and grades from the Principles of Chiropractic Analysis PCCW course. NBCE I microbiology and public health scores could be predicted with $R^2 = .562$ using a regression model combining Y1GPA, BioGPA, and grades from the Embryology and General Pathology PCCW courses.

CONCLUSION

Several strong and statistically significant prediction models now exist for PCCW to predict student performance on NBCE I. Used in conjunction with other available empirical data, these regression models may allow the institution to put in place a system that has a high likelihood of identifying those students at risk for experiencing difficulty on NBCE Part I and offer appropriate counseling and remediation services to such students.



Effects of Spinal Manipulation on Autonomic Efferent Function in Healthy Controls

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It is well accepted that impairment of somatic structures of the human spine can have a significant impact on neurologic function, and the branch of the nervous system believed to play a fundamental role is the autonomic nervous system (ANS). Long-term activation of spinal nociceptive afferents contributes to stimulation of the ANS that may have deleterious effects over time, whereas short-term activation of spinal afferents, as caused by spinal manipulation, is hypothesized to evoke beneficial reflexes and/or eliminate detrimental ones. The purpose of this

investigation was to determine whether spinal manipulation alters central and peripheral autonomic function among healthy control subjects.

METHODS

Autonomic cardiovascular modulation, baroreceptor sensitivity, skin conductance, and peripheral skin temperature were obtained in 18 healthy subjects (5 females and 13 males) between the ages of 20 and 40. Power spectral

analysis was performed on both beat-to-beat R-R intervals (RRI_{HF} and RRI_{LF}) and continuous systolic blood pressure peaks (SBP_{LF}). Baroreceptor sensitivity was calculated using the α index: $[(RRI_{LF}/SBP_{LF})^{1/2} + (RRI_{HF}/SBP_{HF})^{1/2}]$. Skin conductance was determined and peripheral skin temperature was assessed by applying a thermistor on the volar surface of the distal phalange of digit IV of the hand. Initially subjects rested quietly for 20 minutes followed by 5 minutes of baseline data collection. Subsequently, a spinal manipulation was performed involving a high-velocity, low-amplitude manipulative thrust applied with a posterior to anterior vector causing an $-VX$ rotation (bilateral extension) of the fourth thoracic vertebra on the fifth thoracic vertebra. Immediately following this manipulative thrust, 5 minutes of postmanipulation data were obtained. A paired Student's t test was applied to determine differences for dependent variables between baseline and postmanipulation. Two separate analyses were conducted for the initial 1-minute and the entire 5-minute postmanipulation data. Because of multiple comparisons for cardiovascular-autonomic data, a Bonferroni correction was applied ($.05/3 = .016$); and thus the level of significance was set at $p < .016$.

RESULTS

No differences were observed for any time domain hemodynamic parameters (i.e., heart rate, blood pressure, and mean

arterial pressure) or for the peripheral skin temperature, a peripheral sympathetic marker. Comparison of baseline and 1-minute postmanipulation data demonstrated a significant increase in the variables representing central and peripheral sympathetic function (SBP_{LF} : 37.1 ± 16.8 vs. 66.7 ± 10.5 mmHg²/Hz; RRI_{LF} : 38.5 ± 15.9 vs. 68.1 ± 13.2 ms²/Hz; and skin conductance: 2.28 ± 0.17 vs. 2.51 ± 0.32 1/ Ω). Significant decreases were observed in measures of central parasympathetic modulation of autonomic control (RRI_{HF} : 38.3 ± 16.3 vs. 21.4 ± 6.2 ms²/Hz; and baroreceptor sensitivity: 1.13 ± 0.98 vs. 0.96 ± 0.07 mmHg). Baseline vs. the 5-minute postmanipulation comparison showed that increases were detected for SBP_{LF} , RRI_{LF} , and skin conductance (37.1 ± 16.8 vs. 58.9 ± 14.6 mmHg²/Hz; 38.5 ± 15.9 vs. 59.2 ± 14.2 ms²/Hz; and 2.28 ± 0.17 vs. 2.46 ± 0.27 1/ Ω , respectfully); however, only RRI_{HF} demonstrated a significant decrease (38.3 ± 16.3 vs. 27.4 ± 10 ms²/Hz).

CONCLUSION

The results suggest that in healthy subjects spinal manipulation of the midthoracic vertebrae evokes both central (cardiovascular) and peripheral (sudomotor) efferent sympathetic activation with a reciprocal cardiac-parasympathetic inhibition. Furthermore, these autonomic alterations are not merely transient but are evidenced for a period lasting a minimum of 5 minutes postspinal manipulation.



Nonoperative Correction of the Flexible Flat Back Using Lumbar Extension Traction A Case Study of Three with Follow-up

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In recent years, considerable attention has been drawn to a sagittal plane deformity of the lumbo-pelvic spine known as the "flat back syndrome." Traditionally, this condition has been managed with surgical techniques. The nonoperative rehabilitation of the flat back syndrome has not been documented.

The purpose of the study was to provide a method to rehabilitate the sagittal plane alignment of the lumbo-pelvic region in cases with the flexible type of the flat back syndrome. This case report presents the nonoperative rehabilitation of the lumbar lordosis in three consecutive cases with chronic low back pain and insidious/idiopathic onset of the flat back syndrome.

METHODS

Three cases with insidious or idiopathic onset of the flexible flat back syndrome were treated conservatively using a new method of three-point bending lumbar extension traction. The traction was applied in office at three to five times per week for 12–20 weeks. Extension traction duration began at 3 minutes per session and increased to a maximum of 20 minutes per session. A torsion type lumbar spinal manipulation was provided in the initial 3 weeks for short-term pain relief. Outcome measures included pain on a numerical rating scale (NRS) and lateral lumbar radiographic measurements.

RESULTS

The average NRS rating was 7.17 ± 1.89 pretreatment decreasing to 1.0 post-treatment. All radiographic angles showed significant changes. Mean changes in lordosis were 16° – 38° for posterior tangents on L1 and L5, 8° – 24° in pelvic tilt, and 13.5° – 21° for Ferguson's sacral base angle. For two of the subjects, at long-term follow-up NRS remained improved, while radiographic measurements showed continued improvements compared to the last post-treatment radiograph.

CONCLUSION

In three cases with the flexible flat back syndrome, the use of extension lumbar traction over a 12- to 20-week course of care was associated with improvements in sagittal lumbar alignment and a decrease in lower back pain. To our knowledge, this is the first documentation of conservative rehabilitation of the flat back sagittal plane deformity.



The Next-Generation Chiropractic Intern Education in a Military Hospital

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Chiropractic education has frequently consisted of traditional lecture and laboratory presentations with the final phase of clinical education occurring in a college clinic or health center. Although some programs have included more of a problem-based approach, students' interactions with a diverse patient population and other healthcare providers have typically been limited. With greater practice-related options open to today's chiropractic college-graduates, it is incumbent upon chiropractic colleges to develop and cultivate relationships beyond the college owned health centers. These relationships must prepare students to function in the changing healthcare environment. Such changes in the healthcare environment include chiropractic inclusion in hospitals, the military, and Veterans Administration. Chiropractic education will need to provide students with the skills and experiences necessary to function successfully in these environments. Some such experiences should include greater understanding of what other healthcare providers offer to their patients, how to function in a multidisciplinary or integrated team, seeing a broader cross section of relevant patient populations, and being able to function in a hospital setting.

METHODS

The New York Chiropractic College (NYCC) and the National Naval Medical Center at Bethesda (NNMC) are working together to provide such opportunities through a 4-month internship at the Navel Hospital. Chiropractic interns rotate through radiology, orthopedics, physical medicine and rehabilitation, and rheumatology. The interns also spend time

each day delivering chiropractic care in the Chiropractic Department of the hospital. Interns who have participated in this experience have gained a greater understanding of the contributions to patient care made by other healthcare providers and specialists. In addition, chiropractic interns appreciate the level of knowledge that they do have as they make presentations to multidisciplinary groups at the hospital. The presence of chiropractic interns at NNMC has resulted in an increased understanding regarding the education and abilities of chiropractors. Medical physicians overseeing chiropractic intern rotations have expressed their pleasure and surprise with the knowledge and abilities that the interns possess. Chiropractic interns work side by side with interns and residents from other healthcare fields. As a result of these interactions, the next generation of healthcare providers is seeing first hand the quality and benefits of chiropractic.

RESULTS AND CONCLUSION

The interactions between NYCC and NNMC have resulted in a broader educational experience for chiropractic interns that prepare them to function in the military or hospital setting and have led to a greater appreciation of the role of a variety of healthcare providers. NNMC has been able to maintain or improve patient care since the addition of chiropractic interns and has been pleased to participate in intern education. It is the conclusion of the participants that the relationship between NYCC and NNMC serves to benefit the future doctors of chiropractic, patients, and the chiropractic profession.



Clinical Utilization of Advanced Imaging at Logan College of Chiropractic

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Chiropractic physicians utilize diagnostic imaging routinely in the management of their patients. The clinical utilization of advanced imaging within the healthcare system is not well documented, especially within the chiropractic profession. The objective of this study was to determine the rate and clinical utility of advanced imaging within a chiropractic teaching institution.

MATERIALS AND METHODS

This study is a descriptive retrospective review of radiology reports. The reports were written by staff radiologists at Logan College of Chiropractic (LCC). Reports containing advanced imaging were considered. A manual search of reports written at LCC was performed in order to select all the reports containing advanced imaging studies. The advanced imaging studies were then organized according to the modality, anatomical area, and differential diagnosis category. The data were then transferred to spread sheets that were created by the research team for further analysis.

RESULTS

A total of 8273 reports were reviewed, and 249/8273 (3.01%) were identified as containing advanced imaging information. MRI was by far the most utilized modality (186/249, or 74.7%) followed by CT (53/249, or 21%), bone scan (7/249, or 3%), and ultrasound (3/249, or 1%). The arthritis differential diagnosis category was the most prevalent (152/249, or 61.0%), followed by infection/inflammatory (18/249, or 7.2%), trauma (11/249, or 4.4%), neoplasm (7/249, or 3%), congenital (3/249, or 1%), and vascular (1/249, or <1%). No advanced images were obtained for endocrine diagnoses. Normal findings were reported in 57/249, or 23%, of advanced imaging reports. Finally, examination of the data showed that the lumbar spine was the most commonly imaged area (122/249, or 49.0%), followed by the cervical spine (54/249, or 22%), extremities (26/249, or 10%), brain (22/249, or 8.8%), the thoracic spine (11/249,

or 4.4%), partial skeleton (5/249, or 2%), abdomen (3/249, or 1%), chest and sinuses (2/249, or 1%), and entire skeleton and small parts (1/249, or <1%).

DISCUSSION

The current study revealed a high yield of positive reports when clinicians at the health center felt that advanced imaging was necessary. This reflects the fact that these clinicians have a good understanding of when advanced imaging is clinically indicated and therefore beneficial for their patients. The number of positive reports identified rules out overutilization. The problem of underutilizing advanced imaging is harder to discuss due to the lack of empirical data. Physicians could order more advanced imaging in order to attempt to discover more potentially aggressive entities. This would probably lower the rate of positive advanced imaging studies but it would promote the early detection of diseases that need early detection to improve therapeutic outcomes. The fact that clinicians recognize the need for advanced imaging studies whether coming from in-house or out-of-house indicates that well trained, nonradiologist chiropractic physicians have sufficient clinical knowledge in deciding the necessity for such studies. This supports the importance of having good radiology programs at chiropractic teaching institutions as well as in all other healthcare teaching institutions. The radiology curriculum must stress the clinical utilization and importance of advanced imaging in patient management. Although limited by a lack of complete records, the findings of this study provide useful preliminary data on the clinical utilization and diagnostic value of advanced imaging in a chiropractic teaching institution.

CONCLUSION

A high yield of positive reports was identified, which led to the conclusion that well trained, nonradiologist physicians are accurate in ordering advanced imaging studies.



Teaching Cultural Competency in a (Seemingly) Culturally Homogenous Environment

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Most chiropractic colleges have not traditionally focused on training students and faculty to become “culturally competent.” In a society that is becoming rapidly more diverse, it is essential that all health professions students and faculty develop a baseline awareness of the cultural issues that impact our interaction with both the students and patients we serve. This is important, even if our academic environments appear to be less diverse than the society in which we live, learn, and practice. The purpose of the study is to develop training materials on cultural competency relevant to chiropractic educators and students and pilot test them for their use in the chiropractic college curriculum.

METHODS

In 1997, funding from the US Health Resources and Services Administration required the addition of cultural competency components to a model course in geriatrics being pilot tested in chiropractic colleges. Since existing instructors at the pilot test sites had no formal training or experience in cultural competency training, visiting lectures and materials from other health professions institutions were used to fill this requirement. During the 2001–2002 academic year, materials from geriatric education centers around the country were used to develop cultural competency training modules specifically tailored to meet the needs of chiropractic educators and students. Particular care was taken to develop materials relevant to persons currently providing education and patient care in a seemingly culturally homogenous environment. Our training widened the concept of cultural sensitivity to include ageism, sexual orientation, socioeconomic status, and other concepts that create subcultures within the larger context of a global culture.

RESULTS

Materials from several educational centers and Internet resources were adapted to develop a cultural competency

“quiz,” and PowerPoint materials for student and faculty training. These materials have been used in faculty development forums, and for three academic terms in the chiropractic curriculum. Each term, the materials are refined and revised using input from faculty and students, and a postassessment of the perceived value of this training is being developed to implement in 2003. Results of this assessment are presented in the paper, along with a discussion of the challenges to implementing cultural competency training in a chiropractic college environment. After training three ninth-trimester student cohorts, numerous requests have come from trainees to offer the cultural competency training prior to any patient interaction in the chiropractic curriculum. These students realize that their naivety in the area of cultural competence may have negatively impacted their ability to successfully and appropriately interact with patients.

DISCUSSION

Diversity can mean many things in the context of an ever-changing society. Age, race, religion, ethnicity, socioeconomic and educational status are just some of the “cultures” we encounter in educating students and providing patient care. The chiropractic college environment, although seemingly homogeneous on some campuses, still contains sufficient “diversity” to warrant cultural competency training for its students and educators.

CONCLUSION

Chiropractically relevant materials on cultural competency developed through this project, and on other campuses, should be shared, discussed, refined, revised, and assessed for their effectiveness in increasing the level of cultural competency among both chiropractic students and educators.



Characteristics of Patients Who Undergo Medication-Assisted Manipulation Compared to Those Receiving Usual Chiropractic Care

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Studies of medication-assisted manipulation have been published in peer-reviewed healthcare literature since the first half of the past century. Manipulation under anesthesia (MUA), manipulation under joint anesthesia/analgesia (MUJA), manipulation under epidural anesthesia (MUEA), and various injection procedures combined with manipulation therapy represent examples of medication-assisted manipulation techniques. Intravenous sedation and analgesia-assisted traction therapy (IVSAATT) is another such technique, which combines elements such as stretching and spinal manipulation performed while the patient is under sedation, with a unique emphasis on providing traction to improve the movement of sacrococcygeal structures.

An initial question raised in the development of the IVSAATT research project concerned what factors might motivate a patient to consider the more expensive and potentially higher risk procedure. This paper presents a comparison of the characteristics of patients who supplement chiropractic care with IVSAATT and those opting to receive only usual chiropractic care.

METHODS

Patients between the ages of 18 and 60 years with chronic low back pain were recruited at two chiropractic clinics. A cohort study design was used to investigate patient characteristics for two groups of subjects choosing different treatment pathways. All patients received an initial 4- to 6-week trial of chiropractic care. Patients then entered a second phase of care consisting of either continued usual chiropractic care or IVSAATT. Data collection was performed using the 1997 Version 2.0 AAOS/COMSS/COSS Outcomes Data Collection Instruments. Descriptive statistics were computed for age, gender, race, education, and household income sociodemographic variables. Pain and disability and treatment expectations subscales were used to generate mean scores reported at baseline and an initial follow-up at 6 weeks. Cohort differences in pain and disability scores as well as treatment expectations scores were analyzed using independent samples *t*

test. Cohort differences for selected categorical demographic variables were analyzed using the chi-square statistic.

RESULTS

Sixty-eight patients participated in the study with 42 (62%) splitting into the IVSAATT cohort and 26 (38%) making up the usual chiropractic care cohort. Collapsing the education level variable into two discrete categories of 1) some college education or less and 2) college degree or postgraduate education, no statistically significant difference was identified between the IVSAATT and usual care cohorts ($\chi^2 = 1.610$, $df = 1$, p value = .205). A statistically significant difference was noted between these two cohorts for yearly household income categorized as 1) \$59,000 or less and 2) \$60,000 or more ($\chi^2 = 4,861$, $df = 1$, p value = .027). The differences in the IVSAATT and usual care cohorts' mean pain and disability scores (10-point differences on a 100-point scale with 100 representing best possible outcome) were statistically significant at baseline and 6 weeks (p values $\leq .01$) with the usual care cohort consistently reporting less pain and disability. The 12-point (69 vs. 81 on a 100-point scale) 6-week treatment expectations mean score difference between the IVSAATT and usual care cohorts was statistically significant (p value $\leq .05$) with the IVSAATT group reporting a lower score for fulfillment of initial treatment expectations.

CONCLUSION

Relatively lower levels of improvement in pain and disability as well as inability of a trial of conservative chiropractic care to adequately fulfill initial treatment expectations appears to influence patients' decisions to seek supplemental care with a more aggressive medication-assisted manipulation protocol despite the additional cost and perceived risk. Further analyses of data from an ongoing study may provide greater insight regarding characteristics affecting patient and provider healthcare choices relative to this specific medication-assisted protocol.



The Effect of an Orthotic Device on the Quadriceps Femoris Angle

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Many studies exist regarding Q-angle and its relationship to anterior knee pain, standing and supine measurements, force on the patella in the frontal plane, shin splints, and other conditions. However, apparently no studies have been published examining the effects of full-length, custom-made, flexible orthotics on Q-angle. This study was designed to evaluate the effect on Q-angle, after insertion of custom-made orthotics, in volunteers with bilateral hyperpronation of the foot.

MATERIALS AND METHODS

The Logan College of Chiropractic institutional review board approved the study. Each subject read and signed a dated consent form. Forty male chiropractic students were selected from volunteers at Logan College. Inclusion criteria were asymptomatic, male gender, evidence of bilateral hyperpronation, and no history of ankle surgery. Bilateral hyperpronation was determined by observing for external rotation or toe-out (plant phase of gait), excessive lateral wear of shoes, Achilles tendon bowing, and height of the medial arch during nonweightbearing and weightbearing conditions. Arch height was assessed by the navicular drop test (Brody). Using standard casting kits and protocols (Foot Levelers, Inc.), orthotic casts were made for both feet and full-length, custom-made, flexible orthotics were produced. The Q-angle was measured using a 12-inch goniometer (Qualcraft) with a 24-inch Plexiglas extension arm. All subjects' Q-angles in standing extended knee position in their daily footwear were measured by the same examiner. Landmarks used to assess the Q-angle measurement were center of both patellae, tibial tuberosity, and anterior superior iliac spine. Each subject was measured before and after insertion of orthotics. The data were analyzed using a *t* test (before/after orthotic insertion for each limb) in Microsoft Excel.

RESULTS

Insertion of orthotics demonstrated reduced Q-angle, which is in the direction of correction, in 39/40 test subjects. Two-tailed matched sample tests demonstrated statistically significant reduction in Q-angle. A minority of patients demonstrated asymmetrical Q-angle measures. Within this

group there was greater symmetry of Q-angle measures after placement of the orthotic.

DISCUSSION

Previous and current research suggests that the hyperpronated foot is an etiologic factor in many lower extremity complaints, including pain of the foot, knee, hip, and low back. Due to the dynamic nature of bone, abnormal stress results in hypertrophic changes in osseous structures. For example, MRI studies show that abnormal pedal mechanics result in marrow edema of the weightbearing bones of the lower extremities and early evidence of physiological change in bones when abnormal biomechanics were induced. Return to normal lower extremity functional status showed evidence of normal bone marrow signal without edema. Literature indicates that use of custom-made flexible orthotics can stabilize the pes planus foot and restore the optimal degree of pronation. Reduction of pronation thereby decreases the amount of internal rotation of the tibia and femur, with subsequent reduction in the Q-angle. An average reduction of 6.0° in the quadriceps angle using rigid, full-length orthotics has been previously demonstrated. Similar findings were obtained in this study. The use of full-length, custom-made, flexible orthotics resulted in 2.4° mean reduction in Q-angle bilaterally and 0.9° mean reduction in Q-angle asymmetry in the examined population. The greatest reductions in asymmetry occurred in subjects with the largest discrepancy in right and left Q-angle measurements.

CONCLUSION

Insertion of full-length, flexible orthotic devices significantly improves the Q-angle in hyperpronating male patients. The possibility of long-term benefits with use of flexible orthotics exists. More research is required to determine whether these biomechanical changes are maintained following the use of orthotics.

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Using Standardized Examinees to Identify Stringent/Lenient Examiners and to Correct Examiner and Standardized Patient Performance

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Objective structured clinical examinations (OSCEs) are widely used to assess student performance for both summative and formative evaluations. There are additional sources of variance beyond the performance of students. Standardized patient inconsistencies and differences in examiner stringency/leniency are two examples of such sources of variance. For high-stakes examinations, candidates should not be at an advantage because they were assigned to a less stringent set of examiners and standardized patients (SPs), nor disadvantaged due to experiencing a more severe set of SPs and examiners. It is typically hoped that the random assignment of candidates, SPs, and examiners will ensure that each candidate finds a consistent mix.

Students and candidates deserve to be evaluated in a fair manner—one that is not affected by date of examination administration, time of day, assignment of track, examination site, candidate race, gender, standardized patient performance, or examiner stringency/leniency. Little has been published on the effect of the noncandidate sources of variance on examination decisions.

The purpose of the study was to determine if standardized examinees (SEs) can assist in determining if examiner stringency/leniency and standardized patient performance are factors in candidate success and to determine if SEs can be used to correct for variances that are not due to candidates.

METHODS

The Canadian Chiropractic Examining Board (CCEB) uses a 10-station OSCE to assess candidates' clinical skills. Four sets of three professional actors played the role of standardized examinees (SEs) during the June 2002 OSCE. Each member of the four sets of SEs was randomly assigned to one of four OSCE tracks. The SEs were trained to perform clinical skills at one of three levels: excellent (80%), borderline (65%), and failing (50%).

A pilot test was performed in March 2002 over two tracks. Modifications were made to correct for irregularities. Data were gathered in June 2002 when four OSCE tracks were administered in Toronto. Reliability of examination and station scores were estimated using Cronbach's alpha (all items 0.91, station totals only 0.72, independent subsets 0.81). A checklist with approximately 20 items scored on a

3-point scale (not done, tried, done) was used at each station to rate clinical behaviors of all examinees.

SEs were trained over 3 days and briefed on the day of examinations. At the end of the morning and afternoon cycles they were debriefed and responded to a checklist of characteristics.

RESULTS

Eighty examiners were involved in the examinations and were evaluated by the SEs. The most stringent examiner scored the SEs 7 marks (1.6%) lower than they were trained, and the most lenient examiner scored the SEs 6 marks (1.4%) higher than they were trained. This is a range of 13 marks (3.0%). SEs had an average spread of 18 marks (4.2%) between the different tracks.

DISCUSSION

For the strong candidate, the possibility that their performance will be assessed within a range of 4% depending on which track they are assigned is somewhat meaningless. For those candidates in the borderline area, however, a difference of 4% can mean the difference between licensure and repeating an examination.

The SEs provided an unexpected "bonus" of information during the qualitative debriefing. Examiners who were intimidating were identified and corrected; SPs who were giving out too much or too little information during the OSCEs were reported and corrected. Once examiners became aware that they were being assessed in this manner, they admitted to being more concerned over the accuracy of their scoring.

CONCLUSION

For borderline candidates, the noncandidate sources of variance are critically important and must be reviewed for appropriate accommodations. The standardized examinees provide important numerical information about examiner stringency/leniency.



Comparing the Performance of Graduates of American Chiropractic Colleges to that of English-Speaking Graduates of the Canadian Chiropractic College on Canadian Licensure Examinations

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In order to be licensed/registered in Canada, all chiropractors must pass a written and practical (Clinical Skills) examination set by the Canadian Chiropractic Examining Board (CCEB). The June 2001 examination yielded pass rates of 97% (180 of 186) for candidates educated in Canada and 67% (56 out of 83) for those educated in the United States, representing a difference of 30%.

The primary objectives are:

1. To determine if the performance on the licensure examinations by US graduates is equivalent to the performance of Canadian graduates;
2. To determine if the prechiropractic grade point averages for US graduates are equivalent to Canadian graduates;
3. To determine if the performance (on licensure examinations) of US graduates with high pre-GPAs (>3.5 on a 4-point scale) is equivalent to Canadian graduates with high pre-GPAs; and
4. To determine if the pre-GPAs or the cumulative grade point averages while at chiropractic college correlate with the performance on the licensure examinations.

METHODS

The dataset was provided by the Canadian Chiropractic Examining Board (CCEB). The sample is comprised of all candidates who sat the June 2001 Clinical Skills Examination (CSE) ($n = 318$). The sample consists of 151 graduates of the Canadian Memorial Chiropractic College (CMCC) and 151 graduates of US chiropractic colleges.

The three key variables to be analyzed were prechiropractic grade point averages, chiropractic college grade point averages, and overall performance on the licensing examinations. Comparisons were performed using an unpaired t test.

RESULTS

The data analysis has allowed us to determine the following:

1. Canadian graduates do perform significantly better than graduates of US chiropractic colleges on the licensure examinations.
2. Canadian graduates enter college with a significantly higher grade point average than those entering US colleges.
3. The performance on licensure examinations of Canadian and US graduates with a higher than 3.5 prechiropractic grade point average is equivalent. This interpretation is suspect as the sample size for US graduates with high prechiropractic grade point averages is small.
4. Chiropractic grade point averages do not correlate with licensure examinations unless the candidates are separated by country of graduation.
5. There is a very weak positive correlation between prechiropractic grade point average and the candidates' performance in chiropractic college. There is a fair correlation between chiropractic grade point average and the candidates' total raw scores on the examinations.

DISCUSSION

The authors would suggest that, based on the correlation between licensure examination performance and prechiropractic college grade point average, students with high prechiropractic grade point averages will be successful on the licensure examinations regardless of country of graduation.

The authors would recommend caution in drawing conclusions from these results, as not all candidates provided prechiropractic transcripts. We would recommend that this study be repeated when all prechiropractic grade point averages are available. We would also recommend that French-speaking graduates be included in the study.



Measuring Improvement of Radiographic Interpretive Skills A Feasibility Study

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In order to improve the educational experience associated with film interpretation and to develop strategies for improving chiropractic clinical interns' skills, it is necessary to measure how frequently errors in interpretation occur and whether the frequency of errors is altered with successive interpretive experiences. This study evaluated the feasibility of an instrument designed to compare an intern's initial plain-film radiographic interpretation error rate with his or her final radiographic interpretation error rate.

METHODS

The initial four and the final four radiographic reports generated by 18 chiropractic clinical interns over the course of their clinical education were collected. The final radiology reports created by the Radiology Department personnel were matched to the interns' reports. Review of the plain-film radiographs and comparisons of the interns' findings against the radiologist's or radiology residents' final radiological reports were made. Discrepancies of findings between the reports were recorded as errors and tallied. Errors within the chiropractic clinical interns' radiological reports were divided into two major types: errors of omission (failure to recognize and/or document a radiographic finding) and errors of commission (inclusion of a radiographic finding that was determined not to be present or interpretation of a normal radiographic finding as a pathological finding).

RESULTS

Comparison of the total error rate of the initial interpretive encounters versus the total error rate of the final interpretive encounters revealed a reduction in number of total errors from 427 errors to 293 errors. The most significant reduction

in number of errors occurred in the errors of omission category, from 236 errors to 155 errors. Errors of commission decreased from 191 to 138. Review of the individual data revealed that 11 of the 18 interns made fewer errors overall during the final interpretive encounter period.

DISCUSSION

Although the total number of errors for the group diminished between the encounter periods, only 61% of the interns showed a reduction in total errors from the initial period to the final period. Several factors may have contributed to the increased total error rate observed for some interns. The complexity and level of difficulty varied among the plain films interpreted. Also, the interpretation of more difficult cases, such as chest and abdominal radiographs, may have taken place prior to the completion by the intern of the associated lecture course. In addition, social or interpersonal aspects of the faculty-intern relationship may have altered the intern's performance and diligence in creating an accurate radiology report. Chiropractic clinical interns may have interpreted cases with less diligence and less accuracy during a routine work setting than in a known test situation.

CONCLUSION

The instrument used in this study to evaluate improvement of interpretive skills by chiropractic clinical interns is ineffective for measuring the acquisition of skills following successive radiographic interpretation encounters. Future studies must control for the complexity of cases interpreted, the total number of radiographs interpreted throughout the interns' clinical experiences, the acquisition of pertinent clinical information, and proper comparison of the test method with a reference standard.



Empowerment and Organizational Commitment of Chiropractic Faculty

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Professionals in chiropractic education retain much of the authority over their work. Their work is impacted, negatively or positively, by their perceptions of their organization's value for their skills and knowledge. Specifically, empowerment and organizational commitment are two psychological constructs that may mediate work circumstances and therefore are the focus of this study. The purpose of this study was to explore associations between empowerment and organizational commitment among chiropractic faculty.

METHODS

A full-faculty survey utilizing descriptive statistics and multivariable analysis was conducted. Surveys were distributed to full- and part-time faculty working in the United States and Canada. The survey included Spreitzer's multidimensional measure of psychological empowerment, Meyer and Allen's multidimensional measure of organizational commitment, and additional survey items

focusing on faculty demographics and workplace variables, including sex, age, academic rank, employment status, and primary area of work assignment.

RESULTS AND CONCLUSION

More than 54% of the study population ($N = 609$) completed and returned the instrument. A general profile of a chiropractic faculty member emerges as a middle-aged male employed full time as a teacher in the academic program. Regression analyses suggested that the observed faculty characteristics and the workplace variables are not associated with fit between the faculty member's work role and his or her own beliefs, norms, and behaviors regarding the value of the work-related tasks. Conversely, the level of institutional commitment experienced by the faculty member was associated with the fit between the task, goal, or purpose of the job, and the internal standards held by the individual.



A Random Survey of North American Chiropractors on Issues of Scope of Practice, Standards of Practice, and Philosophy

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The purpose of the study was to survey North American (Canada, Mexico, United States) chiropractic physicians on issues of scope of practice, standards of practice, and philosophy. Particular emphasis is given to those issues that have dominated the discussion within the profession for 107 years.

METHODS

A postal survey was conducted of a random systematic sample of 1102 active North American chiropractors. The questionnaire included a 9-point self-reported scope of practice scale which was collapsed into three categories: broad or "mixer" (scores of 1, 2, and 3), middle (scores 4, 5, and 6), and focused or "straight" (scores 7, 8, and 9). Other

questions included requests for information regarding prechiropractic education, patients treated per week, income, years in practice, and chiropractic college attended, as well as questions related to scope of practice, standards of practice, and philosophy. In addition to descriptive material, univariate and bivariate analyses were performed on the data.

RESULTS

Six hundred eighty-seven (63.2%) of the surveys were completed and returned. The completed sample included chiropractors from Canada, Mexico, and all 50 states in the United States. Graduates from all North American chiropractic colleges were included in the final sample. Using

the 9-point scope of practice scale, a plurality (46.3%) of respondents described themselves as middle scope practitioners, while 34.3% placed themselves at or near the broad or “mixer” scope end of the scale, and 19.4% rated themselves at or near the focused or “straight” scope of the scale. The mean for respondents was 4.47 ($SD = 2.16$). Using bivariate analyses, the values captured by this scale were evaluated for significant relationships with demographic data and numerous other variables.

DISCUSSION

Despite the differences in the way chiropractors rate themselves on scope of practice, and despite the many contentious

issues that have confronted the profession in the past and present, a majority of chiropractors of North America are similar in the way in which they practice. They tend to follow a middle path through the thicket of clinical and philosophical choices. Most chiropractors clearly endorse the vertebral subluxation complex, the adjustment, and the somatovisceral relationship traditionally implied by these terms. Most chiropractors choose to broaden the base of manual practice by providing additional conservative services involving, for example, exercise, nutrition, ergonomics, and diagnostics. Despite more than 100 years of good-hearted efforts by broad scope and focused scope chiropractors to sway the profession, middle scope chiropractors constitute nearly one-half of this large sample drawn from across North America.



Chiropractic and Medical Management of Neuromusculoskeletal Conditions in a Managed Care Setting

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Health insurance coverage for chiropractic care is restricted compared to most other healthcare services. A barrier to insurance plan coverage of chiropractic care is the lack of data regarding the effects of such coverage on overall healthcare utilization and costs.

STUDY DESIGN

Using administrative data, this study evaluates the treatment of patients with neuromusculoskeletal (NMS) conditions who are enrolled in a managed care health plan. The study evaluates over 1.7 million patients who were continuously enrolled in the health plan for at least 4 years. There are six distinct cohorts of patients who are evaluated and compared in this study:

Cohort A: Patients in health plans that do not cover chiropractic care.

Cohort A1: Patients in health plans that do not cover chiropractic care who received medical treatment for their NMS conditions.

Cohort B: Patients in health plans that do cover chiropractic care.

Cohort B1: Patients in health plans that cover chiropractic care who had any treatment for NMS conditions.

Cohort B1a: Patients in health plans that do cover chiropractic care who received chiropractic treatment for their NMS conditions.

Cohort B1b: Patients in health plans that do cover chiropractic care who received medical treatment for their NMS conditions.

Parameters studied and compared among these cohorts included demographic variables, distribution and patterns of diagnoses, comorbid conditions, utilization of specific procedures (e.g., CT, MRI, Emergency Room), average cost of treatment per episode, average duration of treatment per episode, and average number of episodes per patient.

PRELIMINARY RESULTS

Very preliminary analyses revealed several trends which are reported here. The magnitudes of these trends are such that they are certain to survive the final analysis. However, we are unprepared to report the actual data at this time as the precise values of these trends are likely to change somewhat in the final analysis.

There is a clear difference in the age distributions in the different cohorts. As compared to cohort A, cohort B has a greater number of children (<17 years) and fewer elderly (>65). There is an even greater difference in age distributions when comparing cohort B1a (chiropractic patients) to all other cohorts. B1a has fewer children, and fewer elderly than the other cohorts. The majority of patients in B1a are in the 36- to 55-year age group.

There are significant differences between cohorts A and B in the rates of comorbid conditions. In cohort A, hypertension, diabetes, cardiac arrhythmias, hypothyroidism, nutritional or metabolic disorders, and congestive heart failure were found more frequently than in cohort B. Conversely, patients in cohort B present more frequently with psychoses and depression.

The total healthcare costs of cohort B are significantly less than in cohort A. The magnitude of this difference is substantial with cohort B patients spending approximately 13% less annually on their healthcare. Work on all other analyses and comparisons is ongoing and will be completed well before the conference date.

DISCUSSION AND CONCLUSION

Preliminary results indicate that there are significant differences in age and comorbidities among those cohorts who have chiropractic coverage and those who do not. These differences are the apparent result of selection processes. This differential selection results in a reduction in total healthcare expenditures in the cohorts with chiropractic coverage. The inclusion of a chiropractic benefit in a health plan seems to produce favorable selection processes, resulting in lower overall healthcare costs among those groups with chiropractic coverage.



Assessing Epistemological Truth Claims in the Philosophy of Chiropractic

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Chiropractic stands at a critical junction for political, scientific, and social legitimacy. Adopting epistemologies that threaten objectivity and rationality is to be avoided if we wish to present chiropractic as a well-grounded healthcare profession. The concerns addressed in this paper are those of a postmodern influence on the philosophy of chiropractic as well as widespread confusion regarding when to apply natural law to a phenomenon versus granting it an “intelligent” appellation. That is, it will be demonstrated that a sound epistemology will include the ability to discern when one should appeal to intelligent causation or causation by natural law. The arguments presented here, if sound, will provide educators with tools to assess the verity and rationality of truth claims in the philosophy of chiropractic and a means to communicate them to their students.

METHODS

This investigation has employed the concept of self-reference as test for epistemological truth claims. If a statement or position cannot satisfy its own criteria for truth, it is necessarily false. One must violate the law of noncontradiction to assert the position’s verity and this is irrational. The law of noncontradiction is a first principle of rational thought and views violating first principles have no meaningful content. Second, in efforts to determine when a phenomenon should be viewed from a natural law or intelligent perspective, Ockham’s Razor shall be employed. Ockham’s Razor, for our purposes here, is an axiom that tells us we cannot have any extra parts to our theories. If

some feature of a theory is not necessary to the theory (or not made probable by), it must be jettisoned. This understanding shall be employed to assess the truth claims in what is commonly understood as “chiropractic philosophy,” which views all causation as intelligent. It will be further argued that when natural law can explain a phenomenon, it should explain a phenomenon. However, it is also acknowledged that natural law cannot explain all phenomena (i.e., as in ethics).

RESULTS AND DISCUSSION

With the assessment tools described above we have examined (1) a denial of correspondence theory by Strauss; (2) Kuhn’s Theory of Paradigm Shifts; (3) the pragmatism as championed by Peirce; (4) the inappropriate application of natural law by B.F. Skinner who views all causation as determined; and (5) the inappropriate application of natural law by Strauss who views all causes as intelligent. Positions (1) through (4) were found to be self-referentially refuting and, hence, necessarily false. Position (5) was found to violate Ockham’s Razor, has an improper understanding of natural law, and makes a category mistake.

CONCLUSION

The views presented above have been falsified because they violate first principles of rationality. The philosophy

of chiropractic should eschew a denial of correspondence theory, Kuhn's Theory of Paradigm Shifts, Peirce's Pragmatism, and Strauss' (and similar) notions of ubiquitous intelligent causation. Further, we have recognized our methods as

reliable indicators of truth in epistemological truths claims. Such an understanding should be passed on to the next generation of chiropractic thinkers.



Assessment of Ergonomics and Occupational Health Teaching and Research Practices within the Chiropractic Profession

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There is an ever-increasing awareness of prevention and health promotion within the United States healthcare system. Since there is general agreement within the chiropractic profession that chiropractors should be viewed as primary care physicians rather than specialists of a therapeutic modality, the inherited burden of increased participation in preventive measures must be assumed. This trend has been greatly endorsed and promoted for medical primary care physicians by organizations such as the National Academy of Sciences and the Institute of Medicine.

As reported by the Occupational Safety and Health Administration (OSHA), nearly 600,000 musculoskeletal injury disorders causing employee absenteeism are reported each year. According to several recent studies, most chiropractic patients originally seek care due to musculoskeletal complaints. It has been reported that as many as 88% of chiropractic visits are for neuromusculoskeletal conditions. Therefore, the assertion that many chiropractic patients seek chiropractic care for musculoskeletal problems due to a lack of sound ergonomics within occupational and/or habitual settings must not be overlooked.

Recognizing the impact occupational disease or injury resulting from poor ergonomics and occupational health may have on employees, employer economic loss, and healthcare costs, it is important to investigate the extent of chiropractic knowledge of ergonomics and occupational health issues. This position paper assesses the teachings and research practices within the chiropractic profession with regards to occupational health and ergonomics.

METHODS

A survey of chiropractic college core curricula and postgraduate continuing education programs was compiled via Internet searches. Course titles, not content, were screened for titles that were overtly indicative of subject matter involving ergonomics or occupational health. A search of the literature was performed using *Medline*, *MANTIS*, and the *Index to Chiropractic Literature (ICL)* databases. The *Medline* search was conducted using all combinations

of the terms ergonomic(s)/occupational health and chiropractic/spinal manipulative therapy. The *MANTIS* search was performed using the search terms ergonomic(s)/occupational health, restricted to the chiropractic discipline. The *ICL* search was performed using the search terms ergonomic(s) and occupational health separately.

RESULTS

Only 4 of 14 US chiropractic colleges offered a course with a title directly related to ergonomics or occupational/preventive/environmental health issues. The review of literature revealed a great lack articles relating to these topics. Of the articles found, most consisted of reviews and discussions addressing issues of chiropractic industrial consulting, occupational diseases, and ergonomic principles/guidelines; however, chiropractic and ergonomic and/or occupational health research studies were lacking. The majority of these articles were found in the trade journals of national associations. Postgraduate training in this area is offered by the International Academy of Chiropractic Occupational Health Consultants (IACOHC) as well as the ACA Council on Occupational Health (ACA-COH). Other postgraduate educational offerings exist, but are rare.

DISCUSSION

In general, there is a great deficiency of ergonomic and occupational health information in both chiropractic curricula and research despite an emergent need for inexpensive, effective treatments and preventative approaches to occupational illnesses. Ergonomic principles are based on biomechanical concepts. Due to the fact that there is also a lack of biomechanical education and research within chiropractic institutions, it is postulated that this may be a contributing factor to the noted lack of ergonomic and occupational health information. It is the contention of this author that chiropractors and chiropractic students should be trained in the many facets

of ergonomics and occupational health. This should include the implementation of ergonomic/occupational health courses within college curricula, as well as the development of seminars and postgraduate educational opportunities. Further

research into this area needs to be performed. There seems to be no two disciplines more fit for union than chiropractic and ergonomics.



Integration and Utilization of Procedures Taught in a Technique Course A Clinic Faculty Survey

Kevin W. Paustian, D.C., and **Glenn Sorgenfrey**, D.C., Palmer College of Chiropractic

When developing and teaching any course, a faculty member must decide the amount of content that can reasonably fit within the time constraints afforded that particular course. This is particularly true when teaching chiropractic technique, as so many methods exist within the profession. The addition of new material will usually have to come at the expense of something currently taught. It is usually the responsibility of the individual instructor or department to decide on the content of the course and any changes that might take place over time. It is also assumed that what is taught in such a clinical science course will be integrated and reinforced within the teaching clinic of the institution. We explore a method of evaluating the utilization and integration of methods taught in a course on extremity adjusting within the curriculum of a chiropractic college.

The purpose of the study was to evaluate a technique course for possible changes in course content and to evaluate whether what is taught in the course is integrated and utilized in the clinical teaching environment. Through clinic faculty feedback, we have identified areas within the course that need to be updated and procedures that are not being utilized. Using these data, we can free up valuable class time and add new material resulting in improved integration of course content.

METHODS

A written survey was given to 29 clinic faculty with instruction to mark the frequency with which either they or their student externs utilized the procedures taught in a course on extremity adjusting. The course instructors demonstrated

a review of each procedure taught in the course to the clinic faculty. The clinic faculty were then asked to complete the survey.

RESULTS

There were 29 completed surveys returned from clinic faculty. These faculty members provided feedback on 48 different extremity-adjusting procedures. The survey revealed that there were some procedures that were used frequently in the teaching clinic and others that were used infrequently. Examples of frequently used procedures include glenohumeral inferior, radius posterior, and wrist traction procedures. Those used infrequently or never included glenohumeral posterior and sternoclavicular superior.

DISCUSSION AND CONCLUSION

Those procedures identified as infrequently or never used may be considered for replacement by methods more commonly used for an area of the body or those that are felt to be more effective. Procedures frequently used according to the survey would be considered for continued inclusion in the course. Evaluation of the survey allows the course directors to make course changes based on clinical utilization instead of instructor bias or preference.

Surveying the clinic faculty appears to be an effective way of gaining feedback on the utilization and integration of course content within a chiropractic institution.



Pigmented Villonodular Synovitis Presenting as Hip Pain in a Chiropractic Clinic

A Case Study and Review of the Literature

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The purpose of the paper is to describe a case in which a patient presenting with hip and low back pain was diagnosed with a rare arthritic lesion: pigmented villonodular synovitis.

Pigmented villonodular synovitis (PVNS) is a rare, locally aggressive or slowly progressive lesion that can develop in the synovial lining of joints, tendon sheaths, and bursae. PVNS presents as a monarticular arthritic lesion equally affecting males and females most commonly in the 3rd or 4th decade of life. Complaints include mechanical pain, recurrent joint swelling, decreased active and passive range of motion, and locking. MRI is an effective diagnostic tool and the treatment of choice tends to be surgical but there are also many beneficial nonsurgical therapies.

CLINICAL FEATURES AND OUTCOME

A 17-year-old female presented to a chiropractic college outpatient clinic with left hip pain and localized low back

pain. Symptoms had gradually increased over the previous 2 years. Conventional radiography and magnetic resonance imaging of the left hip revealed typical manifestations of a synovial-based lesion. Working diagnosis was pigmented villonodular synovitis. The patient was referred for surgery and a synovectomy was performed. Pathology report confirmed the diagnosis of pigmented villonodular synovitis. The patient responded favorably to treatment and 2 months postoperation the patient reports a remission in pain and steady functional improvement.

CONCLUSION

There is no prior description of PVNS in the chiropractic literature. Although this patient displayed some symptoms consistent with a mechanical pain syndrome, this case underscores the importance of obtaining radiographs in patients with long-standing pain complaints.



Development and Implementation of Electronic Data Management for Qualitative Evaluation of Interns in a Chiropractic College Clinic Setting

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The qualitative evaluation of chiropractic students by clinical faculty members is used to monitor interns' development of clinical competencies. Documentation of these evaluations and associated performance feedback has traditionally been recorded and stored on paper. At New York Chiropractic College, several limitations of paper-based documentation became apparent as the volume of evaluations increased. In response, we developed an electronic system of collecting, storing, and utilizing data from faculty evaluations of students in our clinics.

METHODS

Members of the Academic Affairs and Information Technology divisions of the College collaborated to create new

electronic evaluation instruments based on the clinical competencies required by the Council on Chiropractic Education. Hand-held personal digital assistants (PDAs) were configured to collect evaluation data that fed a database that was stored on the local area network. A variety of detailed and summary reports were written to display information from the database. After a period of training and practice, the College implemented the new system, eliminating the previous paper-based means of data collection and storage.

RESULTS

Clinicians and office personnel readily adapted to the new system of data management, which is less time consuming

and more efficient. The format of the reports allows data to be more effectively viewed and interpreted than previously. Access to the data by administrators, faculty members, and students has been greatly enhanced. Requirements for paper and storage space have been substantially reduced.

DISCUSSION

PDA's were chosen over other alternatives because of cost, convenience, portability, and user-friendly, paper-free operation. The development and implementation of our new system required collaboration between clinical and technological

personnel. Other potential uses for the PDA's have been identified, but not yet explored or implemented by the College.

CONCLUSION

An electronic system of data management for qualitative intern evaluations has been successfully developed and implemented at New York Chiropractic College. In addition to improving efficiency and effectiveness of evaluating individual interns, this new system will be, over time, more useful in the process of evaluating the effectiveness of the program of instruction.



You Are What You Read What Textbooks Do Graduates Recommend?

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After 4 years of chiropractic study, the graduating student represents the new wave of young practitioners entering the healthcare arena. Yet little is known about the values, attitudes, and skill sets these young doctors bring to their work. One way of determining this is by examining what textbooks they have found most useful in their development. Although it is generally agreed that getting feedback from students about what they found useful in their schooling is essential to determine what is effective in an educational program, a literature search confirmed that there are no published studies reporting how students use and value these resources.

There are many compelling reasons to look at what students value as textbooks. These include providing a clear picture of which texts are the most effective learning tools and determination of the features of these texts that make them useful. The distillation of such features can be useful in selecting or designing better texts (or other learning resources) in the future. The current study undertook to develop a survey questionnaire and to administer it to all graduating chiropractic students.

METHODS

A questionnaire was designed and used with students graduating in 2001 but it had to be simplified due to a low response rate. The reading list was revised to include 98 textbooks that students had been assigned across their 4 years of study. If they had used a text, they could rate it: (a) highly recommended, (b) somewhat recommended, (c) neutral, or (d) discourage its use by other students.

RESULTS

Of the 147 students graduating, 98 (67%) completed the questionnaire, representing a response rate that can be generalized to the graduating student body. A number of indications suggested that students were purposeful in selecting and endorsing the texts that they found useful and therefore that these results are reliable and valid. Frequency counts for the number of students making ratings on each text were compiled. Textbooks were divided into three groups: core texts, endorsed positively by over 33% of students; complementary texts, endorsed positively by 15% to 32%; and specialty texts, endorsed positively by 5% to 14%.

Of the 98 texts listed, only 12 texts met criteria for core texts, 17 for complementary texts, and 25 for specialty texts. The rank orderings of texts by the 2002 graduates compared favorably to that of the 2001 graduates. Further analyses are also being done to examine other patterns of text usage, and the most interesting findings regarding text usage will be presented.

DISCUSSION

Overall, the persistence of the rank order of rated texts suggests that there is consistency among students, from year to year, in what kinds of materials they find useful in their professional development. The current investigators were surprised that only 12 texts were endorsed by one third

(or more) of the class, suggesting that students make distinctions between texts and are very discriminating.

Complementary and specialty texts will also be reviewed, to determine if the reason for their lower level of endorsement lies in their content, cost, packaging and formatting, or in their failure to address the specific needs that chiropractic students may have. This study hopes to stimulate researchers and instructors at other colleges to review explicitly what resources their students find most useful, how extensively

textbook resources are being utilized, and how resources can be improved.

CONCLUSION

Students make distinctions in the text resources they use and further research can clarify the characteristics of excellent core resources for chiropractic students.



Unique Design Features of an Experimental Study to Evaluate a Chiropractic Manual Placebo

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Placebo-controlled randomized trials (RCTs) are the gold standard for evaluating clinical efficacy. However, there are a number of challenges to the use of a placebo in RCTs of chiropractic manual procedures. These include the near-impossibility of masking the clinician to treatment assignment to achieve double masking, the lack of a definition of a manual placebo, and the difficulty in ensuring that identical manual procedures are performed on all patients.

The objectives of this paper are to describe (1) a unique method to attempt double masking within an RCT, and (2) the process of assuring the delivery of standard forces to patients within the study, including establishing the range of forces defining the placebo treatment and monitoring the standard delivery of those forces by the treating clinicians.

MATERIALS AND METHODS

The active treatment was comprised of flexion-distraction technique combined with trigger point therapy. The placebo was a sham chiropractic manipulation delivered by a hand-held instrument combined with effleurage (light massage). The study ran for 3 weeks followed by an additional 3 weeks of active treatment for patients who desired that. The sample size for the full study is 110 patients.

Patients were randomly assigned to treatment group and masked to group assignment. An attempt was made to avoid unmasking of patients by the clinicians and any effects that might be caused by clinicians' expectations using a unique design. This was accomplished by use of unmasked treating clinicians who delivered the procedures without interacting significantly with the patient and a masked

primary clinician who provided the chief doctor-patient interaction. This created a double-masked study.

Prior to patient enrollment, the study team developed a prescription for application of biomechanical forces for each component of the two treatments using a force plate table measuring real-time biomechanical forces. All clinicians participated in two intensive training sessions to learn to reproduce these forces, participated in a 1-month pilot study to refine protocols, and "recalibrated" by practicing the procedures on a weekly basis throughout the study using non-study-patient volunteers.

RESULTS

Enrollment in the study began in May 2002. With 29 patients enrolled, and 23 completed, the protocol for masking the primary clinician appears to be workable, with few incidences to date of unmasking of the primary clinician. The entire study is anticipated to be completed by January 2003.

During the training sessions, the amount of force used in the usual and customary application of the treatments was measured. For flexion-distraction technique, a range of 80–160 N (posterior/anterior vector) and 31–53 N (inferior to superior vector) was delivered to the patient's lumbar spine at the doctor's contact point. For trigger point therapy, a range of 40–75 N was delivered to the patient's lumbar spine and 10–20 N for effleurage. The weight of the adjusting instrument was the only force applied to the patient during the sham adjusting procedure and was measured to be approximately 10 N. The clinicians were successfully trained to reproduce consistently the required forces for both the active and the placebo treatment.

CONCLUSION

Investigation of the concept of placebo is a major challenge in RCTs of manual procedures. The authors believe the

masking and standardization protocols described in this study may be useful for addressing some of these challenges in future chiropractic RCTs.



Response Rates for Surveys of Chiropractors

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Survey response rates vary by type of practitioner studied and may have declined over time. Response rates for surveys of complementary practitioners have not been studied. The paper describes the response rates in published surveys of chiropractors and explores secular trends in response, and methodologic and geographic correlates of response rates.

A response rate was calculated for 46 postal surveys. The mean response rate was 52.7%. There was no significant association between geographic setting and response rate, and there was no evidence of secular trend in response rates. None of the studies employed incentives. The strongest predictor of response rate was number of contacts with the target population.

METHODS

A secondary analysis of data extracted from published English language reports of surveys of chiropractors was performed. Response rates were calculated as the total number of persons from whom a questionnaire was returned divided by the total number of persons studied.

CONCLUSION

Response rates for surveys of chiropractors are similar to those observed for surveys of medical doctors. The key to obtaining high response rates is the use of evidence-based methods in design and conduct of the surveys.

RESULTS

Sixty-two surveys represented by 79 articles published in the interval 1980–2000 met inclusion criteria for analysis.



From the Classroom to the World The Development of a Short-Term Clinic Abroad Program for Chiropractic Students

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Study abroad programs, and versions thereof, are growing educational venues among American colleges and universities. Students are interested in learning about other cultures, recognizing that during their work life, they will benefit

from training received with regard to cultural issues. Cultural competence is becoming a sought-after attribute in the health-care professions given the diversity of the population in the United States. This paper describes one chiropractic college's

efforts in the development of a program that addresses both clinical and cultural competence, the Clinic Abroad Program.

METHODS

The Clinic Abroad Program developed over the past several years into an extensive chiropractic-centered program through which faculty and students work as a healthcare team to bring chiropractic healthcare to underserved populations around the world. Administration is handled through a Clinic Abroad office with one full-time staff member as the program coordinator. Approximately 270 students participate in the Clinic Abroad Program each year during an average of 12 scheduled trips. Eight countries are current sites for the Clinic Abroad Program, and the groups also go to Indian Reservations within the United States.

RESULTS

Students receive both extrinsic and intrinsic rewards as a result of their participation in the Clinic Abroad Program. Extrinsic rewards include receipt of adjustment and physical examination credits, which can be applied toward their clinical graduation requirements. Intrinsic rewards are that of a new perspective about different cultures, the value of teamwork, adaptability, and flexibility, plus the satisfaction that they can make a difference through the application of chiropractic care.

DISCUSSION

Programs such as Clinic Abroad are popular among students and valued by those who participate in them. Such programs require adequate resources, primarily human resources, and effective assessments as standard program procedures. Persons charged with managing these types of programs need to have excellent organization and communication skills. Post-September 11, 2001, safety of students and faculty traveling throughout the world is a primary concern. Government travel advisories and warnings are monitored daily both predeparture and as trips are underway. The college is committed to the safety of its students and faculty. On-site coordinators provide a valuable service to the program as primary contacts who can advise about current conditions and safety issues.

CONCLUSION

The Clinic Abroad Program provides clinical and cultural learning experiences through short-term travel abroad programs. Students return to campus with a new understanding of cultural issues, exposure to a wide variety of health conditions many would not otherwise encounter in the college's teaching clinics, and refinement of their clinical skills by caring for a great many people within a brief time period.



The Use of Needle Electromyography for the Purpose of Localizing Myofascial Trigger Points

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Myofascial trigger points (TrPs) have been described as hyperirritable loci within taut bands of skeletal muscle. There exists in the literature equivocal findings with regard to the potential to record abnormal electrical activity in diagnosed TrPs. Spontaneous electrical activity (SEA) patterns of low frequency and intermittent high-amplitude spikes have been reported by some laboratories. Other investigators have been unable to reproduce such findings. The purpose of this study was to employ needle electromyography (EMG) methods by which to describe the electrical activity in diagnosed trapezius TrPs and to compare our findings with the activity recorded in unaffected muscle.

METHODS

Subjects ($n = 6$) were identified by trained clinicians as having trapezius TrPs and, in the same muscle, but at a

distance of no less than 1 cm away from the TrP, an unaffected area (control site). For each subject, clinicians used a nontoxic waterproof marker to place discrete marks (<1 mm) at two sites; one site diagnosed as a TrP and another as a control. A two-channel EMG system interfaced to a computer for data acquisition was employed. Low- and high-frequency cut-offs were set at 10 Hz and 10 KHz, respectively, with a gain of 10 uv/division. The clinician carrying out the studies was blinded as to which of the marked areas was TrP or control. Monopolar needle electrodes (1.5 in; 28 G) were inserted into both TrP and control sites. A rotation technique was used to gently and slowly advance needles into the trapezius muscle sites. Intramuscular electrical activity was simultaneously and continuously recorded at rest at both sites for 10 minutes. Additionally, single motor unit activity was recorded at each site following transitional volitional contraction of the trapezius.

RESULTS

EMG tracings obtained from myofascial TrPs were identical to control muscle in all subjects. The authors were able to elicit single motor unit activity in response to volitional contraction in all TrPs and control sites, thereby confirming that the needles were properly placed within in muscle. However, there were also no differences in EMG recordings obtained from TrPs and control muscle during those volitional contractions of the muscle. The results of this pilot study suggest that, utilizing out technique, there is no difference between trapezius TrPs and control muscle in EMG signals recorded at rest.

CONCLUSION AND DISCUSSION

The current data indicate that SEA was not observed as a result of needle EMG examination of diagnosed myofascial TrPs. These findings are in contrast with previous investigations reporting the presence of aberrant electrical activity in TrPs at rest. Conversely, the data corroborate other reports describing an absence of SEA in TrPs.

These findings thus far indicate that needle EMG techniques are not efficacious for the diagnosis of localization of myofascial TrPs. The data further support the theory that electrophysiological changes do not play a role in TrP pathogenesis. Additional studies will be conducted to further substantiate these findings.



Variable Angle Roman Chair as a Therapeutic Tool for Low Back Pain Rehabilitation

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Low back pain is not only the most common cause of disability, but also the most expensive healthcare problem in the United States. The traditional approaches to acute, subacute, and/or chronic low back pain have largely been passive modalities, medication, and rest. Active exercise has become an increasing choice since mid-1980s, following evidence that compromised trunk extensor muscles are risks for low back injury. However, not a single exercise regime or protocol has been established so far as a standard for rehabilitation or prevention of low back pain. Even patients who responded well to various low back pain therapies still suffer from recurrence of pain if no strength training was followed after recovery.

There has been documented success with expensive computerized exercise equipment in treating chronic low back pain, and more affordable nonclinical stationary Roman chair (0° or 45° nonadjustable). However, the demand for strength and full range of motion imposed by the stationary Roman chair and lack of adjustment for resistance limit its use on all patients. In contrast, the variable angle Roman chair can be tilted from 75° to 0° in 15° decrements for resistance progression, and the resistance can be further fine-tuned by four different hand positions. The current study aim was to test the efficacy of the variable angle Roman chair coupled with an exercise protocol as a therapeutic and rehabilitative approach for low back pain.

MATERIALS AND METHODS

Patients were recruited from the Southern California University of Health Sciences clinic system and other community recruitment devices. Twenty patients were recruited based on appropriate inclusion/exclusion criteria, and 18 completed the study. Participants have back pain on average for 4.5 years with a minimum duration of 3 weeks. Subjects underwent a training program of two sessions a week for 8 weeks. The training consisted of progressive resistive lumbar extension exercises on the variable angle Roman chair. SF-36, Roland-Morris, and visual analog scale (VAS) were used as outcome measures at baseline, 1-month, and 2-month periods.

RESULTS

The Roland-Morris Scale, pain scores, and SF-36 all showed significant improvement from baseline to 4 weeks and baseline to 8 weeks. As measured by VAS scale, reduction of pain was found at the end of both the 4th week and 8th week. SF-36 scores indicated enhanced function in more than half of the measured subcategories, including pain, energy/fatigue level, social functioning, health change, and perception of general health. Results from Roland-Morris questionnaire, a very sensitive and reliable indicator for

activity intolerance related to low back problem, also pointed to significant improvement at the end of both the 4th and 8th week.

DISCUSSION

Twice-a-week lumbar extension exercises performed on a variable angle Roman chair led to significant improvement of the patients' back pain condition, daily activity, and function. The adjustable resistance of the variable angle Roman

chair, via setting of different angles in combination with different arm positioning, adeptly allowed tailoring of fine-tuned resistance levels to match individual strength, which was incrementally increased according to the individual patient's progress, allowing a constant demand to continuously condition the patient for progressive improvement.

Larger sample size, addition of objective measures such as trunk extension endurance static hold time (Biering-Sorensen test), and follow-up to determine long-term effects will be areas of added rigor following this pilot study.



The Use of *Commiphora Mukul* for Osteoarthritis of the Knee An Outcomes Study

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Osteoarthritis is a debilitating, slowly progressive degenerating disease of diarthroidal joints affecting men and women. It is the most common form of arthritis affecting approximately 70% to 80% of the aged population worldwide and is the second most common form of disability in the United States. Although many advances have been made in understanding the pathophysiology and treatment of this disease, there is no definitive treatment that will stop the progression of the disease as well as cure it. Hence there appears to be a general need for remedies with good efficacy and a low toxicity in the treatment of osteoarthritis.

Ayurveda, the traditional system of healthcare in India, has been practiced for thousands of years and has many remedies for osteoarthritis. One of the ingredients most commonly found in Ayurvedic arthritis formulas is guggul, an oleo-resin of the herb *Commiphora mukul* (CM). Several earlier animal studies in India have demonstrated the effectiveness of guggul extract in standard osteoarthritis models. The authors have conducted clinical investigations of guggul for osteoarthritis prior to this study. The goal of this study was to determine the effectiveness of guggul for reduction of pain, stiffness, function, and other symptoms that arise from osteoarthritis and to know whether it will be useful in the chiropractic profession. The trial was also conducted to determine the tolerability of this Ayurvedic herb in older patients with a diagnosis of osteoarthritis of the knee.

METHODS

The study was executed along an outcomes, quasi-experimental model. Thirty participants of either sex, meeting the inclusion/exclusion criteria and those with a score of 2 or more on Kellegran-Lawrence scale for at least one knee were admitted in the study. CM was administered in the form of

a capsule (500 mg concentrated extract delivered TID daily) along with food. Concurrent medications for problems other than osteoarthritis were continued throughout the period of study without change. The WOMAC Total Score was used as a primary outcome measure. Visual analog scales (VAS), 6-minute walk test, and WOMAC subscales were used as secondary outcome measures for this study.

RESULTS

At the end of treatment, there was a significant difference in the scores of the primary as well as secondary outcome measures. On the primary measure, WOMAC total score, participants were significantly improved ($p < .0001$) after taking the supplement for 1 month and continued to improve at the 2-month marker and at follow-up. WOMAC stiffness and function subscores were significantly improved ($p < .0001$) after 1 month on the supplement, continued to be significant at 2 months, and remained significantly improved over baseline at follow-up. The symptom count demonstrated the same pattern of improvement ($p < .0001$) as the WOMAC scores.

Secondary measures of pain in the VAS format demonstrated participant improvement. However, mood state and current pain were not significantly different ($p < .05$) than baseline until the 2-month assessment ($p < .001$). Least and worst pain were significant ($p < .0001$) at 1-month measurement points and continued to be significant at 2 months, but had decayed to baseline levels after stopping the supplement for a month. Data showed improvement ($p < .0001$) in walk distances by the 2nd month, but had decayed to a level slightly less than baseline for the follow-up measure.

CONCLUSION

Overall data indicate significant improvement for participants during the trial in both scales and objective measures used for assessment purposes. As there were no side effects

reported during the trial or the case study along with data from case series, which are ongoing, the investigators believe that CM is a relatively safe and effective supplement to reduce the symptoms of osteoarthritis and can be useful in the chiropractic profession.



Survey of Chiropractors in US Health Profession Shortage Areas (HPSAs)

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Ongoing interest and effort has been directed toward studying the use, utilization, and distribution of chiropractic services, particularly relative to rural or underserved areas. This project surveys US chiropractors to determine the extent to which chiropractic practice markets encompass federally designated health professional shortage areas (HPSAs) and their respective practice patterns.

METHODS

A descriptive cross-sectional mail survey was distributed in 2002 to two separate samples of all 68,000 actively licensed US chiropractors: a simple random sample and a stratified random sample that replicated the sampling methodology of the Community Tracking Study. Survey strategy included an initial mailing with two rounds of mailed follow-up to nonrespondents, and a final phone follow-up. Survey data were linked to external data to identify healthcare shortage areas.

PRELIMINARY RESULTS

The separate and distinct sampling frames employed for this survey required that each set of data be analyzed separately. The results from the separate analyses of this interim data were consistently similar and are summarized and reported here as one set of general preliminary findings.

Demographics of survey respondents reflect a largely male (85%) and white (93%) constituency, with most (81%) engaged in practice full time. Many respondents are relatively new graduates. Those graduating within the last 10 years constitute 38%, followed by those graduating 11–20 years prior (34%), and those graduating more than 20 years ago (28%). Sixty percent of respondents serve counties designated as having some shortage of health professionals (whole or part-county shortage), while 15% of all respondents serve high shortage areas (whole-county shortage).

When queried whether they perform “differential diagnosis,” “chiropractic analysis,” or both, most respondents (79%) report performing both, 14% report only chiropractic analysis, and 7% report only differential diagnosis. Most respondents (87%) report having an experience with being the first healthcare provider to identify a patient condition necessitating referral for medical care. Most report that this occurs seldom (44%) or sometimes (38%); fewer report a routine/frequent occurrence (15%). This occurs less than 5 times/year for 50%, 5–20 times/year for 40%, and more than 20 times/year for 10%.

Many respondents (60%) report that they have identified an adverse pharmaceutical event occurring in one of their patients, either frequently (25%), sometimes (32%), or seldom (41%). Such events occur less than 5 times/year for 50%, 5–20 times/year for 30%, and more than 20 times/year for 20%.

DISCUSSION AND CONCLUSION

Although still preliminary, the survey results reported here invite thoughtful consideration. The shortage of medical physicians in rural and underserved areas remains problematic despite decades of MD-targeted recruitment and retention programs. There may be a tendency for doctors of chiropractic to locate their practices in smaller communities, and most rural-practicing chiropractors also originally come from rural areas, a known factor for rural provider retention. Chiropractic healthcare providers have the potential to contribute substantially to this nation’s health work force needs, particularly in rural and underserved areas. A key element of that potential contribution lies in documenting, understanding and enhancing the actual or potential roles of chiropractors in primary healthcare delivery, both within chiropractic practice and in cross-disciplinary professional interactions.

Health policy and planning should consider the full complement of healthcare providers available to improve access to care for underserved populations. More importantly,

chiropractors and the chiropractic profession must become more cognizant of how patients within a chiropractor's service area utilize chiropractic as a component of their

overall care, and must assume the necessary responsibility for ensuring that underserved or vulnerable population groups receive appropriate and adequate care.



Postural Dynamics Following Chiropractic Adjustment Preliminary Findings

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Chiropractors have long been concerned with the relationship between postural alignment and its association with symptom generation and general health. The clinician typically views posture as a form of static biomechanical linkage (attitude) in terms of musculoskeletal symmetric relationships between segments. However, since human posture is a dynamic enterprise, it may be best studied from a dynamical perspective.

To date, chiropractic research has neglected the study of postural control from a dynamic, behavioral approach. This study seeks to determine whether changes in postural coordination occur following adjustments. To determine this, postural coordination was assessed when the primary goal was to maintain balance on different surfaces in the absence of perturbation. Influences of vision on posture were also assessed. From this analysis an attempt was made at inferences about chiropractic intervention on the participants' control strategies.

METHODS

The participants were three female patients from the author's private practice. The body motion of the participants was recorded using a magnetic tracking system. Four surfaces were employed in this study: a wide hard surface, a hard beam, a wide foam surface, and a foam beam. Participants were told to stand comfortably on each surface and maintain balance, with their arms behind their back and head still. A total of 16 trials were conducted preadjustment, four trials on each surface, two with eyes open and two with eyes closed. For the eyes-open trials, the participants were told to keep their eyes focused within a rectangular space depicted on the wall ($12^\circ \times 18^\circ$ visual angle). The hard surface trials were conducted for 20 seconds and the remaining surface trials were 30 seconds in duration. Following full-spine diversified adjustments, participants repeated the procedure. Adjustments were delivered to areas deemed to be subluxated by the chiropractor.

RESULTS

Each of the surfaces afforded varying levels of postural stability. Differences in postural modes (as measured by hip-ankle angle variability ratios) emerged as a function of support surface. However, vision did not seem to influence postural mode. Large individual variation was found between surfaces and before and after chiropractic adjustments.

DISCUSSION

These preliminary results suggest that chiropractic adjustments have an impact on postural stability at least on an individual basis. With just three participants it is difficult to speculate as to the overall main effect of adjustments. The limited number of participants restricts generalization of findings.

Much of the research on postural control has treated it as a dynamic system, designed to maintain balance with respect to forces acting upon the body. In using a dynamic systems model, the common means of studying such a system is to disturb it in some manner and then study how the system returns to its natural state. However, there is little information on how people control and coordinate their posture "normally," in the absence of external disturbances. Applying this methodology to research on the effects of chiropractic adjustments on postural control will allow a dynamic analysis of the system. Furthermore, this type of investigation will provide a means to characterize the effects of chiropractic on postural and movement coordination.

Individual responses to adjustments were in some cases dramatic and tended to facilitate movement stability. Taking a dynamic, behavioral approach to postural control affords the chiropractor alternative means of assessment that could improve on the diagnostic and therapeutic aspects of practice. This type of methodology may be utilized with a variety of human movement and has potential use in assessing various health parameters such as risk of falls in the elderly, movement economy, and rehabilitation intervention in addition to the effect of vertebral subluxations.



Chiropractic Management of Lumbar Spinal Stenosis

A Case Report

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Spinal stenosis commonly occurs due to degenerative changes, causing narrowing of the neural canal and either venous congestion and/or direct nerve compression of the exiting spinal nerves. Subjective complaints include low back pain, leg pain, and neurogenic claudication. Patients should be screened for symptoms of cauda equina syndrome: low back pain, saddle paresthesias, and urinary dysfunction. Examination is generally unremarkable.

Treatment remains controversial. Surgical decompression is recommended for individuals with intractable pain or progressive neurologic symptoms with 64% of patients having good to excellent results. Conservative interventions appear to be less effective, and do not provide long-term relief. Chiropractic management of stenosis has little support in the literature.

CASE REPORT

A 58-year-old female presented with a previous diagnosis of degenerative lumbar stenosis based on MRI findings of “severe 7 mm central canal stenosis, and bilateral neural foramina stenosis at L3–L4.” She complained of low back pain, right thigh pain, and numbness which was brought on by walking and was alleviated by rest and flexion. Pain intensity was rated at 7/10 VAS and Roland-Morris score was 11/24.

Examination revealed left antalgic posture with tenderness and hypertonicity of the lumbar paraspinal musculature. Trunk extension and right lateral flexion, along with orthopedic tests utilizing the same motions, reproduced the low back and thigh symptoms. Neurologic assessment revealed hypoesthesia on the right knee and an absent right patellar reflex.

INTERVENTION AND OUTCOME

The patient was treated utilizing flexion-distraction technique with decreasing frequency over a 9-month period. Subjective, objective, and functional parameters all showed gradual and consistent improvement over the entire course of care. After 5 months she was experiencing low back and

thigh pain upon waking, was walking 1.5–2 miles daily, and her Roland-Morris score was 1/24. She continued care to maintain lumbar flexibility. At 9 months she noted no functional restrictions and complete cessation of low back and leg symptoms.

DISCUSSION

A case of lumbar spinal stenosis, confirmed by MRI, is presented. The resolution of symptoms and restoration of functional ability is likely due to treatment. However, a minority of stenosis patients show improvement over time. Several authors report that conservative care offers only short-term benefits and little hope of functional improvement.

While the diagnosis of stenosis is often based on static measures, spinal biomechanics also play a significant role. The functional size of the spinal canal increases during flexion and decreases during extension, explaining why symptoms decrease during flexion and increase during extension.

Chiropractic manipulative therapy (CMT) is a potentially valid treatment approach for stenosis. The consistent, repetitive stretch of flexion-distraction technique may be more effective than the classic high-velocity, low-amplitude technique that is delivered a few times at best. This repetitive stretch may improve segmental motion and restore normal biomechanics resulting in increased functional canal volume and decreased ischemia and/or mechanical compression.

Limitations are those consistent with any case study. Further research on the effectiveness of CMT needs to be conducted. It is hoped that this case will be the first of several for future publication as a case series.

CONCLUSION

The case of a patient with severe lumbar stenosis is presented. The patient experienced resolution of all symptoms and complete restoration of function. Resolution of symptoms is attributed to the improvement of spinal biomechanics and functional canal volume. Further study of chiropractic management of lumbar spinal stenosis is warranted.



Topical Application of Inflammatory Mediators to the Lumbar Intervertebral Foramen Induces Mechanical and Thermal Hyperalgesia and Ectopic Discharges of Dorsal Root Ganglion Neurons in the Rat

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Inflammation, as manifested by edema, increased endoneurial fluid pressure, ischemia, immune cell invasion, and macrophage activation, appears to play a critical role in the pathogenesis of neuropathic pain. Peripheral nerve injury produces direct injury to the primary sensory neurons and also an inflammatory reaction at the site of injury. The authors previously investigated the roles of complex inflammatory mediators (IM) in ectopic discharges of dorsal root ganglion (DRG) neurons after peripheral nerve injury and DRG compression produced by an artificial intervertebral foramen (IVF) stenosis. To better understand contributions of IM to the hyperalgesia, the present study was designed to examine the possible mechanical and thermal hyperalgesia and ectopic spontaneous activity (SA) following topical injection of IM to the lumbar IVF.

METHODS

Experiments were performed on adult, male Sprague-Dawley rats ($n = 62$, 200–220 g). IM (BK, 5-HT, histamine, and PGE₂) or HEPES-buffered saline (NaCl, glucose, CaCl₂, MgCl₂, and HEPES) at acidic pH (5.5) or neutral pH (7.4) was applied topically to L5 DRG in vivo via a 25-gauge needle inserted into the IVF in anesthetized rats. Of the 62 rats, each of 56 received one of the four treatments, i.e., IM pH 5.5, IM pH 7.4, HEPES-buffered saline pH 5.5 (saline pH 5.5), and HEPES-buffered saline pH 7.4 (saline pH 7.4). The other 6 rats were used as unoperated control for electrophysiological recordings. Of the 56 rats, 32 were used for behavioral tests and 24 for electrophysiological recordings.

Mechanical and thermal hyperalgesia were evidenced by significantly decreased mechanical threshold and shortened latency of foot withdrawal to von Frey filaments and radiant heat stimulation. Intracellular recordings were obtained in vitro from L5 DRG using the conventional bridge-balance techniques. SA neurons were defined as those that continuously discharged for at least 2 minutes.

RESULTS

Application of acidic IM pH 5.5 produced a rapid-onset and long-lasting mechanical and thermal hyperalgesia. The mean mechanical threshold ipsilateral to the injection decreased significantly from a preoperative value of 61.8 ± 3.3 mN to 21.5 ± 5.2 mN, 25.4 ± 4.9 mN and 34.7 ± 4.6 mN on the 1st, 7th, and 14th postinjection day, respectively. The hyperalgesia lasted for 5–6 weeks. Similarly, sensitivity to heat stimulation was significantly increased following the application. The mean latency of foot withdrawal was shortened around $60 \pm 20\%$ during the first 4 weeks after injection. IM pH 7.4 produced a similar hyperalgesia with less severity and similar duration. Saline pH 5.5 produced a transient mechanical hyperalgesia with a lack of thermal hyperalgesia. However, Saline pH 7.4 did not produce hyperalgesia.

Electrophysiological studies showed that the incidence of SA of DRG neurons was significantly increased following topical application of IM pH 5.5, IM pH 7.4 and saline pH 5.5, but not saline pH 7.4, respectively, during the first 2 weeks after injection. The incidence of SA are as follows: (1) unoperated control, 1.1% ($n = 180$ cells); (2) IM pH 5.5, 10.9% ($n = 240$); (3) IM pH 7.2, 10% ($n = 200$); (4) saline pH 5.5, 6.3% ($n = 160$); (5) saline pH 7.2, 2.67% ($n = 150$).

DISCUSSION AND CONCLUSION

The present study indicates that topical application of the inflammatory mediators to the lumbar IVF can induce behavioral hyperalgesia and hyperexcitability of the DRG neurons. This suggests that the inflammatory mediators may play important roles in the production and persistence of hyperalgesia, and contribute to pain induced by peripheral nerve injury or injury to the structures and tissues that are within and/or adjacent to the IVF.



Case Report Writing Methods and Outcomes of a Continuing Education Workshop

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A workshop on case report authoring was offered at the March 2002 joint meeting of the Research Agenda Conference and the Association of Chiropractic Colleges. The workshop exposed participants to the details of the process and provided advice on writing and submitting manuscripts.

There is little peer-reviewed literature regarding the effectiveness of continuing education in the chiropractic profession. This article describes the methods used to conduct the case report writing workshop and reports the results of a pre- and postworkshop authoring confidence survey. To the best of the author's knowledge, this is the first paper to report data supporting the use of a continuing education strategy for chiropractic in the United States.

METHODS

The workshop was designed to be highly interactive with alternating lecture and small group discussion. Prior to the workshop, participants were encouraged to submit manuscripts on which they had been working. Faculty met with individual participants to discuss their manuscripts. A survey was developed for the workshop by consensus of the faculty and conducted at the beginning and end of the program. These surveys were paired later for comparison. Fourteen questions using a 5-point Likert scale rated participant confidence in different aspects of case report preparation. Additional items included year of graduation, number of peer-reviewed publications, articles attempted, and a 10-point scale rating level of intimidation regarding the publication

process. The survey was analyzed using the Wilcoxon Signed Ranks test for all paired questions.

RESULTS

Nineteen participants completed both the pre- and post-workshop survey. Seven completed only the presurvey and four only the postsurvey. Of the 19 paired surveys, 11 had never published. All questions showed positive ranks pre to post with 10 of the 14 questions demonstrating statistically significant improvement in participant confidence with alpha set at the .05 level of significance. The survey indicated increased confidence in finding/evaluating information sources, organizing case reports, and understanding the requirements of a case report. Statistically insignificant improvement was seen in gleaning information from literature, citing sources, and formatting references, and in writing descriptions with enough clarity to be repeatable. The "intimidation" level improved but without statistical significance.

CONCLUSION

The survey used to assess the impact of the workshop shows that based on the participants' perceptions, the objectives of this "education intervention" were successfully met. It may be of benefit in future workshops to place greater emphasis on citing the literature and formatting references.



France 2002: Chiropractic Is Legalized! Results of the First Survey of French Chiropractic Patients

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In February 2002, in Parliament in Paris, French, chiropractic was legalized. The lack of documentation of

the extent of the practice of chiropractic and a detailed look into the experience of its patients still remains to be

accomplished. By generating this information, three of the authors, French chiropractors in active practice, hope to de-mystify chiropractic in France and build its credibility, perhaps neutralizing in the process whatever disinformation might be promoted to weaken our progress.

METHODS

A survey instrument was developed and provided to 100 consecutive patients seen in two clinics in 2001. The survey included questions pertaining to the demographic characteristics of the patients, their reasons for seeking chiropractic care, the process by which patients located their chiropractor, their knowledge about the education and skill of the chiropractor, the history of care seeking, and patient's satisfaction with care.

RESULTS

Data indicate patients are younger (average age 41 years) in the practice situated in Poitiers, a university city of the Poitou-Charentes region (PC), than the average age of patients at the Provence-Alpes-Côte d'Azur (PACA) clinic (50 years), in a city recognized as being a place attractive to retirees (Cannes). We observed a larger proportion of low back problems in PC (25%) than in Cannes (PACA) (14%). Neck pain was the presenting condition for about 18% of the cases in each clinic. Headache was noted by another 10% overall, with 12% in the south-central (PACA) clinic and 9% in the east-central (PC) clinic. Prevention appears to be an unimportant motive for care seeking.

A majority (61%) of patients said they visited a chiropractor not because they knew about chiropractic, not because

their medical physician or other healthcare provider referred them, and not generally because they preferred not to use medication, but because they were referred by a relative. In fact, 75% of patients (64% of PACA and 87% of PC patients) said that a relative provided them the address of the chiropractor they eventually contacted. A majority of respondents were aware that payment for services would likely be out-of-pocket (85%) and that chiropractic (before February 2002) was illegal in France. Fewer patients were aware that chiropractic training in France takes 5–6 years to complete (26%) and that chiropractic is legal outside France (41%).

On other items, referring to past and future behavior, we find that most patients had not had chiropractic treatment before (80%) and that most of the remaining 20% who had chiropractic had visited either another chiropractor (55%) or an osteopath (40%). Most patients (91%) would recommend their own chiropractor to a relative, and 75% would recommend any chiropractor to a distant relative. Interestingly, though, patients in PC were much less likely (58%) than those in PACA (92%) to recommend chiropractic in general to a distant relative.

CONCLUSION

This survey indicated that chiropractic already has a strong base in France and that the profession is quite capable of taking full advantage of this trust and goodwill. It is especially striking to see that 90% of the patients reported they had not visited a DC before, but that a relative had encouraged them to do so. Further, it is important to see that the new-to-chiropractic patients already had a strong trust relationship with their chiropractors. Finally, by advocating more media exposure for chiropractic, patients indicate their belief that this care option should be made available to all their countrymen.



Biometric Comparison of the Heights and Widths of Paired Innominates

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Most manual therapists rely on palpation to help guide them in the treatment of their patients. Others augment palpation with radiographic marking analysis. In using these clinical indicators, the therapists assume symmetry. However, natural asymmetry of paired osseous structures may lead to a false interpretation of findings. This research is the first step in an attempt to confirm or deny these assumptions of symmetry in the pelvis.

METHODS

Thirty-four cadaver pelvises were placed in the horizontal spino-symphysial plane and measurements were taken of each innominate's actual and projected height and width. General linear modeling was used to test three hypotheses: (1) there is a positive relationship between the left and

right innominate widths; (2) there is a positive relationship between the left and right innominate heights; and (3) there is a positive relationship between the interaction of height and width of the left and right innominates.

RESULTS

The mean actual width of the left innominate was 90.4 mm while the right was 91.5 mm. The actual mean length of the left innominate was measured to be 215.1 mm and the right was 217.0 mm. For projected distances, the left innominate width was 79.1 mm and the right was 78.1 mm. The left projected height was 214.8 mm while the right was 216.3 mm. In regards to the interaction between the height and width of each side, the left actual interaction mean was 194.86 mm² and the right was 198.93 mm². When looking at the projected interaction of the innominate, the left was 170.18 mm² and the right was 168.16 mm². The above gives a R^2 change for actual innominate width as

78.7% and projected width as 67.5%. Innominate actual height R^2 was 87.4% and projected height R^2 was 92.4%. The predicted interaction with both height and width was $R^2 = 78.1%$ for actual and $R^2 = 84.4%$ for projected distance. Post hoc analysis indicates that gender does not affect our conclusions.

CONCLUSION

There appears to be symmetry in the innominate bones based on innominate height, width, and their (statistical) interaction. The height of the innominates tends to demonstrate more symmetry than their width with little difference between actual and projected measurements. Further studies are planned to confirm and expand these findings by utilizing radiographic views of these pelvises. This is with the expectation of eventually supporting or denying the practitioners' assumption of osseous symmetry within the pelvis when performing palpatory or radiographic analysis.



Use of Interactive Multimedia for a Web-Based Case Study

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One of the challenges for student interns is to be able to practice the application of basic science and clinical knowledge in "real-life" situations without adverse effects on patients. Simulated case studies provide a safe and reliable way to gain practice and meet learning objectives. Within a clinical internship course, a simulated case study unit, consisting of a multiple-week series of exercises using a Web-based format was developed. Technical components included use of multiple Web pages, hyperlinks to additional references, audio/video, still photos, and an automated e-mail response page with a confirmation of responses sent. The case study included learning elements of collaboration between students, analysis and synthesis of information, and evaluation and feedback from the instructor, which are essential components of problem-based learning.

METHODS

Interns were assigned to work in small groups of three students each. Two groups were assigned to each of two instructors. Group members were encouraged to interact with each other to develop their initial hypotheses and later receive feedback and critique from the instructors via e-mail. As the weeks continued, additional information was referenced and given to the groups by each instructor to further develop the case and answer their specific inquiries.

RESULTS

Personal and group time spent was reported for each week. Weekly personal time ranged from zero to 45 minutes and group time was regularly reported to be an average of 30 minutes. Students' comments identified factors in the design that would have made the technical navigation of each week of the study more intuitive and some noted problems that could have been avoided by clearer instructions. The most common negative response to the experience was that it was too difficult and time consuming to meet as a group in person to discuss the case. Some had difficulty in using the video information due to unavailability of appropriate software or speakers on computers and questioned the clinical value of the video presentations. The positive feedback indicated that they enjoyed the content and process and would have liked even more feedback from the instructors. The case study was ended 1 week early due to competing priorities at the end of the term.

DISCUSSION

One notable disadvantage in the technical design was that an "open discussion board" format was not available. Therefore, the unit was organized to use asynchronous feedback

in the form of e-mail interactions. One unanticipated result was the resistance to being in a group for this project. All had reported a good experience in working with a partner on a previous case study. Though students preferred to meet in person, rather than communicate to each other via e-mail, they found that it took more time and was difficult to schedule. Students were instructed to communicate with instructors on campus only via e-mail to test the practicality and ability to formulate and receive answers to their questions in this format. By using strict e-mail communication, we could start to explore the viability of using various mentors

(e.g., adjunctive faculty doctors in private practice) for advice based on their experience with patients.

CONCLUSION

Primary benefits of Web-based case studies include a greater number and variety of cases, student and instructor flexibility, and more interactive time available in the classroom.



Climate Studies

Can Students' Perceptions of the Ideal Educational Climate Be of Use for Institutional Planning and Resource Utilization?

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The Canadian Memorial Chiropractic College is in the 4th year of implementation of the new Integrative Curriculum. While all curriculum changes are designed primarily to try to improve the whole learning environment for the students, the actual process of change, as well as the rate of change, is very stressful for both students and faculty.

How students perceive the curriculum is called the climate of the institution, and this climate very strongly affects student achievement, satisfaction, and success. It is thus important to assess the climate of the institution on a regular basis in order to nurture areas of excellence and improve areas needing attention. Asking the students to report their perceptions of the actual environment they have lived in and experienced provides a basis for modification in order to enhance the learning experiences of the students. In addition to measuring how students actually perceive the educational climate of an institution, the literature also suggests that it might be useful to find out what sort of an educational climate the students would really like to have. The purpose of the present study was to ascertain whether students' perceptions of the ideal, or preferred, environment that they would have wanted to experience could be useful to institutional planning and resource utilization.

METHODS

This research made use of the Dundee Ready Education Environment Measure (DREEM) Inventory to assess the whole as well as parts of the educational environment and climate at the institution. The DREEM inventory is a validated inventory with proven high reliability that has been used in various countries around the world to assess the

educational climate of health professional institutions. The inventory consists of 50 questions and permits quantitative assessments of five domains or subscales of students' perceptions of a given institution. These are: students' perceptions of learning (12 items); students' perceptions of teachers (11 items); students' academic self-perception (8 items); students' perception of atmosphere (12 items); and students' social self-perceptions (7 items). The scale allows the user to report a total environment score plus scores for the five subscales. This study measured the ideal climate as reported by the students at the different year levels, and also separated the male and female responses in order to measure possible differences in expectations.

RESULTS

The DREEM Inventory was administered to 146 (95%) 1st-year, 123 (82%) 2nd-year, and 73 (48%) 3rd-year students ($N = 342$). The results indicated a number of significant differences ($< .05$) between 2nd- and 3rd-year students, but not much between 1st- and 2nd-year students. Ranking of ideal scores per domain, as well as the identification of the largest discrepancies between actual and ideal scores per domain, also showed strongly similar requirements for the three groups.

Comparison of male and female students' perceptions of what they would ideally like the educational climate to be also yielded consistent results. Five significant ($< .05$) differences were found between the 1st-year male and female students, while the 2nd-year yielded only two significant differences and the 3rd year yielded one significant difference between the perceptions of the genders.

CONCLUSION

The results of this study indicate clearly that the students, from the 1st to the 3rd years, were able to identify and

agree on the areas of most concern at the institution. This information was found to be very useful for institutional planning purposes.



Logan Basic Methods and Low-Force Adjusting for Treatment of Chronic Low Back Pain in the Age Group 57 and Older A Pilot Study

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Low back pain (LBP) is a major concern for the elderly population. LBP and associated symptoms are the third or fourth most commonly reported symptoms among those greater than 65 years of age. Estimates show between 13% and 49% of the elderly population has LBP. Given the possible consequences of unmanaged LBP in an older age group, such as depression, functional disability, and compromised quality of life, further research in alternative treatment approaches is warranted. Low-force adjusting has been employed clinically for many years by multiple adjusting techniques. One approach, the system of Logan Basic Methods, uses structural analysis from radiography combined with postural and clinical examination findings to determine and apply specific low-force adjustments to the pelvis and spine. The purpose of this pilot study was to assess the effectiveness of the system of Logan Basic Methods to reduce pain and increase functional activities in an age group of 57 and older complaining of moderate chronic LBP.

METHODS

After approval by a local Institutional Research Board, 20 subjects 57 years of age (average 70.7 ± 7.4) and older were recruited for a 5-week clinical trial consisting of 10 spinal-pelvic adjustments using Logan Basic Methods. Intake examinations and surveys included full-spine radiography and postural analysis, a verbal rating scale, the Roland-Morris Low Back Pain Questionnaire, a pain

drawing, physical examination, and quadrilateral weight scale measurements.

RESULTS

The subjects presented with a self-reported average pain level of 3.3 ± 0.4 on a scale of 1 to 5. Pain rating of "3" is moderate pain, described as pain that requires modification of activity but is not disabling. After 10 treatments, the patients reported an average pain level of 1.9 ± 1.0 . Pain rating of "2" is mild pain, described as annoying but not interfering with activity. The patients presented with an average Roland-Morris score of 6.7 ± 3.5 . After 10 treatments the average Roland-Morris score was 4.1 ± 2.9 . Patients self-reported an average of $44.2 \pm 19.3\%$ improvement. Eighty-six percent of the patients classified their improvement as "good," 6% as excellent, 6% as "fair," and 6% as "poor."

CONCLUSION

Chronic low back pain in the age group 57 and older is a major concern. This study demonstrated that low-force adjusting, 6–12 ounces of digital pressure to specific spinal pelvic structures as determined by the system of Logan Basic Methods, was effective in reducing chronic pain intensity and increased functional activities of daily living. This pilot study suggests that chronic low back pain can be effectively managed with spinal manipulation using low-force adjusting.



Leg Length Inequality Case Study

Three-Dimensional Movement Analysis of the Effects of Foot Orthotics and Heel Lift

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Many healthcare professionals evaluate and treat leg length inequality (LLI). Anatomical LLI is produced by significant asymmetry in femoral and/or tibial bone length. Functional LLI describes visual, postural, and/or movement asymmetry but without bone length difference. Much clinical literature exists for LLI and its treatment using foot orthotics and/or heel lifts. However, these topics are controversial. The aims of the present case study were to use advanced three-dimensional (3-D) gait analysis technology to quantify postural and gait alterations produced by treatment using foot orthoses and a heel lift in a subject who exhibits clinically obvious LLI.

METHODS

Procedures were IRB approved. The volunteer male subject (40 years, 1.75 m, 83 kg), an avid runner, periodically experienced mild to moderate right hip pain. The subject wore a black "marker suit" to which 38 small reflective markers were attached at predefined locations. An eight-camera Peak Performance video analysis system was used to record 3-D data (15 s, 120 Hz per trial). Four different footwear conditions were employed: barefoot, athletic shoes, athletic shoes with orthotics (Foot Levelers Inc.), and athletic shoes with a right heel lift (7 mm). Using a parallel foot placement (20 cm between), the subject stood upright, performed low effort knee dipping, and walked at 1.34 m/s upon a treadmill. Kinematic analysis involved conventional 6 degrees of freedom (DOF) rigid body modeling to quantify the motions of the feet, legs, thighs, and pelvis. From these estimates, a novel functional alignment technique generated a subject-specific postural model which was used to create more refined joint-specific and link-segment-specific estimates of 6 DOF body segment dimensions and alignment.

RESULTS

Functional Alignment: Standing Posture

For the barefoot condition, the subject stood in static posture with the pelvis right-rotated 4° and exhibiting 1° of right list. Accordingly, the right hip center was found to

be 6 mm lower than the left and the left knee was flexed 9° greater than the right. Calculated estimates of in vivo femoral and tibial lengths showed the left lower limb (hip to ankle center) to be 1.6 cm greater than the right. Analyses of the shoes, orthotics, and right heel lift conditions revealed similar characteristics. However, use of the right heel lift was not directly additive. Knee flexion increased by 3° on the right side.

Functional Alignment: Gait

Measured gait and postural asymmetries included: compensatory adaptation of right pelvic rotation to aid right leg push-off; greater extension of the right hip at push-off; early plantarflexion in the right foot from mid to late stance to functionally increase the right leg; and greater flexion in the left knee to effectively decrease the length of the "longer" left limb. Use of the foot orthoses or the right heel lift provided evidence of desirable compensations, notably increased symmetry in the positioning of the legs. However, the two treatments did not produce the same effects and neither treatment satisfied all theoretically desired compensations.

DISCUSSION

The subject of this case study was previously diagnosed with a suspected anatomical longer left leg. Analysis using functional alignment provides strong support for this diagnosis. Further testing will be conducted to determine if the addition of the right heel lift to the orthotics yields preferable results. While further work will examine the validity and precision of functional alignment, this technique appears quite suitable for measuring subject-specific asymmetries and treatment effects (i.e., foot orthotics, exercise, and manipulation).

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The Usefulness of Radiology Case Presentation as a Method of Self-Directed Study

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The purpose of this study was to evaluate usefulness, including student opinion, of case presentation as a method of learning radiology.

MATERIALS AND METHODS

A cohort of 3rd-year chiropractic students was given the assignment of obtaining and individually presenting a radiology case to the rest of the class. At the end of the term an eight-question, multiple-choice questionnaire was given to the class.

RESULTS

The majority of students reported case preparation and presentation as a valuable ancillary method of learning

radiology. Two-thirds of the students also reported learning from the other students' presentations, and one-half actually claimed that they had fun performing the presentation. In addition, nearly half said that they also gleaned information about healthcare administration through obtaining cases from outside facilities and that this information would benefit them in future practice.

CONCLUSIONS

Students seem to find case presentations a valuable method of learning. Including a self-directed component in a course may diminish teacher workload and help give students the research skills they will need for cases they encounter in practice in addition to providing some variety and even fun to a course. A positive side effect is augmentation of the radiology teaching file with copies of the cases obtained.



Financial Experience, Knowledge, and Attitudes Among Chiropractic Students in College

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The purpose of the study was to examine personal financial management among chiropractic students to answer three research questions: do students make reasonable financial choices; how much do they know about investment and financial management; and what steps can be taken to improve students' personal financial decisions.

METHODS

This study was conducted through the use of a questionnaire containing 28 questions ranging from demographic factors to factors defining financial success in chiropractic.

Students at Logan College of Chiropractic and Parker College of Chiropractic were given the questionnaire with no prior knowledge of the survey to ensure that their responses were spontaneous and reflected their true feelings. Frequency analysis, mean values, and standard deviation were used for the statistical analysis.

RESULTS

A total of 166 students (60 female) from Logan College of Chiropractic and 158 (42 female) from Parker College of Chiropractic completed the questionnaire. Most students

(97/166 from Logan and 113/158 from Parker) would have a total debt of above \$100,000 after graduation. Most students felt they were not knowledgeable in personal finance management; how to generate significant income from a chiropractic practice; how to generate significant income from investments; and how to use tax strategies. Students agreed that they could be a better doctor and serve patients better if they were financially secure. Most students believed that they would be financially successful as a chiropractor. They expressed strong interests in studying strategies for achieving financial success. They also indicated that enrollment in chiropractic college had not prompted them to develop an interest in reading financial news, nor had they received sufficient information relative to financial success. Most students had an interest in using the strategies if they had training in financial management. Students had no confidence in their current ability to manage the business aspects of a chiropractic office. Only 4/324 students had set an income goal

of \$50,000 within 5 years. Most students had set goals of annual income between \$100,000 and 250,000 and above plus early retirement. Students reported little knowledge in stock, bond, and real estate, but a third of them owned stock and mutual funds.

CONCLUSION

A significant number of chiropractic students reported lack of financial management and investment knowledge. Many students projected high indebtedness and high income after graduation, but they had insufficient knowledge in personal financial management. Many students expressed strong interest in learning financial management, investment, and tax strategies at chiropractic colleges.