ABSTRACTS OF ACC CONFERENCE PROCEEDINGS

Platform Presentations

The New York Chiropractic College Curriculum Project 1995–1999

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New York Chiropractic College (NYCC) convened a Curriculum Summit in July 1995 to examine the needs of and challenges facing the chiropractic profession, and how the NYCC D.C. curriculum could be structured to address these issues. Participants at the Summit meeting, which included selected faculty, administrators, and alumni and nonalumni D.C.s, broadly concluded that the College's curriculum should consist of a required core curriculum encompassing fewer credits and hours than the existing curriculum and an inclusion of diverse elective courses that would enable students to pursue individual subject and professional interests and accommodate specific licensing requirements in various jurisdictions.

METHODS

Groups consisting of faculty from the basic sciences, clinical sciences, and clinics, and students were established to critically review the major subject areas of the curriculum. During this 2-year process, course content was disassembled and reassembled as courses were deleted, revised, and created. Concurrently, clinic administrators proposed extending off-campus outpatient clinic tours from 8 months to 1 year, with such tours including presentation of required didactic courses and new electives to latter-term students. This had not existed previously in the NYCC D.C. curriculum.

In mid-1997, a disciplinary cross section of faculty and academic administrators was constituted as the Curriculum Review and Revision Management Committee (CRRMG) to focus the efforts of the cluster groups into a workable curriculum. The CRRMG was chaired by the Registrar (now Associate Provost), who was well respected, knowledgeable, and perceived as neutral in curricular turf battles. Coincident with the formation of the CRRMG was a request by the Council on Chiropractic Education (CCE) for chiropractic colleges to clarify their definitions of primary care in their mission statements. NYCC conducted a comprehensive survey regarding primary care of its nearly 100 faculty (60% of whom were active practitioners) and requested their input with respect to NYCC D.C. education. The Board of Trustees appointed a task force consisting of the President, trustees, D.C. faculty, and alumni practitioners to review the results of the survey and recommend changes in the College's mission statement. With 70% faculty approval and task force concurrence, the Board of Trustees in early 1998 adopted a revised mission statement which articulated that NYCC educate its students to be ıportal-of-entry health care providers who specialize in the treatment of neuromusculoskeletal conditions, with an emphasis on the ability of the human body to maintain homeostasis.

With clear direction from the Board, the curriculum was finalized, ratified by 93% of the faculty in a college-wide referendum (September 1998), approved by the Board of Trustees (October 1998), forwarded to the New York State Education Department (NYSED)(December 1998), and approved by NYSED (April 1999) for implementation in September 1999.

RESULTS AND DISCUSSION

The revised curriculum features an expanded clinic tour of 1 years duration to enable students to better master CCE competencies; places a premium on integrating the

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basic science, clinical science, and clinic components of the academic program; eliminates content redundancies; improves diagnostic training; and provides early exposure to adjusting techniques with a global, full-spine method of delivery.

Elective courses comprise 27 credits, which exceeds 10% of the 246.5 credits required for graduation. These are free electives with students able to select from among 30 elective courses in areas such as techniques, pediatrics, electrodiagnostics, applied kinesiology, pharmacognosy, and botanical medicine, to name a few. Total contact hours increased slightly from 4,905 to 4,950, with a significant reduction in required course hours.

CONCLUSION

The development and approval steps related to NYCC's revised, and indeed new, curriculum are testimony to collegiality, collaboration, and communication among faculty, administrators, students, trustees, and state education officials. Challenges of curriculum implementation and assessment await the College.

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Lumbar Range of Motion in Chronic Low Back Pain Patients in a Randomized Clinical Trial

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Quantification of range of motion is considered important in assessing physical function and is a routine procedure in the evaluation of chronic low back pain. A promising instrument for measuring spinal range of motion is the OSI CA-6000 spinal motion analyzer. This instrument allows free patient mobility for quantitative measurement of range and velocity in all planes of motion. The CA-6000 has shown good intra- and interexaminer reliability for lumbar range of motion in asymptomatic individuals. It has also shown good intraexaminer reliability in patients with low back symptoms and acceptable validity when compared to x-ray. However, further studies with larger samples are required to confirm the reliability and validity of this promising instrument for use in chronic low back pain populations. Even if the measurement of spinal range of motion proves to be reliable and valid, the question remains, does it matter? It is still unclear whether improvement in spinal range of motion translates to improved patient-oriented outcomes, and whether there are certain factors which can predict improvement. Given the widespread use of range-of-motion measurement in chronic low back pain patients and the recent shift of emphasis to patient-oriented outcomes, this is an important issue to resolve.

The proposed study is an analysis of data collected in a randomized clinical trial of chronic low back pain patients. This study has three specific aims:

1. To assess the inter- and intraexaminer reliability of the CA-6000 motion analyzer in a large sample of chronic low back pain patients
2. To assess the correlation of changes in range of motion with changes in pain and disability in chronic low back pain patients treated with conservative therapies
3. To determine whether changes in lumbar range of motion can predict patient-oriented outcomes 12 months after treatment with conservative therapies

METHODS

Data collected in a randomized clinical trial of 174 patients with chronic low back pain will be analyzed. Lumbar range of motion and strength were measured at baseline and after 5 and 11 weeks of treatment. The proposed study involves predefined secondary analyses of the range-of-motion data collected in the randomized clinical trial.

Lumbar range of motion was measured with the CA-6000 three-dimensional computerized spine motion analyzer at the two baseline appointments, and after 5 and 11 weeks of treatment. Two clinicians were trained and certified to perform range-of-motion measurements and were blinded to the nature of patient treatment group allocation. Flexion, extension, lateral bending, and rotation were measured at each visit and each motion was repeated 4 times.

To assess the inter- and intraexaminer reliability, the intraclass correlation coefficient (ICC) will be calculated for each motion using data from the two baseline appointments.

These analyses will be performed on clinically stable patients. Difference scores will be calculated for weeks 5 and 11 in relation to baseline values for range-of-motion changes and changes in pain and disability. To quantify the association between change in range of motion and changes in pain and disability, Pearson correlation coefficients will be calculated. Moderate to high correlation coefficients will be considered clinically important. Finally, based on the best possible model, hierarchical stepwise regression analysis will be performed to assess whether lumbar range of motion changes predict pain and disability outcomes 12 months after the end of conservative treatment.

RESULTS

Results of the inter- and intraexaminer reliability analyses, the correlation analyses, and regression analyses will be presented and discussed in light of previous studies.

ACKNOWLEDGMENT

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Efficacy of Spinal Manipulation for Chronic Headache
A Systematic Review

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Chronic headache is a prevalent condition with substantial socioeconomic impact. Complementary or alternative therapies are increasingly being used by patients to treat headache pain, and spinal manipulative therapy (SMT) is among the most common of these. Our objective was to assess the efficacy of SMT for chronic headache by conducting a systematic review of the literature.

METHODS

Randomized clinical trials on chronic headache, including tension, migraine, and cervicogenic types, comparing SMT to other interventions or placebo were included in the review. These trials were identified by a comprehensive computer search, citation tracking, and hand searching of the nonindexed chiropractic, osteopathic, and manual medicine journals. For inclusion, the trials had to have at least one patient-rated outcome measure such as pain severity, frequency, duration, improvement, analgesic use, disability, or quality of life. Information about outcome measures, interventions, and effect sizes was used to evaluate treatment efficacy and levels of evidence were determined by a classification system incorporating study validity and statistical significance of study results. Two authors independently extracted data from and performed methodological scoring of selected trials.

RESULTS

Nine trials involving 683 patients with chronic headache were included. The methodological quality scores ranged from 21 to 87 (100-point scale). The methodological quality of the individual studies will be discussed as well as the results of the best-evidence synthesis.

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The Influence of Balance Training on the Aged Postural Control System

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The purposes of this research were to 1) examine the relationship between reflex modulation and one-foot balance scores in older adults, and 2) understand the potential mechanisms underlying the effectiveness of multisensory training programs on the aged postural control system.

METHODS

Healthy elderly individuals were randomly assigned to intervention ($n = 11; 72.5 \pm 4.86$ years) and control groups ($n = 10; 77.0 \pm 5.50$ years). Individuals in the intervention group underwent a 10 week progressive multisensory training program: 2 sessions per week, 45 minutes per session. Reflex modulation of peripheral feedback from the soleus muscle, co-contraction of the ankle musculature, and one-leg, eyes-open balance performance were assessed at 10-week intervals, pre- and postintervention program, in both groups of subjects. One-leg, eyes-open balance performance was measured using the Romberg test. Tibial nerve H-reflexes and maximum M-waves were evoked using standard procedures to assess reflex modulation. Standard electromyographic (EMG) recording techniques were used to assess co-contraction between the soleus and tibialis anterior muscles.

There were three testing conditions: 1) subject resting supine with the left foot secured to a plate at 90°; 2) subjects standing on a carpeted, firm platform; and 3) subjects standing on a soft, compliant foam pad. H/M ratios were defined as the maximum H-reflex amplitude / maximum M-wave amplitude and integrated EMG (iEMG) values for the soleus and tibialis anterior muscles were recorded for all testing conditions.

Univariate Group × Time × Condition ANOVAs were used to reveal changes in H/M ratios and reflex modulation factors as function of balance training. Group × Time × Condition MANOVA for iEMG values from the soleus and tibialis anterior muscles was used to reveal changes in co-contraction with balance training. Regression analyses were used to examine the relationships between one-foot balance times and reflex modulation factors prior to and after balance training.

RESULTS

One-foot balance times increased by 4.9 seconds (35% improvement) in the intervention group without a concomitant change in the control group ($p < .05$). H/M ratios and reflex modulation factors did not change as a function of balance training ($p > .05$). The analysis of simple main effects of time within group revealed that the amount of co-contraction decreased from pre- to post-testing in the intervention group, but not in the control group ($p < .05$).

Prior to training, the relationship between one-foot balance times and the reflex modulation factor for upright stance on the firm surface was $r = -.70$; the correlation for upright stance on the compliant surface was $r = -.69 (p < .05)$. Postintervention correlations between one-foot balance times and reflex modulation factors decreased significantly to $r = -.22$ and $r = -.25$ for upright stance on firm and compliant surfaces, respectively ($p < .05$).

CONCLUSION

The inverse relationship between reflex modulation and one-foot balance times prior to training confirms the contribution of the Ia afferent-alpha motoneuron pathway to the postural control of static balance. The multisensory training program did not alter the capacity of the aged central nervous system for reflex modulation. The multisensory training program may have altered the postural control strategy used by older adults during upright stance. The decrease in co-contraction with balance training may reflect a decrease in joint stiffness about the ankle. It is hypothesized that regular chiropractic care, defined as alleviation of joint restrictions with proprioceptive training, will also be found to improve the performance of the aged postural control system.

Spinal Reflex Attenuation Associated with Spinal Manipulation

Donald Dishman, D.C., M.Sc., New York Chiropractic College

The exact mechanism underlying the neurophysiological effects of spinal manipulation has yet to be determined. Investigators have postulated that spinal manipulation may produce a stretch reflex from joint capsules which may lead to inhibition of muscle spasm. Thus, while spinal manipulation may lead to a reduction in pain in many patients with low back pain and muscle spasm, the specific mechanism is unknown.

A recently proposed mechanism for the attenuation of pain following spinal manipulation is that the procedure elicits an inhibitory stretch reflex response generated from the capsules of the zygapophyseal joints. In support of this neurophysiologic mechanism, our laboratory, as well as others, has reported inhibitory effects on the motoneuron pool as a consequence to spinal manipulation. This inhibitory effect, however, was recorded after manipulation was performed on the segmentally related areas of the spinal cord (e.g., lumbar manipulation effects were assessed from the H-reflex of the tibial nerve). To date, there have been no known studies reported on the effect that nonsegmentally related manipulative procedures, such as cervical spine manipulation, exert on the excitability of lumbosacral alpha motoneurons. In this investigation, the effect of lumbar and cervical spine manipulation on the excitability of the lumbosacral motoneuronal pool was examined in human subjects employing the tibial nerve Hoffmann reflex (H-reflex) technique to determine if nonsegmental (cervical spine) manipulation leads to attenuation of lumbosacral alpha motoneuronal activity. Monitoring the amplitude of the tibial nerve H-reflex at various time points after cervical spinal manipulation may provide additional insight as to the neurophysiological mechanisms underlying spinal manipulation.

METHODS

Twelve volunteer subjects were recruited from a college student population and assigned to one of two experimental groups: 1) lumbar spinal manipulation ($n = 6$), or 2) cervical spinal manipulation ($n = 6$). All manipulation procedures were performed by one clinician. Group 1 subjects received lumbar spinal manipulation, while group 2 received cervical spine manipulation. The general methodology for data collection in both studies was the same. M-wave and H-reflex responses were recorded from the gastrocnemius muscle (GM). For both procedures, the H/M recruitment curve was performed as per the method of Hugon, and determined at the beginning of the experimental session. Before spinal manipulation was performed, the amplitude of 10 maximum H-reflexes were recorded as prebaseline values. Following the group-specific treatment, maximal H-reflexes were evoked immediately postintervention and at 5 and 10 minutes posttreatment. At the completion of H-reflex testing, the posttreatment maximal M-wave response was recorded.

A group-by-time ANOVA model was used to reveal the effects of SMT on alpha motoneuron pool excitability. The dependent variable was the H/M ratio.

RESULTS

The group-by-time interaction term was significant ($p < .05$). The lumbosacral motoneuron pool excitability was significantly depressed at 10 seconds following the lumbosacral spine manipulation procedures. Cervical spine manipulation did not effect lumbosacral alpha motoneuron excitability. In one case study, cervical spine manipulation did depress the flexor carpi radialis H-reflex at 10 seconds postmanipulation, further corroborating this apparent segmental inhibitory effect exerted by spinal manipulation.

DISCUSSION/CONCLUSION

The results of this study indicate that high-velocity, low-amplitude lumbosacral spinal manipulative procedures lead to short-term attenuation of alpha motoneuronal activity, as quantified by H-reflex amplitude changes. These findings corroborate our laboratory's previous findings when the manipulation is performed to the same region of the spine as the motoneuronal pool innervating the muscle in which the H-reflex is recorded. Additionally, these data suggest that the effect that spinal manipulation exerts on the alpha motoneuronal pool is one that is profoundly segmental, rather than global in nature. These findings may be of significance to clinicians when determining the desired effects and location of spinal manipulative therapy.

Quantitative Sensory Testing in Clinical Chiropractic
The Use of Roughness Perception in the Management of Upper and Lower Extremity Sensory Disturbances

Donald Dishman, D.C., M.Sc., New York Chiropractic College

Quantitative sensory testing (QST) is being used with increasing frequency in the diagnosis and treatment of neurologic disorders. Many sensory testing modalities are now commonly employed in the evaluation and treatment of many neurologic disorders. Peripheral neuropathies such as entrapment mononeuropathy and diabetic neuropathy are often assessed via vibratory, thermal, and pain threshold levels. In clinical chiropractic practice, patients with spine disorders often exhibit concurrent extremity subjective complaints of paresthesia. Patient populations that commonly exhibit these complaints include the whiplash-associated disorder (WAD) and intervertebral disc derangement (HNP) patient. The subjective sensory disturbance(s) are often encountered in the presence of normal electrodiagnostic findings. This observation tends to imply that either conventional electrodiagnostic testing procedures are not sensitive enough to detect subtle lesions in the periphery, or that perhaps a more central psychophysical impairment may exist in these populations. Our laboratory is currently investigating which QST modalities may be most effective in the initial evaluation and outcomes assessment of spine patients with subjective extremity paresthesia.

METHODS

Vibratory Perception

Thresholds for detecting 1-, 10-, and 300-Hz stimuli measured on the fingertips of carpal tunnel syndrome (CTS) patients ($n = 24$) and healthy control subjects ($n = 20$) were obtained. Vibratory stimuli were generated by a computer-driven electromechanical vibrator. Subjects were tested in a sound and vibration isolation somatosensory psychophysics testing booth in our laboratory. All subjects were from the practices of local hand surgeons and previously diagnosed with CTS by electrodiagnostic testing.

Roughness Perception

Subjects utilized for the roughness perception testing to date have been recruited from the practices of local Doctors of Chiropractic. These subjects have sustained either a WAD or HNP injury as well as concurrent sensory complaints in either the upper or lower extremity. These patients were physically and electrodiagnostically examined and were found to exhibit normal findings. These subjects were "blinded" and asked to determine if a rough object (sandpaper) felt the same when touched to the distal aspect of each extremity. Various grit sizes were used for the experiments. Healthy normal subjects were used as a control group for roughness perception experiments ($n = 9$).

RESULTS

Vibratory Perception

There were no significant differences in threshold for 1 Hz (ANOVA, $p = .087$) and 300 Hz ($p = .430$) between the control and CTS groups. Although there were significant differences for the 10-Hz stimuli ($p = .028$), the mean patient threshold was within 1 standard deviation of the mean threshold for the control group.

Roughness Perception

In the control group ($n = 9$), we have found that the relation between grit size and the subjective magnitude of roughness measured using magnitude estimation follows a power function. The control group exhibited normative electrodiagnostic data, normal neurologic exams, and no difference in roughness perception whether ascertained by the left of the right hand/foot. On WAD and HNP patients whom we have measured to date, we have found that the symptomatic extremity produced roughness estimates greater than the unaffected side.

DISCUSSION/CONCLUSION

These results indicate that threshold testing with vibratory stimuli is not a suitable diagnostic tool for CTS. Our data also suggest that roughness perception may be an effective modality in the clinical evaluation of those patients with extremity sensory impairment. Likewise, roughness perception may reveal subtle sensory modality impairment that may not be detectable by current electrodiagnostic procedures. In the current experiment, patients will return to our laboratory for a postspinal manipulation treatment regimen evaluation of roughness perception. Thus, roughness perception may be an efficacious outcomes assessment tool in those patients with extremity sensory impairment that is not detectable by conventional electrodiagnostic methods.

Implementing a Model Curriculum in Geriatrics
One College's Experience

Brian Gleberzon, D.C., Canadian Memorial Chiropractic College, and **Lisa Zaynab Killinger**, D.C., Palmer Center for Chiropractic Research

Chiropractic education is arduous and demanding. Students are inundated with a prodigious amount of information in a short period of time, which they are expected to understand and apply clinically. It behooves chiropractic colleges to develop teaching strategies that can convey a plethora of information in an efficient manner. The presented information should be clear, concise, and accurate, creating an interactive environment conducive to learning.

With these goals in mind, a "primer" was developed for the geriatrics course at Canadian Memorial Chiropractic College (CMCC). This primer incorporates elements of the "Model Curriculum" developed at another chiropractic college with U.S. Health Resources and Services Administration (HRSA) funding.

METHODS

The template Model Curriculum was developed from an analysis of chiropractic college syllabi, focus groups, surveys, and input from representatives of five health professions. This created a curriculum with an interdisciplinary team perspective on geriatric health care issues. Some aspects of this model were not feasible for use at CMCC, and only those features that were applicable were incorporated into the primer. Applicable elements of the "Model Curriculum" were combined with medical texts, the few chiropractic references that were available, and previously developed class notes to create a primer on geriatric chiropractic education for students at CMCC. The use of this combined approach allows:

1. An opportunity for further standardization of chiropractic geriatric education materials
2. Students to cover more material in less time when the primer is disseminated prior to the commencement of classes
3. An interactive learning environment through the use of unanswered questions in the primer, engaging the students in the learning process
4. Students to read ahead and prepare for class
5. Reduction in student's stress and preoccupation with transcribing the lecture material
6. Fairness in examination—all students have the same study materials
7. Ease in updating materials
8. Intercollegiate collaboration

RESULTS

Student evaluation of this primer has been extremely positive, with approval rates approaching 90%. Student feedback also supports continued use of the primer. Since implementing the primer as a primary reference for the course, students have reported the examination to be fair and reasonable. Interns have indicated that they utilize the primer as a resource in the development of management plans in the clinics. Students will be followed forward through their clinical and practice experience to assess how well this course prepared them for geriatric patient care.

DISCUSSION

Demographic studies reveal that the fastest growing segment of the population is the elderly. Typically 50% of respondents indicate they have used or are currently utilizing complementary or alternative medicine, with chiropractors the most commonly utilized. Older patients are more likely to utilize chiropractic services, especially for those clinical conditions that will not respond to pharmacological or surgical approaches. This may be because the chiropractic health paradigm embraces the tenets of holism, conservatism, rationalism, and naturalism, components of health care not often emphasized in allopathic medicine.

Although an older patient may present with almost any clinical condition, there are many clinical conditions that preferentially affect the elderly. It is, therefore, imperative to instruct chiropractic students and interns specifically in the field of geriatric patient care.

CONCLUSION

A primer designed for the needs of CMCC, based on a larger template of the Model Curriculum, is an important educational instrument to ensure both examination fairness and standardization of the geriatric course at CMCC with courses in other chiropractic colleges. The success of this teaching resource is another example of how the HRSA-funded educational initiatives have promoted enhancements in chiropractic geriatric education. This type of collaboration is indicative of an extremely healthy educational environment in the arena of chiropractic geriatric education.

Baseline Characteristics of Chiropractic Patients
Correlation of Anatometer Readings with Supine Leg-Length Inequality

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The observance of leg-length inequality (LLI) has been routinely used by chiropractors as an indicator of neuromuscular dysfunction resulting from the vertebral subluxation. The biomechanical significance of LLI has been implicated in stress fractures, low back pain, and osteoarthritis and the relationship between bilateral weight distribution and the LLI is of interest to chiropractors who practice upper cervical chiropractic methods.

METHODS

The Anatometer II, a biomechanical assessment tool, was used to record the postural and weightbearing characteristics [bilateral weight differential (WD), pelvic tilt (PT), pelvic rotation (PR), and shoulder distortion (SD)] during the initial visit and at seven subsequent visits over a 2-week period. Supine LLI determination was also done at each visit.

RESULTS

Baseline postural assessment was performed on 168 subjects, 57% male and 43% female, with an average age of 42. Comparing LLI to high ilium using kappa statistic resulted in -0.58 and to the heavy side was -0.53 agreement. The kappa statistic between the heavy side and the high ilium was -0.28. Coefficient of variation of the three baseline WD, taken on each subject within a 5-minute interval, indicates low variability between readings (left 1.31%, right 1.70%).

DISCUSSION

This study explores the postural changes of subjects with subacute low back pain and looks at the relationship of these changes to the functional short leg. In the chiropractic clinical setting, this information may be helpful for monitoring a patient's progress and may provide a means for evaluating the biomechanical adaptations related to the vertebral subluxation.

CONCLUSION

Our findings indicate a moderate negative correlation between LLI, the heavy side, and the side of the high ilium. The supine short leg occurs on the opposite side from that of the heavy side and the high ilium.

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An Investigation of Connective Tissue Bridges Originating from the Posterior Spinal Dura
A Pilot Study

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Identification of connective tissue attachments to cervical dura from muscle, ligament, and osseous elements has sparked increasing interest. Dysfunction of these complexes may result in disturbance of standing balance, kinesthesia, cervicogenic headaches, and vertigo.

Work by Hack et al. identified a connective tissue bridge between the rectus capitus posterior minor (RCPM) muscle and the cervical dura. Mitchell et al. reported an attachment of the ligamentum nuchae to the occipital bone and spinal dura. Hinson and Zeng found osseous epidural attachments

in the upper cervical spine. Abundance of attachments decreased incrementally below C2. Anatomical evidence suggests a connection between the myodural and nuchal ligament attachments to the posterior dura. Pulling on these attachments results in the movement of dura and adjacent tissue bridges.

This communication reports findings of a pilot anatomical study, including MRI investigation for links between the ligamentous and myodural connective tissue bridges in the upper cervical spine.

METHODS

An anatomical survey of the suboccipital and upper cervical region of four heads from embalmed cadavers was performed. Scanning by MRI of one of the embalmed heads was also performed.

Three of the heads were deep-frozen and sectioned. The half-heads were then investigated. The fourth head was dissected whole. All heads were dissected until the RCPM, ligamentum nuchae, posterior spinal dura, and adjacent connective tissue bridges were identified.

To more readily identify the connective tissue bridges arising from the myodural and ligamentous structures on MRI, vitamin E gel was placed around the involved structures. One vitamin E gel capsule was placed posteriorly in the embalmed head as a comparison marker.

RESULTS

Connective tissues bridges attaching the nuchal ligament to the cervical dura between the first and second interspinous space were identified in all specimens. The myodural bridges connecting the RCPM and the dura at the atlanto-occipital region were identified in all specimens. In the whole-head specimen, a continuous tissue bridge was found to link the RCPM with the C1–C2 ligamentum nuchae structure.

On MRI scans of the whole-head specimen, the vitamin E-enhanced images clearly identified both the ligamentum nuchae as well as the RCPM attachments to the dura. Tissue bridges connecting the RCPM muscle with the adjacent ligamentous nuchae elements were also visualized.

DISCUSSION

This pilot study adds further confirmation that the posterior dura in the upper cervical region consists of connective tissue attachments arising from the RCP minor muscle and the nuchal ligament complex. However, results from this study suggest that the separately identified ligamentous and myodural connective tissue bridges may in fact be part of the same complex. As the present study consisted of a small number of specimens, further research involving larger numbers of specimens will be needed for confirmation.

This study also investigated whether the connective tissue bridges to the dura could be identified using MRI. Preliminary evidence suggests that suboccipital muscle atrophy/hypertrophy may be linked to chronic neck pain and somatic dysfunction. The identification by MRI of damage to dural tissue bridges from trauma may offer an explanation for some unresolved cases. In this study, vitamin E was used to outline and hence confirm the dissection findings. Although further research is needed, it appears that MRI may be useful in identifying damage to the suboccipital dural complex.

CONCLUSION

This is the first study to present anatomical evidence for a suboccipital dural complex integrating the myodural bridge as described by Hack et al. with the ligamentum nuchae complex decribed by Mitchell et al. Preliminary evidence suggests that MRI may be a useful modality for identifying the integrity of the suboccipital dural complex. Work is currently ongoing to firmly establish these findings.

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Retrospective Study of Chest Pain Cases Presenting to a Chiropractic Teaching Clinic
A Feasibility Study

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Recent studies suggest that for chest pain presentations to primary contact ambulatory medical settings (e.g., emergency and urgent care, physicians' offices), up to one fourth may be musculoskeletal in origin. Based on current available evidence in the literature, it is unknown what proportion of chiropractic patients (e.g., field practitioners' offices, teaching clinics) present with chest pain, either as chief complaint or associated findings. The purpose of this study is to explore the

feasibility of gathering useful data on chest pain presentations to a typical chiropractic teaching clinic, based on retrospective reviews of existing patient records.

METHODS

A review was done of 108 randomly drawn clinical records for new cases presenting at a Midwestern chiropractic teaching clinic from June 1, 1998 to December 1, 1998. Records were reviewed to determine the degree to which documentation regarding the presentation of chest pain was consistently recorded at nine data capture points, within five (a–e) relevant elements of the patient's clinical record:

a. The Patient Intake Form (self-administered by patient)
b. Cardiac Screening Questionnaire Form (self-administered by patient)
c. Narrative of the Patient's History (clinician report)
d. Narrative of the Patient's Physical Exam (clinician report)
e. Patient Management Plan Form (clinician report)

RESULTS

Of the 108 records reviewed, 84 were entirely absent of chest pain indicators in any of the nine patient chart data points. However, of these non-chest pain "control" patient charts, it should also be noted that 28 (33%) were completely missing one or more important elements of the record (e.g., regional physical exam or patient history missing from record, etc). Of the 24 potential chest pain "cases" identified in this chart review, only one was also missing a key component of the patient record.

Almost always, the flagging of potential chest pain cases was based exclusively on those elements of the record filled out by the patient at intake, since in only one of the 24 cases did a notation of chest pain also appear in the clinician's accompanying narrative (in the patient history). Most frequently, the patient-reported chest pain "flag" appeared solely in response to the query prompt in the Cardiac Screening Form (in 13 of 24 cases). In eight of the 24 cases, the patient answered affirmatively to prompts in both the Patient Intake Form and the Cardiac Screening Form. In the remaining three cases, the patient only responded positively to the Patient Intake Form prompts, but not to the Cardiac Screening Form prompt.

The patient-reported Health Problem List for this entire sample never included "chest pain", however, "shoulder pain" or "between shoulder pain" was noted for 21% of the cases and for 10% of the controls.

DISCUSSION/CONCLUSION

It is important to document the extent to which chest pain cases are seeking out chiropractic care as a first, or later, point of contact with the health care system, and the degree to which such care-seeking is appropriately documented in the clinical records. To the extent that accurate and accessible clinical data will allow reliable tracking of the patient during the entire chiropractic health care encounter, then the appropriateness with which such cases are managed in chiropractic teaching clinics or other settings may also be monitored. Given the dearth of information available, further work on this topic is needed. In particular, multisite collaborative studies across chiropractic teaching clinics, and in practice-based settings, would greatly improve our understanding of the nature of this important professional issue.

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Public Health Education in Chiropractic
The Collaborative Development of a Model Course

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There is currently no specific paradigm or recommended syllabus for teaching public health in chiropractic curricula. College syllabi on this topic have been found to vary widely, and suggestions have been offered for ways to enhance public health education at chiropractic colleges. Currently, a task force from the membership of the Chiropractic Healthcare Section of the American Public Health Association (APHA) is working collaboratively with others to gather materials and develop optimal strategies for teaching public health at chiropractic colleges.

OBJECTIVES

The goal of this collaborative effort is to propose a "model course" in public health for use as a resource by chiropractic

colleges. This course is intended to provide the chiropractic student with a working knowledge of the principles of public health and population-based health assessment and intervention. Additionally, such a course should expose students to the various essential attributes, functions, and mechanisms of public health services, and should provide chiropractic students with the tools to be active participants in public health practice, emphasizing health promotion and disease prevention.

METHODS

In 1998, the Chiropractic Health Care Section of the American Public Health Association formed a task force to develop a model course in public health for chiropractic college curricula. The task force is composed of APHA members, chiropractic public health teaching faculty, and practitioners with expertise in public health and/or health professions education. The first activity of the task force was to perform a needs assessment. This was accomplished with a survey of instructors of public health courses at U.S. chiropractic colleges. The task force used this survey's results along with data from a previously published analysis of chiropractic public health course syllabi.

RESULTS

Based on the assessment described above, and using input from the task force members, a template syllabus and list of instructional materials were compiled using an interactive group process. This template syllabus will be disseminated to all U.S. chiropractic colleges, and other interested institutions or individuals. The syllabus will also be made available for participants in this session. This project is projected to be complete prior to the annual APHA meeting in November 1999.

DISCUSSION AND CONCLUSION

The proposed syllabus for a "model course" in public health emphasizes topics with clinical relevance to the chiropractor, such as health promotion and disease prevention. This project has utilized collaborative methods of course development similar to those described by Killinger in 1998 on the development of a "model curriculum" in geriatrics. This process has brought faculty members from several chiropractic colleges together to contribute to the development of a model that hopefully will represent an enhancement of chiropractic education in the field of public health. In addition, this project has nurtured a relationship between the public health teachers and members of the APHA's Chiropractic Healthcare Section. Such educational projects are most useful if followed by pilot testing of the proposed model course, revisions to the model based on the results of the pilot tests, and publication of the results of this educational enhancement effort. The authors hope that funding can be obtained for the implementation and assessment of the proposed model course.

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How Can Chiropractic College Faculty Add to the Evidence Base?

Cynthia R. Long, Ph.D., **Cheryl Hawk**, D.C., Ph.D., and **William Meeker**, D.C., M.P.H.,
Palmer Center for Chiropractic Research

Recent studies demonstrate that the chiropractic profession has a small number of faculty devoted to full-time research, promoting discussion of the need to implement faculty development and incentive programs to stimulate scholarship in nonresearch faculty. This effort would increase the research capacity of chiropractic colleges, which would increase the evidence base of chiropractic. Increasing the research capacity of chiropractic colleges has been the focus of three recent conferences funded by U.S. Health Resources and Services Administration Bureau of Health Professions (HRSA BHPr): Research Agenda Conferences 1–3.

Encouraging chiropractic college faculty who are not engaged in formal research to publish case reports and case series merits serious consideration. However, many of these faculty do not have the appropriate training and experience to follow through with these publications. For a faculty member to successfully publish a case report or case series, he/she needs to have two sets of skills. The first is to be able to complete a literature review and to critically appraise that literature. The second is to be able to write the report in a publishable form.

This presentation will discuss two preconference workshops, targeted at nonresearch chiropractic college faculty, at the fourth Chiropractic Research Agenda Conference (RAC4), as well as plans for further workshops.

METHODS

The RAC4 planning committee set aside one day for preconference workshops. All conference registrants were

eligible to sign up for the workshops, which were tailored to participants' level of experience. Two 1½- hour workshops, "Scientific Writing" and "Research Consumerism: Interpreting the Scientific Literature," were offered with the nonresearch chiropractic college faculty and practitioner in mind.

The target audience for the workshop on scientific writing consisted of those individuals new to scientific writing, and it was recommended for all those who had not yet published in a peer-reviewed journal. The workshop included information on writing research papers, case reports, and review articles, as well as instructions on searching the literature.

The target audience for the workshop on interpreting the scientific literature consisted of nonresearch faculty, professional staff, students, and practitioners. This workshop included guidelines for critical appraisal of clinical research articles and identified resources for further development of these skills.

RESULTS

RAC4, held in Chicago on July 22–25, 1999, was cofunded by HRSA BHPr and the National Institutes of Health. It attracted 207 professionals; most also participated in the preconference workshops. Approximately 17% were nonresearch chiropractic college faculty; another 15% were field practitioners. Virtually all of the nonresearch faculty and practitioners attended the two workshops described above.

Although there was only a 20% response rate on the post-conference evaluation, all respondents indicated these workshops met the stated learning objectives. All of the respondents found the scientific writing workshop very useful. Two-thirds of the respondents found the workshop on interpreting the scientific literature very useful; the remaining found it somewhat useful. Written comments suggested future small group workshops on scientific writing allowing for examples of successful publications and practice in writing. Verbal comments received from several attendees of this target audience indicated the need for "a whole day on just writing."

DISCUSSION

The high attendance and positive feedback from participants at RAC4 are reassuring. A small-group, interactive journal writing workshop is now being planned as part of RAC5, to be held in the summer of 2000. Providing training opportunities for nonresearch faculty in reading the scientific literature and writing for publication will ultimately help the profession move towards the goal of increasing the research capacity and adding to the evidence base of chiropractic. However, the increased time and effort by faculty in gaining these skills and the resulting publications must be recognized as scholarship by college administration.

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Teaching Film Interpretation
A Review of the Literature

Dennis M. Marchiori, D.C., M.S., D.A.C.B.R., Palmer College of Chiropractic

Plain-film radiology is widely utilized within the chiropractic profession. More than 82% of chiropractic practitioners use radiographs as part of their clinical protocol. Radiographs are considered the standard first step of the imaging protocol to evaluate degenerative and inflammatory joint disease, fractures, infections, and neoplasms. Reflecting the topic's importance to the profession, radiology constitutes a large portion of the clinical science curriculum at chiropractic colleges. The primary goal of the radiology curriculum is to prepare students for clinical chiropractic practice. It is vital that the course content and selected pedagogy reflect and facilitate this need. Educators need to determine the most effective teaching methods for developing the skills of film interpretation. The goal of this paper is to review the health science and education literature related to film interpretation for curricular improvement.

METHODS

Computerized literature searches were conducted to identify journal papers and other documents related to plain-film interpretation. Three electronic databases were searched: CINAHL (computerized index to nursing and allied health literature), 1982–1999; ERIC (educational resources information center), 1966–1999; and Medline (biomedical literature), 1975–1999. The search terms "radiology" and "interpretation" were employed. Articles that had both search terms contained in their title, abstract, or keyword lists were identified. The abstracts were reviewed for relevance to teaching film interpretation. The full text of papers was obtained for the most relevant abstracts. The reference list of these papers was hand searched to identify additional related papers.

RESULTS

The computerized searches are not complete. However, to date, the computerized search identified more than 50 related abstracts, from which 15 full papers were obtained. Although all of the papers dealt with film interpretation, several themes are apparent. There is a major emphasis on the use of computer technology in teaching radiology and specifically film interpretation. A second group of research papers dealt more specifically with trying to identify factors and methods associated with developing successful film interpretation skills. Additionally, student evaluation and testing was a common theme in the film interpretation literature.

DISCUSSION

Film interpretation is a clinical skill. It is probably best learned by engaging students in exercises that mimic the problem-solving situations of clinical practice related to radiology. Research demonstrates that factors possessed by successful diagnosticians were similar to factors related to success in film interpretation. These factors need to be further identified and developed in the radiology curriculum. Vigilance is needed to ensure the radiology curriculum does not overemphasize teaching knowledge at the expense of teaching skills of interpretation. Other measures that can be taken to develop the skills of film interpretation include making use of small group labs and computer-based instruction that facilitates student activity. Examination methods need to mimic the problems of clinical practice. The use of normal films and different categories of pathologies (i.e., congenital, tumors, etc.) mimics clinical practice and therefore has greater validity for measuring film interpretation skills. The literature suggests students will be more successful in film interpretation if they concentrate on developing a process for searching the images. Lastly, abnormalities should be described and not diagnosed during reporting because the literature indicates poor interobserver agreement for radiographic diagnosis.

CONCLUSION

In conclusion, the literature suggests several methods for increasing skills of film interpretation. These include developing competency building exercises, promoting small-group and interpeer learning relationships, emphasizing the needs of clinical practice in the testing and content of a course, and concentrating on developing a student's process or mechanics of film interpretation.

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Increasing Publications among Chiropractic Clinical Science Faculty
A Case Study

Dennis M. Marchiori, D.C., M.S., D.A.C.B.R., Palmer College of Chiropractic

Chiropractic faculties publish less than nearly all other health science faculties. In the past, chiropractic faculty members were able to concentrate solely upon teaching. However, there is increasing external pressure from the profession, and internal pressure from peers and administrators, for faculty to become involved in publishing and research. Publication can no longer be a futuristic goal for chiropractic faculty. There is a certain expectation that faculty members contribute to the growth of the profession and mission of their colleges by pursuing written scholarship. The goal of this presentation is to describe the effect of implementing a series of steps aimed at increasing publishing by four full-time clinical science faculty employed in one department of a chiropractic college's clinical science division.

METHODS

A through review of the educational (ERIC database) and health science literature (Index Medicus database) was undertaken to identify administrative tactics for improving faculty productivity in publishing. A department chair with line authority over four full-time clinical science teaching faculty at a chiropractic college constructed a program for increasing faculty productivity using the information presented in the related literature. In general, the program consisted of six steps. The first step was for the chair to clearly define the need for publication in each faculty member's mind. This was done by focusing on the need for each faculty member to become balanced as a teacher, scholar, and institutional servant. The

point was clearly made that publication would be important for future contract renewal and promotion. Second, preliminary training was provided on topics relating to searching the literature, technical writing skills, etc. Third, the faculty members were encouraged to formulate workable projects. They were encouraged to begin small with case studies or to work in collaboration with more experienced faculty mentors on larger projects. Fourth, the faculty members were encouraged to begin writing, collecting data, and formulating their manuscripts. Each was encouraged to identify templates in the literature that provided them with a model of how the manuscript should be composed. Fifth, faculty members were assisted through the publishing hurdles by discussing their submission, peer reviews, and rewrites with those experienced in the process. Lastly, after achieving success the faculty members were recognized for their efforts within their department and institution.

RESULTS

Within 1 year of the implementation of steps listed above, two of the four faculty members have had manuscripts accepted to the *Journal of Manipulative and Physiological Therapeutics*. Both faculty members were previously unpublished as primary authors and had little involvement in written scholarship. Both of these faculty members have other projects in progress.

DISCUSSION

Barriers to research productivity are well known and documented in other professions. There is also much similarity across various disciplines. Some of the more well-described barriers include lack of: time, technical support, skills, mentors, and interest. Survey data suggest that the reasons chiropractic college faculty do not publish include: 1) the feeling that it is not their responsibility to do such, 2) that it is not important to their supervisors or their institution, 3) lack of training, and 4) lack of mentors. The implementation of steps created to address each of these barriers was successful with two of the four faculty members. The reason the plan was not successful with the other two faculty members is difficult to assess. Further inquiry is needed to uncover which barriers were insurmountable for these faculty members, and whether unique barriers exist for these two faculty members.

CONCLUSION

The literature has identified many barriers to low productivity among chiropractic faculty. Moderate success (50%) was obtained by implementing a series of steps aimed at reducing selected barriers.

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The Utility of a Radiology Report Database in a Chiropractic Clinical Teaching Environment

Ian D. McLean, D.C., D.A.C.B.R., Palmer Chiropractic Clinics

Radiographic examinations represent an integral aspect of chiropractic management both in private clinical practice and within most major chiropractic teaching clinics. The majority of chiropractic college teaching clinics utilize chiropractic radiologists to accomplish the primary interpretation of radiographs. As in most health care delivery arenas, the radiologists use the radiology report as the primary system of communicating radiographic findings to the clinicians. Within the busy teaching environments encountered in these institutions, insufficient communication and consequent inappropriate follow-up and management based on the radiological findings can be problematic. The goal of this paper is to review a system based on a relational database that increases the reliability of appropriate clinical follow-up of radiographic findings and recommendations delivered by radiologists.

METHODS

A database was constructed in 1992 as a dBase IV-compatible file designed on LotusÆ ApproachÆ. The data fields included data relevant to both the patient and attending doctor along with the radiologist's working diagnosis and recommendation for appropriate follow-up. A form letter is generated from the database which is sent to the attending faculty doctor in conjunction with the radiology report. The form letter reiterates the radiological working diagnosis and the appropriate recommendations for follow-up. The faculty doctor is expected to return the completed form letter to the radiology department and the responses are entered into the appropriate fields within the database. The database is reviewed once per month and 1 month prior to each graduation date. At this juncture, a search is accomplished

on all cases in which a form letter has not been returned. The search is primarily based on the date of graduation (given as a class number). In those circumstances where a case is noted to be outstanding, both the responsible faculty doctor and student are contacted, principally with a repeated generated form letter. The faculty is responsible for ensuring that the appropriate data relative to the radiological recommendation are supplied prior to the graduation of the responsible intern. Failing this, the name of an incoming intern is supplied which is subsequently entered into the database, which ensures continuity of case management.

RESULTS

Since the construction of the database in 1992, 1,040 records have been entered into the file, representing cases in which the radiologist believed a diagnostic follow-up would be appropriate. This database system has resulted in a number of benefits. Of prime importance, compliance with the radiologist's recommendations is ensured by periodically reviewing the database content, especially at a time adjacent to the date of the responsible intern's graduation. The faculty, recognizing the potential medicolegal ramifications of ignoring a radiological follow-up, also appreciate this system. Also of benefit, the database has afforded an ideal system by which data concerning case profiles relating to types of conditions can be obtained. Cases can also be found that could be of value in publications and as radiology film library material. In general, this database system represents an improvement in communication between the radiologist and the clinician.

DISCUSSION

The busy environments encountered in many chiropractic clinical teaching institutions make assuring timely follow-up to the radiologist's recommendations for further testing difficult. Designing a database system to track the radiologist's recommendations can be considered to be an appropriate solution. The expense of administering and designing such a system is minimal. This could be especially true if compared to the potential medicolegal costs that might occur if inappropriate management resulted from incomplete or nonexistent diagnostic follow-up.

CONCLUSION

Designing and operating a database system to track radiology diagnostic recommendations should be helpful in reducing the probability of inappropriate follow-up to radiology recommendations in a chiropractic clinical teaching environment.

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The Relationship between Chronicity of Complaints and Changes in General Health in a Practice-Based Study

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A practice-based research (PBR) network has been developed to collect general health data, patient demographics, and adjustment information on patients in chiropractic practices specializing in specific upper cervical care. The primary outcome measure being used is the RAND SF-36 General Health Survey (SF-36). Results after 2 years of data collection have shown that SF-36 scores of the chiropractic patients are well below the general population norms at the initiation of care and that SF-36 scores improve significantly during the course of care.

While it is tempting to attribute the improvements in general health seen in these patients to the spinal adjustments provided, there are no available data on a matching nonadjusted control group on which to base this conclusion. It may be that other factors, such as the placebo effect, or the natural course of the conditions under study may have brought about these results. An investigation of the patient database was undertaken to determine the effects of chronicity of the patients' conditions on the level of improvement seen under care.

METHODS

Data from field practitioners is continually being collected and entered into a computerized database. This database was queried to determine the chronicity of patients' complaints (i.e., the range of time between the reported onset of chief complaint and the date of entrance into the practice). For patients on whom completed data sets were available, the

gains made in SF-36 subscale scores were compared to the chronicity of the entering complaint.

RESULTS

The chronicity of complaints was widely distributed between 0 days and more than 10 years. In both groups, between 18% and 20% of the patients had chronicity of less than 4 weeks, while nearly 35% had chronicity of complaint greater than 2 years. For further analysis, a cutoff of 8 weeks was used to separate patients into acute and chronic groups.

The SF-36 data can be reduced to health scores ranging from 0 to 100 in eight discreet dimensions or subscales. The initial data for both acute and chronic patients are very similar, with no statistically significant differences found. The final data follow similar trends, with the acute group being slightly elevated in comparison to the chronic group. A statistically significant difference between the groups was found only in the social function subscale ($p = .044$). The gains in general health, indicated by increasing scores in the SF-36 subscales, were similar between the acute and chronic patients.

DISCUSSION

Data analysis has shown that the majority of patients entering the surveyed chiropractic practices have complaints of a chronic nature that have lasted more than 8 weeks. Furthermore, there is no relationship between gains made on SF-36 general health scores and the duration of complaint.

CONCLUSION

Data collected from chiropractic practices specializing in specific upper cervical care show that patients most often have chronic complaints, lasting more than 8 weeks. Regardless of chronicity, however, SF-36 scores of the chiropractic patients are well below the general population norms at the initiation of care. Improvement has been noted in all eight of the SF-36 subscales after 4 weeks of care, on the average, and further improvement has been noted at MCI, where values in five of eight subscales exceed the normative values. Similar gains in health are seen when both acute and chronic complaints are present, suggesting that the improvement in health was not due to the natural course of the condition.

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The Vertebral Animator
A Window to Education and Research

James Provoost, B.E., D.C., Life University

One of the more recent developments in chiropractic research involves three-dimensional modeling of the spinal segments via computer graphics simulation. While still in its infancy, this field offers the advantage of a visual picture of spinal processes and mechanics which may be unattainable in the real world. The benefits such visualization can offer in the areas of education and research are already apparent.

The "Vertebral Simulation Project" was initiated to take advantage of these benefits. The original open-ended design of the project lends itself to many future revisions addressing the questions of data translation and acquisition. The project involves the creation of a flexible interface into a three-dimensional virtual window on the PC desktop. Dubbed the "Vertebral Animator," this interface/virtual window accepts numerical data and interactively affects changes to vertebral segments housed within the virtual window. The initial phase of this project limits spinal segments to those of the upper cervical region and relies on some of the well-defined upper cervical x-ray marking techniques for determining misalignment.

METHODS

Due to feasibility constraints, the project cannot recognize osseous anomalies, but instead uses scaled standard models of the vertebral segments. The initial focus (phase I) was on the nature and extent of vertebral misalignment in a given individual. An efficient graphical user interface exists to easily key-in x-ray measurement and listing data. The program uses the entered data set to animate the measured deviance from ideal or perfect alignment by repeatedly stepping in a linear interpolation of 6 to 46 frames (user determined), one-way or looped. The base reference used for perfect alignment of the atlas is 0° of rotation, 0 mm of laterality, and a lateral S/I angle of 7°. Similar standards for axis and occiput are less commonly established, as are corresponding measuring techniques. These are addressed by means of an advanced dialog option.

Multiple animations can be resized, moved, and viewed simultaneously within separate frame windows, allowing

for comparison. Three-dimensional viewport navigation is effectively achieved through both a mouse and a keyboard control interface, allowing for convenient traversal through space. Also accommodated are printing and exporting of bitmap images of the viewport image.

The project was implemented using Visual C^{++} in the Windows 98/95/NT4 PC environment, utilizing DirectX. The mouse-driven navigation control uses a unique trigonometric panning and zooming mechanism to allow for unlimited perspective views of the moving simulated segments.

For evaluation of its potential utility and appeal, an anonymous survey was conducted among 38 random faculty and college students of various academic levels for feedback as to the relative ranked value of the software in the areas of research, patient education, and student education.

RESULTS

Results of the supplemental survey showed average rankings of 4.4, 4.1, and 4.3 on a 1–5 scale for the areas of student education, research, and patient education, respectively. These results suggest a clear potential for utility and a level of enthusiasm for its future implementation into the curriculum.

DISCUSSION

The high-resolution computer interface is being used more and more as a tool for visualization of otherwise hidden structures and processes. Manipulating 3-D models to reflect x-ray measurements would seem an excellent way of beginning an open-ended exploration of the tools available. While some disagree as to whether subluxation can be measured from films, most would agree that luxation can. Logically, x-ray measurement should then at least have a consensus of value for severe subluxation.

CONCLUSION

The ability to image underlying structures of the body with computer technology opens up a new world of exploration for research and educational understanding, and chiropractic is not excluded from that world.

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Neutral Point in Cervical Range of Motion
Examiner Versus Self-Placement Error

Barbara A. Reitz, B.A., D.C., **Alan B. Solinger**, Ph.D., and **Charles A. Lantz**, D.C., Ph.D., Life Chiropractic College–West

The objectives of this study were to compare the accuracies and reliabilities of neutral head position for examiner and self-placement by pain-free subjects, and to determine whether cervical range-of-motion (ROM) measurements from neutral position to extreme (on one side—half-cycle) are as reliable as extreme-to-extreme (full cycle) measurements in pain-free subjects.

BACKGROUND AND SIGNIFICANCE

Musculoskeletal disorders are the single most common reasons for patient visits to physicians, including chiropractors. Changes in ROM measurements are widely used in documenting outcomes of treatment. Decreased and asymmetrical ROM measurements are often important indicators for chiropractors.

ROM measurements are usually measured from a "neutral" point. These measurements are dependent on assuming that the neutral point can be repeatedly resumed. Clearly, the errors or reliability and stability of neutral point positioning are important in ROM measurements.

The importance of neutral head position has not been widely discussed in the scientific literature. The only study of self-placed neutral head position using asymptomatic subjects reported low reliabilities. But since there were errors of up to $9Y_{\circ}$ because of the choice (and availability) of instruments, the study can be regarded as inconclusive.

METHODS

Subjects

A convenience sample of 30 asymptomatic volunteer subjects has been recruited from chiropractic college students.

Instruments

The OSI CA-6000 electrogoniometer has been used to measure deviations from neutral position, and has been described in detail elsewhere. Angular and linear displacements as functions of time are calculated by software supplied with the instrument. Measurements are displayed both as a graph of position versus time, sampled at about 10 Hz, and as the extremum values. They are saved in files as a time-ordered series. For cervical spine measurements, the rods-and-potentiometer part of the unit is attached to a post on a headpiece, and to another post affixed to the thorax.

Procedures

Investigator positioning of subjects as compared to neutral position determined solely by subjects' proprioception and visual orientation formed the basis for the measurements. Each complete evaluation consisted of a full-cycle and two half-cycle trials (one in each direction) in lateral bending motion, with the subject beginning and resuming neutral position at the end. Measurements were made of deviations from initial placement, each time the subject resumed neutral position and/or was placed in neutral by the examiner. The sequence of motions and type of placement (examiner vs. self) were randomized.

Data Handling/Analysis

Data will be entered into spreadsheets for analyses by descriptive statistics. Inferential statistics will be performed in Systat. The analysis will include calculation of within-trial, and grand individual subject means, standard deviations, and probable errors for self-assumed neutral positions, for full-cycle and half-cycle motions, and for examiner-placed neutral positions, for full-cycle and half-cycle motions. Significant differences for all values will be tested via two-way ANOVA (in Systat) and follow-up multiple comparison tests.

RESULTS

Preliminary indications from visual inspection of the data are that subjects' abilities to resume neutral position are bimodally distributed, which may indicate that some pain-free, asymptomatic subjects may have subtle cervical dysfunctions which are detectable by the resumption of neutral point test. Half-cycle measurements for the latter group would not be as accurate as full cycle. Further, examiner placement seems more accurate than self-placement for the subjects with large neutral point variabilities, but about comparable to self-placement for the others. The examiner neutral point placement has a distinct trend toward the better with time, indicating a training effect. Comprehensive statistical results will be presented.

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An Interactive, Problem-Based Case Presentation Format for the Large Classroom

Robert M. Rowell, D.C., Palmer Center for Chiropractic Research

Case studies have been used in health care education for years. In the large classroom setting the presentation of a case study can be very useful. The challenge for the large classroom teacher is how to present the case in a manner that simulates a real patient encounter, complete with student doctors making decisions and choosing diagnostic pathways.

This paper discusses a lecture method that employed an interactive computerized presentation using hypertext to move through a case study. Students had the opportunity to choose examination procedures and management protocols.

METHODS

A case presentation of a 21-month-old infant with intussusception was prepared using Microsoft PowerPoint software run from a laptop computer and projected for the students using a data projector. The students were presented with a slide containing the initial patient history followed by another listing several possible examination options. Each option was in the form of hyperlink text which when selected by mouse click would move to another slide within the presentation. Each of the examination options presented allowed students to choose a diagnostic pathway that may have been helpful or distracting toward reaching the final diagnosis. Following the case presentation, a survey instrument was issued to the students soliciting answers to specific questions, as well as their comments.

RESULTS

Student reaction to the method employed was positive. Students felt the format was interesting and informative. Particularly emphasized was the integration of examination,

diagnostic imaging, and case management into a single case presentation. The students did find reason to criticize the selected case. A small number of students felt the case would have been more appropriate for presentation at a medical college rather than a chiropractic college.

DISCUSSION

As the students progressed through the patient workup, they gathered data. Several points in the pathway were appropriate for a discussion among the students facilitated by the instructor. When the issue of possible referral of the patient was broached, the slide show was programmed with the question: "To whom should the patient be referred?" This stimulated discussion without disrupting the presentation. Some of the information provided was designed to confuse; other information was included for its relevance. It was felt that this was a similar situation to that encountered with a live patient in which the student doctors may decide to order or not to order tests, the results of which may or may not be helpful toward reaching a diagnosis.

The instructor in this scenario has both the luxury of dictating what options the students have available from which to choose, as well as the difficult task of ensuring that a "real life" array of possible examination procedures are presented. In preparing a case in this manner, the instructor must anticipate the decisions his or her students may make, and provide slides with the needed information. This format can be used in large classroom presentations, with individuals, or small groups. The presentation can be loaded on a computer and students allowed to work through the case individually.

Many health care colleges have moved from the traditional lecture format to a problem-based curriculum. This presentation format allows a problem-based lecture format within a large class setting.

To date, this type of case presentation has been used a limited number of times. Student satisfaction surveys need to be employed to find out if students feel the format is useful. Further outcome measures need to be utilized to assess how well students learn the presented material.

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Interstitial Fluid Lactate and Local Blood Flow in Trapezius Muscle Trigger Points

Veronica M. Sciotti, Ph.D., **Veronica L. Mittak**, **Margaret Finn**, D.C., **Lisa DiMarco**, D.C., New York Chiropractic College, and **Robert C. Hickner**, Ph.D., East Carolina University

The etiology and pathogenesis of diagnosed foci of muscle band tautness and pain, referred to as myofascial trigger points, remains elusive. One theory holds that localized myofascial trigger points arise as a result of imbalances between the supply of organic substrates and oxygen required for aerobic muscle metabolism, and the demand for those substrates to maintain metabolic homeostasis. Imbalances may result from ischemia or overuse of the muscle. Simons's "energy crisis" theory puts forth that metabolic imbalance leads to elevated cytosolic calcium resulting in sarcomere shortening. The sustained contraction which subsequently occurs places additional metabolic demands on the myofiber. If the energy crisis theory is accurate, the biochemical profile of myofascial trigger points will reflect any metabolic perturbations to the tissue. As a result of increased anaerobic metabolism, it is hypothesized that muscle blood flow would be attenuated and that interstitial fluid levels of lactate would be elevated.

OBJECTIVES

The goal of this pilot study was to document, within diagnosed trapezius myofascial trigger points as well as normal trapezius muscle, the profile and interstitial fluid concentrations of lactate as an indicator of anaerobic respiration. In addition, the ethanol-clearance technique was employed to quantify local nutritive muscle blood flow. The microdialysis technique was used to sample the interstitium of myofascial trigger points as well as control muscle. The principle of microdialysis is to mimic the microcirculation by implanting an extremely small porous fiber into a tissue and dialyzing that fiber against physiological saline. Hence, biological compounds present in the sampled tissue will diffuse into the fiber, exit the fiber, and be collected. The dialysate is then analyzed for content and concentration of various biological compounds.

METHODS

Subjects ($n = 3$) were identified as having a unilateral trapezius myofascial trigger point using the clinical criteria established by Travell and Simons. Contralateral, unaffected trapezius muscle was used as a control site. The protocol was as follows: The skin overlying the muscle to be sampled was iced to provide a transient numbing sensation. The epidermis was thoroughly disinfected using 70% isopropyl alcohol. CMA microdialysis probes (1 cm long, 20,000 Dalton MW cutoff) were inserted into the trigger point muscle using a 22-G introducer with split tubing. The above procedure was repeated for the placement of a probe in

asymptomatic trapezius muscle. Probes were perfused with Kreb's bicarbonate Ringer solution supplemented with EtOH (for blood flow analysis) at a flow rate of 1.5 μl/min using a CMA100 syringe pump (CMA Microdialysis AB). Samples were collected, frozen at −80°C and subsequently analyzed, spectrophotometrically, for lactate concentration. The ethanol clearance technique was used to quantify nutritive blood flow within the tissue surrounding the probe.

RESULTS

Dialysate interstitial lactate levels were consistently elevated in the interstitium of myofascial trigger points during all sample collections. With the exception of one data point ($T = 60$ minutes), dialysate levels of lactate were at least 30% greater in the interstitium of trigger point muscles when compared to control. Blood flow measurements were averaged over the course of the study. Local blood flow in myofascial trigger points was approximately 28% less than control muscle. ($2.38 + 0.64$ ml/min/100 g vs. $3.25 + 0.48$ ml/min/100 g).

These preliminary data are suggestive of a disturbance in the local metabolic milieu and blood flow of myofascial trigger points, which may contribute to the symptomology of the disorder. Further studies will be carried out to fully elucidate the biochemical profile and regional blood flow of myofascial trigger points.

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Conservative Management of a Patient with Central Canal Stenosis
A Case Report

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A case report is presented documenting successful management of low back pain and bilateral anterior leg pain in a 78-year-old Filipino male with acquired degenerative central canal stenosis.

OBJECTIVES

The objective was to report on the chiropractic management of a patient presenting with central canal stenosis. Treatment approach is designed to minimize risk of adverse reactions. Literature support for conservative, chiropractic and surgical care, and rationale for chiropractic treatment using flexion-distraction technique are discussed.

SUMMARY OF BACKGROUND DATA

This 78-year-old man presents with progressively worsening achy low back pain and bilateral, electric and sharp, anterior leg pain. All symptoms are felt several times daily, are worse in the morning, and last from 5 to 15 minutes. The low back pain is rated 4–5/10 verbal reporting scale (VRS), and the bilateral leg pain 9/10 VRS. Objective findings are minimal with unremarkable orthopedic and neurologic assessment. Prior medical evaluation via MRI concluded severe, multilevel, central canal stenosis; diffuse annulus bulge at L3–L4; and marked degenerative changes.

METHODS

The patient was treated with manual flexion-distraction technique. This treatment approach involved progressively increasing depth of flexion and segmental traction based upon favorable reaction of the patient to the last treatment. A literature search was performed on both the Index to Chiropractic Literature and Medline. Additional articles were obtained from bibliographies of the above articles.

RESULTS

The patient experienced a significant decrease in both frequency and severity of pain after four visits over an 8-day period, and then plateaued. After 1 month, he was reassessed, rating subjective improvement at 80%. He no longer felt low back pain and only felt leg pain, rated 6–7/10 VRS on average, first thing upon wakening. Physical exam remained unremarkable. The patient's symptomatic picture remained improved and stable at a 5-month follow-up visit.

DISCUSSION

This case presents an example for the management of symptoms in a patient with central canal stenosis. A conservative, progressive approach during the application of

treatment is utilized to decrease risk of adverse reaction. The literature supports conservative management of central canal stenosis in individuals without cauda equina syndrome or progressively worsening neurologic symptoms. Studies on chiropractic treatment for central canal stenosis are few.

The role of chiropractic in the management of central canal stenosis requires more study. Flexion-distraction technique is utilized to increase the range of motion of individual lumbar vertebral segments. A dynamic increase in canal size has been shown to alleviate compression of the spinal nerves and/or their arterial blood supply, resulting in symptom relief. Hypothetically, any technique that functionally increases canal size shows promise and should be fully investigated. The natural course of this condition allows time for a trial of conservative care. The literature suggests that current conservative therapies are less successful than surgical approaches.

CONCLUSION

A case study is presented demonstrating successful management of symptoms either caused by, or complicated by, central canal stenosis. Hypothetically, flexion-distraction technique may provide an effective method for dynamically increasing canal size. Further study utilizing this method is warranted to determine whether it can regularly provide relief for afflicted individuals seeking nonsurgical management.

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The Anatomy of the Dorsal Rami of Thoracic Spinal Nerves

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Compared to lumbar and cervical pain, thoracic pain syndromes are less frequent and have attracted less direct research. Basic information on the innervation of the thoracic spine and the distribution of thoracic dorsal rami is incomplete. This study has been undertaken to provide a comprehensive description of the thoracic dorsal rami, which could be applied to the interpretation of thoracic pain.

METHODS

Thoracic dorsal rami were studied in five embalmed human cadavers with the aid of a magnifying lamp and a dissecting microscope, using a posterior approach.

RESULTS

After a short course, thoracic dorsal rami divide into medial and lateral branches. Medial branches of upper thoracic dorsal rami divide into superficial and deep branches, with cutaneous and muscular distribution, respectively. Some lateral branches of lower thoracic spinal nerves have a distinctive intermediate branch, which supplies the longissimus muscle.

DISCUSSION

The distribution of the medial branches of dorsal rami of upper thoracic spinal nerves is similar to that described for the medial branches of dorsal rami of cervical spinal nerves. The branching pattern of the lateral branches of dorsal rami of lower thoracic spinal nerves corresponds to that of the lateral branches of lumbar dorsal rami.

CONCLUSION

The distribution pattern of the dorsal rami of thoracic spinal nerves is similar to the distribution of dorsal rami in the neighboring regions of the spine.

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Replacement of Muscle Fibers by Adipose Tissue in Medial Parts of the Triceps Surae Muscle

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Limb muscles from older individuals are smaller and have significantly more fat and connective tissue than limb muscles of younger individuals. In a small percentage of elderly individuals there is a significant fatty infiltration of the soleus and medial head of gastrocnemius muscles.

OBJECTIVE

The goal of this study was to report the findings in two cases that showed replacement of muscle fibers by adipose tissue in the soleus and medial head of gastrocnemius muscles.

METHODS

The lower limbs of 22 embalmed human cadavers were studied and fatty infiltration of areas of the triceps surae muscle was observed in two of them (one male and one female, 89 and 88 years old, respectively). The soleus and gastrocnemius muscles of these two cases were carefully dissected and tissue samples were processed for histological examination with hematoxylin and eosin and Masson's trichrome stainings.

RESULTS

The external contour and volume of the affected muscles was normal on gross examination. One case showed only fatty replacement of the medial part of the soleus muscle, while the second case showed fatty infiltration of the whole soleus and the medial head of gastrocnemius. Microscopic examination revealed very few atrophic muscle fibers and large amounts of adipose and fibrous tissues replacing the normal muscle tissue.

DISCUSSION

These changes are consistent with denervation atrophy, although they may represent extreme cases of the "normal" muscle atrophy that occurs with aging. The process seems to begin on the medial aspect of the soleus muscle and extends laterally to include the whole soleus and the medial head of gastrocnemius.

CONCLUSION

Fatty infiltration of the triceps surae muscle has been reported only scarcely in the literature. Further research is necessary to clarify its incidence and underlying mechanisms.

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Residency Programs at the Canadian Memorial Chiropractic College (CMCC)

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Acknowledging the importance of graduate programs in developing future chiropractic specialists, researchers, faculty, and leaders, the CMCC Division of Graduate Studies provides residency programs for chiropractors to develop clinical, research, and teaching skills, often in multidisciplinary settings.

PURPOSE

This review of the first 25 years of CMCC residency programs offers reasons for chiropractic colleges to consider establishing residency programs. Description of the structure of the CMCC residency presents a possible model. Outcome

measures have been identified and applied in a retrospective analysis of CMCC residents (1975–1999). Future directions for chiropractic residency programs are discussed.

BACKGROUND

Early residents become current with the relevant literature, began researching chiropractic concepts, and taught at CMCC when these programs were established (1975) in conjunction with the Colleges of Chiropractic Radiology and Clinical Sciences. Interdisciplinary links were sought to expand the scope of residents' experience. By 1980, the residency included participation in hospital rounds and clinics, chiropractic practice, and collaboration in research and publication: the Saskatoon rotation. By mid-1990s, this was replaced by other multidisciplinary clinical and research rotations. The Radiology residency was extended to a 3-year duration to enhance preparation for Diplomate exams. The Sports Sciences residency was inaugurated in 1994. Ever-increasing multidisciplinary clinical and research opportunities are incorporated if they offer value for expenditure of resources. Evolution has required a more formalized residency core curriculum and regular evaluations. The structured selection process yields up to five new residents per year from an international pool of applicants.

METHODS

The following information was obtained from review of CMCC records, personal knowledge, and inquiries of CMCC faculty, including Fellows. Frequency counts were generated, cross-tabulated, and, where appropriate, subjected to analysis for statistically significant differences by using Pearson chi-square testing.

RESULTS

Between 1975 and 1999, 66 of 85 residents completed their programs; 44 were active Fellows of a chiropractic specialty college. Only 15 of those completing a residency confine their professional activities to clinical practice alone. The rest combine activities as chiropractic leaders, teachers, researchers, and consultants (usually) with practice. For example, residency graduates constituted 23 of 107 CMCC faculty members, and contributed 60 of 95 papers published in the *Journal of the Canadian Chiropractic Association* between 1988 and 1997. Those who become Fellows are more likely to pursue teaching and research.

DISCUSSION

It would be interesting to compare the effectiveness and productivity of residency graduates with those of other chiropractors, in clinical, research/scholarly, teaching and leadership activities. A difference in these outcome measures would highlight the importance of chiropractic residency training. Higher priority afforded research and teaching may be the reason for completing a residency program and pursuing a multi-faceted career. Future research will ascertain numbers and types of chiropractic specialists—and thus residents—which are needed. Pooling of residents and resources among chiropractic residency programs may be desirable, to provide the best possible experience while maximizing the availability of residents to maintain teaching, clinical, and research rotations.

CONCLUSION

Graduates of the CMCC residency program have made significant contributions to chiropractic as scholars, educators, consultants, and leaders. Despite their apparent success, it is time to formally study the demand for and requirements of chiropractic residency programs in the chiropractic profession and in the health care system.

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Implementing a New Curriculum
One College's Approach

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Implementation of a new, or substantially revised, curriculum can be a formidable task. At New York Chiropractic College (NYCC) the desire to offer as many benefits of the new curriculum as possible to currently enrolled students was a strong motivating factor to investigate a larger scale curriculum conversion. NYCC found that there are many factors, constituents, and perspectives that, when recognized and addressed appropriately, can contribute to a smooth and well accepted curriculum implementation plan. Identification of key players and stakeholders that will be

involved in curriculum implementation is critical. Once these groups, departments, or individuals have been identified, their involvement and input into the development of a curriculum implementation plan can be encouraged. Ongoing communication is essential. Opportunities for those involved to express their ideas, thoughts, and opinions should be encouraged.

METHODS AND RESULTS

The creation of curriculum conversion options was found to be beneficial. We developed three different models of curriculum conversion which were shared and discussed with much of the college community. Pros and cons of each model were discussed and ultimately played a significant role in participant buy-in and selection of the model that was to be implemented. At NYCC, the following groups or individuals were identified as key players in development of curriculum implementation: Students, Faculty, Department Heads, Clinic Directors, Dean of Chiropractic Education, Associate Provost, Provost, Registrar, Executive Director of Enrollment Management, and the Board of Trustees.

NYCC's new curriculum had been designed over a period of approximately 4 years with input from students, faculty, administration, alumni, and other field practitioners. For the last year of the curriculum development process, a group of faculty, academic department heads, clinic directors, the Dean of Chiropractic Education, and the Associate Provost worked to finalize a revised curriculum. The members of this group had the greatest familiarity with the new curriculum and were logical choices to play key roles in designing options for implementation.

The Registrar, Dean of Chiropractic Education, Academic Department Heads, and the Clinic Directors were charged with developing models of implementation. Ultimately, three models were developed:

Plan A: A gradual conversion (phase-in) plan
Plan B: The most aggressive conversion plan believed possible
Plan C: An intermediate conversion plan

These plans were shared and discussed separately with senior administration, the full faculty, and student representatives. Facility utilization and faculty needs for each implementation plan were calculated. Based on the above data and input, recommendations for implementations were made to the Board of Trustees.

The Board of Trustees approved implementation of plan C, the intermediate conversion timeframe. This information, and the benefits of this plan, were shared with faculty, students, Academic Affairs, Enrollment Management, and Student Services. Each class was provided with a program planner that detailed the course work in all remaining trimesters as well as a "Guide to the Implementation of the Curriculum for Currently Enrolled Students" which explained the new curriculum, gave course descriptions, and included program planners for all trimesters.

DISCUSSION AND CONCLUSION

Designing implementation for significant curricular change can be a positive experience when key constituents can be identified early in the process, incorporated into discussion and design, and encouraged to play significant roles throughout the process. The opportunity to design more than one implementation plan fosters sharing of ideas and perspectives and allows for compromise. Organization and dissemination of materials specific to each constituent encourages process participation and acceptance of proposed models.

Planning and communication can foster cooperation that results in institution-wide acceptance and enthusiasm for implementation of a new or significantly modified curriculum.

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Relationships among Traditional Indicators of Academic Performance and Successful Completion of an Objective Structured Competency Examination

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The objective of this study was to assess the relationships among the traditional markers of academic performance (described below) and performance on the Integrated Competency Exam I (ICE I), a form of the Objective Structured Competency Examination (OSCE). It was hypothesized that students with weaker academic profiles would exhibit difficulty in the successful completion of the examination.

METHODS

This preliminary study is a retrospective analysis of third-term students enrolled in the Fall of 1998. All students eligible to take ICE I were used in the analysis ($n = 85$). Data collected included:

1. Demographic information (gender, age, and ethnicity)
2. Preadmission academic data (grade point average, number of undergraduate units, and years of postsecondary education)
3. LACC academic data (two-term cumulative grade point average (CGPA), basic science GPA (BSGPA), clinical science GPA (CSGPA), and the ICE I score as pass/fail)

Successful completion of ICE I was defined as passing all examination stations at the first attempt. Frequencies of variables, comparison of the means by *t* test, chi-square analysis of categorical variables, and logistic regression of significant variables were performed. Pearson correlations among incoming units, incoming GPA, BSGPA, and CSGPA were performed. All results were calculated using the Statistics Package for the Social Sciences (SPSS).

RESULTS

The chi-square results for categorical variables showed no difference between the pass and fail groups related to gender and years of postsecondary education (2 vs. 4 years). The chi-square result was significant between pass and fail groups related to Asian ethnicity ($p = .04$).

The *t* test results for continuous variables showed no difference in performance between the pass and fail groups related to age, incoming units, and incoming GPA. The *t* test results were significant for the BSGPA ($p = .003$), CSGPA ($p = .003$), and CGPA ($p = .004$).

Crude logistic regression of the BSGPA, CSGPA, and ethnic groups reached significance ($p = .004$, .005, and .006, respectively). Adjusted logistic regression showed ethnicity was the strongest predictor of failure on ICE I ($p = .02$, 95% CI). Pearson correlation between incoming GPA and BSGPA was mildly significant ($r = .29$, $p = .008$), as was the correlation between incoming GPA and CSGPA ($r = .25$, $p = .03$).

DISCUSSION

The results show an unexpected predictive relationship for Asian ethnicity and failure of ICE I. As BSGPA or CSGPA decreased for an Asian student, the likelihood of failure on ICE I increased. It is unknown as to why this was the case. The results differ from the previous literature on comparison of traditional academic performance indicators and performance on an OSCE.

The incoming GPA/BSGPA correlation results are similar to the preponderance of the literature, which shows there is a direct relationship between GPA at entry, the Medical College Admission Test (MCAT), and performance on paper-and-pencil examinations in the first year of training at health professions institutions. Although the previous literature is scant, the general trend is there is no predictive value between academic indicators and performance on an OSCE. The difference seen in the present study may be possibly explained by weaker academic profiles in general and other as yet untested factors, such as language difficulties and learning methods.

CONCLUSION

Lower GPA and Asian ethnicity were associated with failure on ICE I. The reasons for this are not clear. Further quantitative and qualitative work to identify reasons for failure, GPA cutpoints, and other factors affecting exam performance will be done to help develop a risk profile that can direct students to supplemental instruction and successful performance.

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Teaching "Successful Aging Through Chiropractic" Pilot Tests of a Model Course

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Coursework in geriatrics is offered at virtually every accredited chiropractic college in North America, usually emphasizing the disease processes associated with aging. In 1997–1999, with U.S. Health Resources and Services Administration funding, a "model course" in chiropractic geriatric education was developed and implemented. This model emphasizes chiropractors' roles as wellness providers on the interdisciplinary health care team. Two formal pilot tests of this model course have now been completed at one chiropractic college. This presentation will summarize the teaching

strategies and the assessments utilized in the two formal pilot tests, and the results of this educational experience.

OBJECTIVES

These pilot tests were conducted in order to:

1. Assess the feasibility of using this teaching method and the geriatrics "model course" in the chiropractic college setting
2. To assess student knowledge and attitudes on aging issues and interdisciplinary collaboration
3. To teach this topic with an emphasis on wellness and prevention, rather than the more traditional disease and symptom approach

METHODS

Twenty to 30 students each trimester were trained using case-based, evidence-based, and community-based methods. Students participated in alternate activities, such as attending a senior exercise class or visiting a nursing facility, to gain practical knowledge of issues in gerontology. Students also did literature searches and developed problem-solving skills by working on a number of chiropractic "cases" in class. Three times during each trimester, students also did physicals, assessments, and chiropractic palpation on geriatric mock patients. An emphasis was also placed on interdisciplinary collaboration as students participated in classes facilitated by psychologists, nurses, and social workers.

Assessments were done both on students in the pilot course and in a traditional course in geriatrics. The Palmore Facts on Aging Quizzes, Perceptions on Professions questionnaires, and the Aging Semantics Differentials were all used as course assessments. In addition, a pre- and post-test assessed the mastery of specific material and knowledge in this class.

RESULTS

Assessments on the level of knowledge on aging issues indicated that this teaching method did improve student knowledge in virtually every participant. Student evaluations of the activities and the teaching methods used in the pilot tests were extremely high. Specific data on the elements of this course that students found to be most helpful will be presented. Overall, students were particularly satisfied with the wellness, prevention, and interdisciplinary aspects of this course.

DISCUSSION

Geriatrics courses in chiropractic colleges are often positioned mid-curriculum, an ideal time to incorporate a course that serves as a bridge between knowledge and application. The hands-on elements of this course, combined with its critical thinking and problem-solving exercises helped to bridge that gap. This course, with a "wellness" focus, also armed students with many strategies to promote healthy lifestyles in their older patients. Students in this model course gained confidence and skills important in delivering competent care to older chiropractic patients.

CONCLUSION

In our aging population, it is extremely important for chiropractic colleges to be placing a greater emphasis on geriatrics and gerontology. It may no longer be appropriate to utilize didactic methods alone in training chiropractic students in geriatric health care. Since this model course has been developed and pilot tested, chiropractic educators are encouraged to incorporate elements of this course and teaching strategies into their respective programs, and to continue to participate in the enhancement of chiropractic gerontological education.