
Poster Presentations

Exploratory Study of Student Confidence Related to Methods of Instruction

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Many aspects of problem-based learning (PBL) methods have been studied. The advantages have prompted chiropractic educators to investigate the value of these teaching methods and activities in the clinical science classroom. These methods encourage self-directed learning, self-appraisal, development of clinical problem-solving skills, and teamwork. Benefits of this style of teaching include flexible curriculum structure, reduced contact hours for students and faculty, better balance of theory with practice, and stronger objectives for classes. Faculty serve as mentors and facilitators in this process. Facilitators act as guides and should have specialized training. Problem-based learning educators utilize patient scenarios, ask questions, and then require student groups to search for answers. Whitman cautions that this is a different teaching approach and not all students are comfortable with independent learning. The question of student confidence in their abilities has not been thoroughly studied.

METHODOLOGY

The purpose of this exploratory study was to test the null hypothesis, that there was no significant difference in students' confidence level between two groups taught with different teaching methods. One group was taught with a traditional didactic lecture approach (control group) and the other taught using a problem-based method (experimental group). Using two methods of teaching, spinal evaluation was taught in a sixth-trimester clinical science course. The control group ($N = 52$) was taught using a traditional didactic approach, while the experimental group ($N = 54$) was taught using a PBL approach. The dependent variable

was the outcome response concerning confidence to perform spinal evaluation. The independent variable was the actual teaching method.

A survey questionnaire was administered to note student confidence to perform aspects of spinal evaluation prior to any graded tests. Confidence was defined as a feeling or belief that one's actions, performance, or evaluation will be correct, proper, or effective, which stresses faith in oneself and one's ability without any suggestion of conceit. The survey was given in consecutive class hours on the same day allowing no opportunity for communication between groups. The statistical procedures included the mean, standard deviation, unpaired t test, and two-tailed p value for each item question and items viewed as a whole.

RESULTS

No statistically significant difference between the two groups was seen on any of the survey items. The mean response for the entire survey was 2.99 (standard deviation 0.68) in the problem-based learning group and 2.97 (standard deviation .60) in the didactic lecture group. The unpaired t test was .154 and the two-tailed p value was .877 when all items were viewed as a whole. Therefore, we accept the null hypothesis that there is no significant difference between the two groups.

DISCUSSION

It may be important to begin problem-based learning in the first or second year of training to see differences in the clinical years, which may add to the costs of the institution. Saarinen-Rahiika et al. report that an individual course, such as the one in this study, may have certain disadvantages such as confusion regarding faculty-student expectations. They

also suggest that faculty and student tutorial skills and self-directed learning strategies may not be developed sufficiently. Also, several key components of PBL methods may be missing such as curriculum integration, learning context, and provision of sufficient time to learn. Frost noted that students initially tend to lack confidence in their ability and to question their depth of knowledge with the material.

CONCLUSION

This study showed no significant difference in confidence to perform spinal evaluation between students taught with a problem-based learning approach and students taught with a didactic lecture teaching approach.



Increasing the Chiropractic Graduate's Research Competency without Increasing Curricular Content Can Chiropractic Institutions Do It?

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There is a common recognition that the chiropractic profession needs a considerable increase in the quantity and quality of valid scientific research being produced by its field practitioners. Yet a review of course catalogues from the various institutions indicates that the graduate receives only cursory exposure to research methodology in the typical chiropractic curriculum, far too little to develop sufficiently refined research skills. It is reasonable to expect that the adaptation of ideas and methods proven successful by other health care professions to address similar problems can likewise enable chiropractic institutions to increase the assimilation of professional and research competencies by their graduates. Important to note is the fact that this can be accomplished without increasing the already overburdened chiropractic academic programs. The key is to integrate profession-specific concepts/skills together with research skill components throughout the existing curricula. This is a process-oriented, versus content-oriented, approach. The objective of this study was to identify the specific elements relevant to the above described integration process and to propose ways to actualize the integration within the existing chiropractic educational programs. The purpose is to foster certain behaviors expected of all health care professionals, i.e., being effective consumers of, and contributors to, the profession's body of knowledge.

METHODS

A literature review was conducted to look at methods by which the basic components of profession-specific concepts/skills (chiropractic in this case) together with research skill components can be woven throughout the curriculum, starting at the entry level. It was assumed that problem-solving skills must be increasingly developed by the students to enable them to progressively acquire the skills demanded of the practitioner and similarly of the researcher.

The question of how these roles develop as the student progresses through the education process, their relationship to the stages of Bloom's taxonomies, and the progressive application of these skills and/or behaviors in the pregraduate setting as well as in private practice will be discussed and illustrated.

A plan for auditing course objectives to identify those objectives wherein professional (chiropractic) concepts together with research skill components can be integrated will be presented. Methods for designing appropriate learning activities, and their evaluation, will be proposed. Samples will be provided. Basic prerequisites for students' participation, and activities designed to give them practical entry-level experience will be identified, including methods by which students can effectively participate in the research process.

DISCUSSION

Various health care professions have demonstrated that the process of research skill development can be integrated into curricula without necessarily increasing content. For the chiropractic education community to incorporate this process, thus increasing the research capabilities of its graduates, the educational objectives of all courses must be audited to determine where chiropractic concepts/skills together with components of research competencies can be integrated. The outcomes of this process are expected to be progressive, just as the development of research skills is progressive. The institutions initially will experience an increasing interest and relevance of all curriculum components to chiropractic on the part of the students, and their development of essential research skills. Subsequently, the students will exhibit a continued inquisitiveness, optimizing the likelihood that the majority of graduates will further develop as research consumers, with some going on to participate in the role of scientist-practitioner.



Life's Clinical Excellence Program A Comprehensive Quality Assurance Program

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Quality Assurance has become a dominant theme in the health care disciplines. The origins of Life University's quality assurance program are derived from a number of mechanisms. These are:

1. Commitment to direct supervision of all student/patient encounters
2. Quality assurance feedback surveys
3. A formal clinical review process of patient files (CRC)

Over the past 4 years we have evaluated the effectiveness of this system and, as a result, an evolving comprehensive program has been developed, incorporating: quality assurance feedback surveys; faculty training and assessment tools; faculty-student advisement; case management standard operating procedure (SOP) and case management class; faculty feedback meetings and the integration of clinics quality assurance processes through the Academic Clinic Coordination Committee; student competency assessment; Clinic Review Committee; certification clinic; and file review.

METHODS

A Case Management SOP Reference Manual has been created to increase standardization of care. Development of a formal advisement process has assured better mentoring relationships between faculty and students and better monitoring of student progress through the clinics. Faculty have participated in the certification processes in specific technique competence.

Quality assurance feedback surveys are administered to assure patient satisfaction with care, students' clinician satisfaction with supervision, CRC process reliability, student satisfaction with clinic classes, and their overall clinical experience. The 7th term certification clinic has been developed to increase students' technical expertise and case management skills. The 8th term case management class helps further develop students' case management skills. Clinical Competency Assessments are coordinated at regular intervals to assess competency skills.

In 1997 the clinic and administrative faculty began to conduct work team meetings with a view to assure that

consistent professional care was rendered in the clinics. Several innovative programs evolved from this multidisciplinary work team process. A second multidisciplinary work team comprised of scheduling committee faculty, curriculum committee faculty, and content area specialists was formed to create an 8th term clinic case management class. After syllabus creation and approval by the curriculum committee, deans, and president, the 8th term class, clinical case management, designed to improve student skills in patient management and procurement, was added to the College curriculum. This class has consistently received excellent student evaluations relative to case management skills improvement.

RESULTS

With the evolution and the development of the Clinical Excellence Program, 14th quarter student exit surveys have shown marked improvement from a mean of 3.02 to 3.70 on a 5-point scale. Students are expressing more satisfaction with their clinical experience. There is a much greater sense of mentoring and faculty empowerment as a result of the advisement system. Feedback surveys indicate high patient satisfaction with care, and student satisfaction is high regarding the quality of supervision. Students report strong satisfaction with 7th term certification clinic and 8th term case management classes.

CONCLUSION

The Clinical Excellence Program has increased the quality of student clinicians' clinical experience. The advisement system has increased the quality and quantity of faculty student mentoring processes. Students and faculty have experienced a greater sense of acceptance and empowerment in the process. Faculty training and certification in particular techniques has increased levels of expertise in specific technique protocols and enhanced their self-esteem. The Clinical SOP Manual has helped to standardize care and clinical protocols.



Enhancing the Third-Year Intern Clinical Experience Procedures and Protocols for Supervised On-Site Chiropractic Care at Athletic Events

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The clinical education of the chiropractic intern can be enhanced through their participation in an off-site supervised treatment experience. A well planned and coordinated effort results in a win-win-win experience for the intern, the athlete, and the profession.

DISCUSSION

Supervised off-site treatment at an athletic event has proved to be a “peak learning experience” for the intern, allowing them to apply their interpersonal, diagnostic, and treatment skills to an interested public. In addition to bolstering the intern’s clinical confidence, this experience fosters responsibility and underscores the importance of teamwork by showing what gets done when everyone is on the same end of the rope. For the athlete, this program has introduced the performance-enhancing or restorative and regenerative benefits of chiropractic care. Interested athletes can have questions answered, receive a treatment, or simply observe the immediate results of care. For the profession, this

is an opportunity to mainstream chiropractic by presenting a consistent service from event to event that promotes chiropractic care as a professional service, staffed by knowledgeable practitioners. Pre-event coordination with other health care providers allows the chiropractic intern to function as part of a larger “team.” Patient education opportunities are optimized by directed discussions and participants are encouraged to visit a licensed professional in their hometown.

CONCLUSION

In summary, the supervised treatment of athletes at road races and track meets has allowed interns the chance to practice their profession, promoting confidence and competence. For the athlete, this experience has proved to be an opportunity to experience chiropractic care and the benefits consistent care may have on an athletic career (and beyond). For the profession, this experience helps mainstream the image of the profession as organized, staffed with knowledgeable practitioners, in demand and therapeutically beneficial.



Using Senior Undergraduate Students as Instructors A Scandinavian Model for University Teaching

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The use of students as instructors at Danish universities has been a common practice used for decades. Most subjects, such as anatomy, physiology, and biochemistry, involve a combination of theoretical and practical learning activities. The experience at Danish universities is that senior undergraduate students, formally employed as student instructors, can successfully lead many of the practical learning experiences.

To the best of our knowledge, this model for teaching university courses is unique to Scandinavian universities, but it seems to be working very well indeed and might serve as a source of inspiration to tertiary educators elsewhere. As an example of this presentation, we use the Theoretical

Biomechanics course from the curriculum of the 5-year chiropractic course at the University of Southern Denmark, Odense University.

METHODS

The course in Theoretical Biomechanics is an 80-hour course running over second and third semesters of the total 10-semester chiropractic curriculum. The course uses Nordin and Frankel’s *Basic Biomechanics of the Musculoskeletal System* and Kapandji’s *The Physiology of the*

Joints, volume 3 as their core textbooks. The format of classroom teaching involves the following:

- *Formal lectures (40 hours)*: In the lectures, the senior staff member in charge of the course covers and gives an overview of the whole course content with an emphasis on the principles and theoretical considerations, and in this way maintains a relatively close link to the core textbooks.
- *Small group seminars (30 hours)*: In the seminars, the students are divided into smaller groups of 20–25 and a senior student employed as a student instructor leads each class. Topics covered are normally those covered in the previous weeks' formal lectures, at which the problem-solving exercises for next week's small group seminars are also handed out. Thus, the students have 1 week to complete their exercises, after which they will be asked to present their solutions to their seminar group, where the senior student will provide feedback and answer any questions in relation to the exercises.
- *Laboratory exercises (10 hours)*: Here the class is divided into teams of five to six students who carry out a practical laboratory experiment based upon topics previously covered in lectures and small group seminars. After the laboratory exercise, each group of students must write an acceptable report on the experiment. Laboratory exercises are typically supervised by either a junior staff member or a senior lab technician assisted by the same

student instructors involved in the small group seminars.

DISCUSSION

The use of senior students as instructors/teachers has several advantages. Our experience in this course and others is that senior students understand what exactly the students need and how it should be explained to them—probably because their own learning experience with the same material is quite recent. In addition, students and student instructors, as peers, seem to communicate with each other in a more frank and relaxed way, making the curriculum easier to understand. One of the problems of small group teaching seen from an administrator's view is that it can be a very expensive exercise in terms of the number of classroom hours needed from senior staff members. This economical hurdle to an ideal teaching/learning situation is overcome by the use of senior students in the teaching of the practical elements of the course.

A small disadvantage may be that the student instructors do not always have the full insight that is needed to answer questions beyond the textbook level. In practice, this does not seem to be a major problem and can be minimized by the senior staff members encouraging questions in the formal lecture setting.



Chiropractic Program Admissions Criteria as an Indicator of First- to Fourth-Year Academic Performance

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The issue of whether to admit students without a science background into predominately science-oriented programs is not new to admissions officers in chiropractic colleges or medical schools. This paper continues previous studies of the class admitted to our program in 1996. Student performance over each of 4 years was examined in relation to admission criteria and first-year cumulative grade point average (CGPA).

METHODS

Admission and academic performance data were collected and analyzed using a linear regression analysis as performed by EXCEL 97. The class was also divided into groups according to the number of science units taken prior to admission and the individual group data were analyzed. Each

science unit consists of a full year (two-semester course) in biology, chemistry, physics, or mathematics. Criteria as described by Colton were used to interpret the correlation data.

RESULTS

Initially, 154 students from a class of 160 were chosen for this study. After completion of 4 years, only 141 of these students graduated. Three students had to repeat a first-year course as a result of a discipline hearing. Five students failed first year and one failed second year. Four students who had passed left this class, two joined other professional programs after first year, and the others dropped out for a year or more, due to health reasons, following second year.

There was no significant difference between the admission scores of these failing students and the rest of the class. Their number of preadmission science units varied from 0 to 11. The majority of the failures had less than 5 science units. Regression analysis of science units vs. CGPA for this group gave an $r = .886$. Over the 4 years, the CGPA mean and median fell slightly each year. The skew and spread were highest in first and fourth years.

Academic scores were fair indicators of performance for the first 3 years. Numbers of science units and science CGPA matched the academic score as indicators. The number of nonscience units showed a negative correlation with performance for these years (fair indicator). None of these indicators showed any relationship with fourth-year performance. Interview, Essay, and Total Admission scores showed little or no correlation with performance in any year of our program.

First-year CGPA was a fair to good indicator of performance for the next 3 years. R values declined each year with the weakest correlation ($r = .505$) in fourth year. Of

the students with a CGPA of 2.5 or less in the first 3 years, the majority had five or less science units. In fourth year, fewer students were in this category.

CONCLUSION

The only admission criteria that has any significant correlation with performance in our curriculum is academic grades (fair indicator) for the first 3 years. Once a student is in the program, however, first-year CGPA is a good to excellent indicator of performance in remaining years. Admission scores and first-year CGPA show the weakest correlation with fourth-year performance as compared to other years. This may be due to the decreased number of science courses with clinic accounting for half of the CGPA. The findings of this study have implications for chiropractic admissions policies, and remedial support chiropractic colleges may need to provide students.



Faculty Evaluation into the New Millennium An Evolving Process

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In chiropractic education, issues related to quality improvement, accountability, tenure, fiscal responsibility, professional growth, and stakeholder satisfaction have been raised. New strategies have had to emerge to address these issues. This includes implementing a quality faculty evaluation system, which invariably causes both individual and institutional quality improvements. Currently, many institutions are using a more balanced approach to faculty evaluation, one that reflects the missions of a particular institution and the work of its faculty.

Over the past 6 years, New York Chiropractic College (NYCC) has been involved in developing a fair, comprehensive, and useful system for faculty evaluation. The purpose of this poster is to describe the new model for faculty evaluation and its outcomes. This will include a brief history of early attempts and the lessons learned.

METHODS

In 1994, a Faculty and Administration Cooperative Team (FACT) was established and charged with the development of a faculty evaluation system. With the guidance of a consultant, a matrix system was developed which was based on a "role model" from which faculty could choose their

workload. A series of mathematical calculations was done to quantify the process. However, this was found to be unable to meet the needs of the college for a variety of reasons.

Next, an interim system was created which utilized department head/clinic director observation and evaluation, student evaluations, and self-reporting. And while this system kept the process alive and created some accountability, further development was still needed.

During the winter of 1998, the college engaged the services of another consultant to help review and remodel the faculty evaluation system. In the fall of 1998, an ad hoc committee, the Faculty Evaluation Committee (FEC), was created. It was designed to involve the main players in the faculty evaluation process. Subgroups were organized to look at four specific areas of concern: student evaluation of faculty and courses, interdepartmental integration, the work and evaluation of the clinical educator, and the professional development plan (PDP).

RESULTS

The FEC first focused on developing guidelines for writing a PDP. The FEC then organized and received the work of the subgroups, and in turn offered the results to the faculty

for their input. The subgroups had results based on their own charges and will be displayed. This will include a revised PDP guideline document and the classification and evidencing of faculty work document.

DISCUSSION

The above work all fed into the annual cycle of events of the new evaluation system. This starts with a review of the classification document, which becomes the basis for writing a PDP. Once this is written and reviewed, the evaluation year unfolds. Evidencing documents are collected to support the work effort. Student evaluations are done, as are observations by supervisors. The faculty member writes an annual self-report to comment and reflect upon the academic year's successes. The supervisor then performs an annual review and evaluation. The results of all of the above become

the basis for writing the next year's PDP 2 months later when the cycle begins again. A series of diagrams will show the annual cycle of events with a brief description of each.

CONCLUSION

A quality evaluation process establishes clearly defined work and goals, sets expectations, and organizes the evidence. It fosters personal and institutional growth. The outcomes of the system include both formative information (which helps the faculty member work better) and summative information (which helps create the basis for decisions regarding contract renewal, promotion, and awards). Overall, this evaluation system is well on its way to providing a process in which all participants can have confidence and take satisfaction.



Predicting Success in the First Year of Chiropractic College

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No published research directly investigates if undergraduate variables of academic performance can help predict success in a chiropractic college; yet, some of these variables are weighed heavily to determine acceptance into chiropractic college. The purpose of this study is to determine if there are any preadmission academic or demographic variables that can predict success in the first year of our chiropractic college program.

METHODS

A stepwise multiple linear regression analysis of 174 student records was conducted. Academic success in the first year was defined as the dependent variable of cumulative GPA at the end of the first year (Y1GPA). Independent variables were students' cumulative matriculating GPA (MatGPA); the undergraduate GPA of chemistry (ChemGPA), biology (BioGPA), and physics courses (PhyGPA); cumulative pre-chiropractic college semester units (MatUnit). Correlations between the variables were obtained. Based upon the strength and significance of each correlation, the computer entered qualifying variables into the regression analysis.

RESULTS

Pearson product moment values demonstrating the strength of correlation between each of the independent variables and Y1GPA ranged from .109 to .525 and were significant at the $p < .0001$ level, except for MatUnit. The correlations of MatGPA, PhyGPA and Chem GPA to Y1GPA were strong enough to enter the regression analysis. Three regression models demonstrated moderate strength ($R = .525-.572$) with coefficients of determination (R^2) accounting for 27.6–32.7% of the variance found in predicting students' Y1GPA. All models were statistically significant as determined by an analysis of variance.

CONCLUSION

Based upon this regression analysis, a relatively strong and statistically significant prediction model for Y1GPA ($R^2 = .327$) exists and is represented by the following equation: Predicted Y1GPA = $.618 + .553(\text{MatGPA}) + .154(\text{PhyGPA}) + .172(\text{ChemGPA})$. This regression model will allow the institution to predict a student's Y1GPA from their undergraduate academic performance with a certain degree of accuracy.



The Unsubstantiated Claims of the Largest State, Provincial, and National Chiropractic Associations and Research Agencies

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The purpose of the study was to determine the presence or absence of claims for the clinical art which are not currently justified by available scientific evidence, or which are intrinsically untestable.

METHODS

A survey of patient education/promotional material produced by national, state, and provincial societies and research agencies in Canada and the United States was undertaken. Patient brochures were solicited from the three largest provincial, three largest state, and the three largest national professional associations in the United States and Canada. Similar requests were made of two research agencies supported by the national associations. Brochures were reviewed for the presence or absence of unsubstantiated claims.

RESULTS

Of the 11 organizations sampled, nine distribute patient brochures. Of these nine organizations, all distribute patient brochures that make claims for chiropractic services not known to have been scientifically validated.

DISCUSSION

The largest professional associations in the United States and Canada distribute patient brochures that make claims for the clinical art that are not currently justified by available scientific evidence, or which are intrinsically untestable. These assertions are probably self-defeating, since they reinforce a stigmatized image of the chiropractic profession as functioning outside the boundaries of scientific behavior.



Analyzing the Neurological Interference Component of the Vertebral Subluxation with the Use of Pattern Analysis A Case Report

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Most working definitions of vertebral subluxation include both a biomechanical and a neurological component. Chiropractic analysis tends to focus on one of these two components. Different tests available to the chiropractor are specific for these different components. Radiographs and palpation analysis provide biomechanical data, but do not reveal information about the neurological component of the vertebral subluxation. Other tests, such as paraspinal thermal analyses, which do not give information on the biomechanical component, have been used by chiropractors to assess the neurophysiological component of the vertebral subluxation. It is assumed that both components are important enough, and different enough, to require separate examinations of each, using tests that are sensitive to each, to confirm the presence or absence of the vertebral subluxation in its entirety.

METHODS

This report describes a method of pattern analysis that can be used in the assessment of the neurological component of the vertebral subluxation and provides an application of a quantitative method of analyzing the data derived from the pattern analysis. The method was applied to an actual patient who received a chiropractic adjustment. Clinical data from both before and after the adjustment are presented.

RESULTS

The patient was analyzed before his adjustment as having evidence for the presence of the neural component of the vertebral subluxation. Immediately after the adjustment, there appeared to be a worsening of the nerve component. There

was, however, an improvement noted according to the pattern tests on the following day after the adjustment.

DISCUSSION

While it is not the intention of this paper to prove the validity of the particular methods used in this analysis of the

nerve interference component, this report seeks to convey the importance of developing a system whereby the neural component can be readily assessed by the chiropractor in practice. The particular method offered in this report can assist the chiropractor in making a more objective analysis of the elusive yet very important component of the vertebral subluxation—the neurological interference component.



From Needs Assessment to Satisfaction Inventory One Student Services Department's Use of Chiropractic Student Feedback

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It has been a primary concern of this Student Services Department to enhance student and campus life. Through evaluating student feedback, this institution has recognized that student feedback improves campus morale and has indirect benefits on recruitment and alumni services.

METHODS

Initially, the Student Services Department thought that it would be helpful to get student feedback through the administration of the Student Services Needs Assessment (SSNA). The SSNA was administered in 1998 and 1999. This institution-specific instrument elicited student feedback along two axes: "has" and "needs" for 52 student-service specific resources. Some of these services were currently provided and some were not. Student feedback afforded the opportunity for each subdepartment to respond to a service that students believed was needed, yet they were unaware of its current availability. Services that were not currently available were included so that strategic and financial plans could be made toward providing such service.

Descriptive analysis was used to review student feedback. The complete report included 520 charts (52 items per 10 trimesters), summary of findings per trimester, as well as a comprehensive summary of the data overall. Each subdepartment received a specific report related to their respective subdepartment. Each subdepartment then responded to the report as to how they would like to address the findings from student feedback.

Upon receipt of sufficient data and student feedback elicited from the SSNA, the need to get specific satisfaction or dissatisfaction data was identified. The Student Services Department developed an institution-specific instrument titled the

Student Services Satisfaction Inventory (SSSI). Each subdepartment contributed to the items specific to their section on the Inventory. Again, students were asked to use a 5-point rating scale to note satisfaction or dissatisfaction as well as a "Not Applicable" option for services for which they had had no experience. Students were encouraged to provide written feedback as well. Each subdepartment has received its respective feedback and is in the process of responding accordingly.

RESULTS

Results of the SSNA and SSSI administrations were as follows:

1. Students want as many services as they can receive that better their student and academic lives.
2. Student feedback is invaluable to the enhancement of current services and the direction of potential student services.
3. A pattern has been identified where earlier trimester students report more satisfaction with the institution's student services than those in the later trimesters. This may influence the direction of the next student feedback inventory.

DISCUSSION

Student feedback enhances the overall morale of the campus, because their needs are met and they feel a part of change at the institution. The Student Services Departments appreciate the opportunity to know what they are doing well

and what specifically they can do to better enhance student life. With improved morale, more students are attracted. With improved morale, students are more likely to remember how their needs were met during the rigors of their professional program. They are more likely to become active and contributing alumni when their needs were seriously considered. Consequently, student feedback has many indirect benefits as well.

CONCLUSION

The relationship between students and Student Services is an intricate part of any institution. If students are not satisfied, then the institution is not satisfied. Through this institution's observations and experiences with student feedback, we encourage every chiropractic institution to make it a priority to get this type of feedback.



Considerations of Digitally Compressed Diagnostic Images Intended for Instructional Use

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Transmitting and storing diagnostic images digitally is becoming more common with growth of communication technology. However, concerns have recently been cited regarding the degradation in the quality of diagnostic images as a result of digital data compression. Images including x-rays, MRIs, CT scans, and diagnostic ultrasound are being transmitted digitally from computer to computer and electronically stored. Mathematical digital compression inherently causes a reduction in image quality either from loss of image detail, or introduction of digital artifacts or noise. These distortions may be unacceptable in some instances for diagnostic purposes. However, a certain level of degradation may be acceptable for teaching purposes.

METHODS

A computerized literature search was conducted and the results reviewed for relevancy. A radiograph of a lateral foot was scanned at 600 ppi (pixels per inch) and stored as a BMP file. This image was used as a comparative base. The digital radiograph image was also scanned again at 600 ppi and stored as JPEG (Joint Photographic Experts Group) file. The images were imported into an image manipulation program (Paint Shop Pro 5.0 by Jasc) and compared. A copy of the BMP was compressed using the standard JPEG compression algorithm in the image program, and compared at calculated compression ratios of about 2:1, 4:1, 25:1, and 50:1. Special consideration was given to differences in the degradation of image detail.

RESULTS/DISCUSSION

The most common format for compression is JPEG format. The quality of the compressed image will be proportional to the compression rate of the image. The human eye often

cannot detect subtle changes in tone or color, but is more sensitive to variations in brightness. JPEG compression uses mathematical algorithms that exploit those traits in human vision, making the compressed image difficult to distinguish from the original. The algorithm will compare surrounding pixels, and average the value, storing the location of the pixel and the single color value rather than the different variations of color. This process can result in appreciably high compression values, as much as 200:1 and greater. However, compressed images that are visually indistinguishable from the original are limited to about 25:1 compression.

There are two terms relating to the types of compression: Lossless and Lossy compression. Lossless compression means the compressed image (usually no greater than 2:1) can be mathematically expanded back to the original image, with no loss of data. Lossy means pieces of the image will be permanently changed. The greater the compression, the greater the "lossyness" or permanent distortion of the image.

Although the algorithms used in this comparison were admittedly unsophisticated compared to those intended for diagnostic image use, generalizations can be made with due considerations. It is also much more likely for an instructor to use a digital image program with limited capabilities for use in an instructional setting than a program with more sophisticated compression algorithms.

New formats, such as the JPEG2000 format currently under development, promise greater quality with higher compression. However, this will only affect newly compressed images, and will not improve those images previously compressed.

CONCLUSION

There are a number of sophisticated special purpose algorithms designed for diagnostic image compression. Although JPEG offers a standard, these algorithms vary in image

quality and compression capabilities. Consideration must be made for the intended use of the image to determine an acceptable type and limit of the compression. The level of

distortion and degradation introduced in compressed files as much as 25:1 should not preclude its use as an instructional aid.



Implementing Patient Outcome Assessment Procedures in a Chiropractic College Outpatient Health Center Utilizing Patient Questionnaires and Case Reporting to Measure Results of Patient Care and Ensure Adequate Supervision of Interns

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The purpose of this paper is to report on the authors' process of incorporating several patient outcome assessment instruments into general use at a chiropractic college outpatient center.

METHODS

Several established outcome assessment tools were adopted, including the Revised Oswestry Low Back Pain Questionnaire, the Neck Disability Index, Pain Drawings, and a Numerical Pain Rating Scale. In addition, a Patient Progress Questionnaire developed by the authors was implemented. Baseline Oswestry Questionnaire(s) were completed by the patient, at or as close to the initial visit as possible. Follow-up questionnaires were scheduled at either 2- or 4-week intervals. Patient Progress Questionnaires were completed by the patient every three visits, regardless of visit frequency. This form was designed to establish whether any subjective improvement had been seen since care began, and to document what percentage improvement had been seen. In order to provide an opportunity for the supervising doctor and intern to regularly review these forms, a schedule for case reporting by interns was initiated. Each intern was required to meet with the supervising doctor every 2 weeks.

RESULTS/DISCUSSION

In 1990, Russell Coile, Jr. wrote an interesting and portentous analysis of future health care trends. His analysis presaged an emphasis on patient outcome assessment and the proliferation of managed care as being the two trends destined to have the greatest impact on the delivery of health care in the United States over the next decade. During the past decade, the United States and Canada have both published clinical guidelines for chiropractic practice. The chapters addressing outcome assessment in these publications, arrived

at by expert consensus, stressed the need of obtaining "significant documented improvement" on an ongoing basis during the course of a patient's treatment. Endorsement was given to the use of well established and proven patient questionnaires, because of their validity, general acceptance in health care, and ease of use in chiropractic practice. In accordance with these guidelines, the aforementioned outcome assessment instruments were chosen and implemented into the patient management procedures at the chiropractic college health center. Use of the instruments provided an increased level of documentation which afforded the supervising doctor and intern a basis for measuring patient improvement, for justifying ongoing care, or indicated the need to abandon manipulative therapy due to failure to improve. Scheduled case reporting by interns to the supervising doctor on each case was performed at 2-week intervals, with the purpose of reviewing visit notes and the completed patient questionnaires. This provided for close supervision of intern activity as well as timely modifications to patient treatment plans. The time expenditure for form completion and review, and case reporting, proved to be minimal. Most patients were able to navigate through a pain drawing and an Oswestry Questionnaire in less than 5 minutes, and faster after multiple exposures to the forms. The Patient Progress Questionnaire required even less time. On the average, case reporting by interns, with associated documentation, took about 5 minutes per case.

CONCLUSION

Incorporating patient outcome assessment instruments into a chiropractic college outpatient clinic setting is an uncomplicated procedure, requiring only minimal time expenditure and effort on the part of the patient, the supervising doctor, and the intern. The benefits include increased precision in case management and intern supervision, and well documented patient outcome assessment using proven and universally accepted instruments.



Spinal Cord Intradural Plaques and Back Pain

Stephen P. Larsen, Ph.D., and **Alexandr Makarov**, M.D., Cleveland Chiropractic College-Los Angeles

Intradural plaques located in the human brain and spinal cord have previously been discovered at autopsies and cadaver dissections. The medical community reports that these plaques are not responsible for back pain. This study was undertaken to determine the frequency of occurrence of intradural plaques and if the location of these plaques might be responsible for back pain.

RESULTS

Gross examination of 96 human cadaver spinal cords revealed five cases of intradural plaques. Plaques were located on the dorsolateral cord from the lower lumbar to upper thoracic regions, and were attached to the arachnoid trabecular tissue. Some plaques were adhered to the dorsal

spinal nerve roots. Histological studies confirmed the existence of hyaline plaque, heterotopic calcification, and attachment of plaque to perineurium of dorsal spinal nerve roots. Radiographic studies revealed the plaque could not readily be detected by routine methods.

CONCLUSION

It is proposed that intradural plaques are formed at the site of inflamed subarachnoid tissues and plaque intimately attached to dorsal spinal nerves could be responsible for somatic and referred visceral pain in body structures served by the affected spinal cord level. This pathology may be worthy of consideration when conducting differential diagnosis for etiology of back pain.



Accessible and Reactive Support for Effective Use of Computer Technology

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New York Chiropractic College (NYCC) has made a commitment to using the computer to improve the educational environment and augment communications between students, faculty, and staff. In order for the user community to maximize computer use in the classroom and as a productivity tool, they must have accessible and reactive support.

METHODS

The Board of Trustees has committed the allocation of resources for computer technology at NYCC. There has been a considerable investment in networks, multimedia and distance learning rooms, computer labs, high-speed Internet access, laptop computers, printers, scanners, and digital cameras.

To empower the user to maximize resources, a number of "support" mechanisms have been instituted so as to increase user's comfort level with the capabilities and limitations of computers. NYCC has made available the following:

- Numerous hands-on workshops that are offered on site (e.g., Microsoft Office Suite for beginning through advanced users, use of a scanner and digital camera, effective use of the Internet and on-line courseware)
- Expeditious assistance for faculty and staff to resolve hardware and software problems via a Helpline (3911)
- Computer resource assistance availability during noninstructional hours
- Support personnel offices that are centrally located near the area they serve
- Approachable support personnel who can view academic scenarios from a technical, educational, and "user" perspective
- Computer Application Users Group which meets on a regular basis to share ideas and shortcuts
- Common files that are accessed on the LAN and WAN
- Access to NYCC e-mail at residence (via Internet connection)
- Electronic Newsletter entitled "Techie Tidbits" which lists tips, tricks, and technology happenings (i.e., upgrades, changes, etc.)

RESULTS

Our initial observations suggest that students, faculty, and staff are more involved and informed because of the integration of computer technology in the learning process.

1. Electronic presentation enables faculty to emphasize the important points to the students, while allowing ease of revising lectures and the accompanying notes. At our institution, the number of faculty members using presentation software to teach increased from 3 in 1997 to 45 in 2000.
2. The Internet and e-mail lend themselves to asynchronous prompt communication not confined to the campus. At NYCC, most day-to-day communication within the entire user community is via e-mail and the Internet.
3. Asynchronous learning by students via Internet resources, network files, and e-mail is becoming commonplace. At NYCC, the integration of computer technology in the learning process is evidenced by several on-line course materials: 12,291 student hits were seen on a mandatory on-line course over a 13-week period; 7,406 student hits

were seen on a materials on a complementary on-line course for a lab over a 13-week period.

4. Teaching with additional visuals has resulted in enhanced academic performance. At NYCC, students and faculty have initiated e-mailing of files, images, and websites related to specifics covered in courses. PowerPoint lectures have been made available on the Intranet to allow students to "revisit" lectures containing text and images.

CONCLUSION

Computer technology is becoming a more commonly utilized resource in the learning process at institutions of higher education. Empowering the user entails personal support by approachable individuals who look at academia from a technical, educational, and user frame of reference. The support mechanisms currently made available have encouraged the use of computer technology for electronic presentation, communication, and asynchronous learning.



An Investigation of the Peripheral Trigeminovascular System Nasal Lavage as an Objective Diagnostic Tool in Migraine: A Pilot Study

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Chiropractic College—Los Angeles

Migraine has been demonstrated to result from changes in the peripheral and/or central nervous system. Studies on migraine show that migraine attacks in the early phase occur as a result of increased sympathetic activities, which cause the cerebral vasoconstriction. The vasoconstriction is followed by vasodilatation that leads to pain and headache. The vasodilatation has been explained to be as a result of increased endogenous prostaglandin release that inhibits the sympathetic activity and trigemino-parasympathetic reflex. However, whether peripheral changes in trigeminovascular system are also involved in pathophysiologic mechanisms of migraine is still unclear.

OBJECTIVE

The purpose of the present study was to investigate the peripheral inflammatory changes of the trigeminovascular system by measuring inflammatory mediators, peptide leukotrienes (pLT), prostaglandins (PGE₂), and thromboxane (TXB₂) in the nasal fluid of migraine patients. Increased concentration of the inflammatory mediators in nasal lavage

might be an indicator of an ongoing activated peripheral trigeminovascular system and neurogenic inflammation in migraine patients. This model might also be applicable, besides subjective responses, as an objective tool to assess the progressive improvement of migraine pain following chiropractic treatments.

METHODS

A total of 18 subjects (men and women), nine migraine patients and nine sex- and age-matched healthy volunteers, participated in the study. Each subject took part in an experimental session. In this session, they were required to complete a "Health History Questionnaire." They were also informed about the study and finally underwent nasal lavage. Nasal lavage was performed using Ringer's lactate solution. Lavage fluid was frozen at -80°C for further analysis. A highly sensitive enzyme immunoassay (EIA) was used to analyze the samples.

The data analysis is in progress and the evaluation of data will be completed prior to the ACC meeting and will be included in the poster presentation.



Life University College of Chiropractic Clinical Certification Program An Innovative Approach to Clinical Education

Deborah Pogrelis, D.C., Sid E. Williams, B.S., D.C., Scott Earley, D.C., and Cynthia Boyd, B.S., D.C., Life University

This paper outlines the process of development and implementation of curricular restructuring (Clinical Certification Program) in the clinical setting at Life University College of Chiropractic. Making a commitment to assess a program with long-standing tenure is fraught with difficulty. It was decided early on that to ensure the successful completion of this project, all constituents of the Life University College of Chiropractic must be involved in the process.

BACKGROUND

The Clinical Certification Program began with a charge from the President to investigate our approach to clinical education in May 1997. It was his goal that we create a new approach to clinical training that would produce highly skilled and trained student clinicians.

METHODS

In November 1997, the Dean of the College of Chiropractic gave a directive to form a multidisciplinary work group with constituents from the divisions of Technique and Analysis, Clinic Business, and Clinic Faculty. This group looked at baseline parameters for subluxation-based care as taught in our curriculum and the application of those parameters in the clinical setting. In addition, they looked at standards of case management throughout the profession. In February 1998, a consultant was brought in to facilitate progress. The charge of the multidisciplinary work group (Case Management/Quality Assurance Committee) was to study the feasibility of creating a clinical certification program, define the terms *certification* and *case management*, and define the goals of the clinical certification program. At this point, two plans for implementation were brought forward:

1. Integration of the certification program into the existing outpatient care facilities
2. Implementation of the certification program in a separate stand-alone facility

These proposals were brought forward in September 1998. It was decided to utilize the main campus clinic facility that was then occupied by the student clinic. This change in facility use was scheduled to take place in the Fall Term 1999.

In early summer 1999, an intensive effort began to prepare for the implementation of the first phase of the Clinical Certification Program. It had been decided that the certification process would be phased in one technique at a time beginning with Toggle/HIO, followed by Full Spine, and an additional upper cervical technique last. Faculty recruitment was begun. Weekly lesson plans were developed. Skill assessment instruments were designed. Thermography and adjusting equipment was ordered. Students were notified they would have the opportunity to enroll in this innovative program beginning Fall Term 1999.

The certification program was designed to provide students with the training necessary to become proficient in the evaluation of patients and the delivery of specific chiropractic care. This unique program, which operates as a "rounds" scenario, allows small groups of students (3–6) to participate in or observe all aspects of the case presentations of patients while under the direct supervision of technique specialists (both clinic faculty and technique faculty) at all times. Upon completion of the Clinical Certification Program and other prerequisite courses in the curriculum, students enter the 8th Term outpatient clinic practicum.

RESULTS

Student satisfaction surveys indicated that 97% of 7th Term students completing the Clinical Certification Program felt more competent in their patient evaluation and case management skills. The consensus of the Certification Clinical Faculty was that the certification program increases student competence in all areas of patient management. A serendipitous benefit of the development and implementation of the Clinical Certification Program has been a better working relationship between Didactic Teaching Faculty and Clinical Teaching Faculty.

CONCLUSION

The effort required to assess curriculum effectiveness and develop new approaches to clinical training is definitely justified. Working toward a common goal creates a spirit of collegiality and teamwork in which all parties (faculty, students, and patients) benefit.



Evaluation of Motion and Still Images as a Learning and Assessment Tool

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

Three-dimensional computer modeling is a learning tool category constituting multiple views of a model. This was compared in a study with the traditional print media category which presents only key views, such as lateral, anterior, and superior views. Contrary to expectation, it was found that students actually performed better at identifying landmarks when they had been presented only with key views as opposed to the multiple views of the computer viewers, suggesting that the brain may store spatial information as specific two-dimensional views. Other cognitive research with three-dimensional objects has supported this. However, one must note that prior conditioning may also affect the results of such research, and that the memorization of spatial landmarks is just one application of visual information processing. Other mental processes come into play when attempting various cognitive tasks, such as mastering an adjustment.

A similar form of multiple-view learning tool is motion video. This media can convey dynamic information that is virtually impossible to convey via key view imagery. The combination of the three-dimensional viewer with motion animation offers many new unexplored opportunities for education research. Three-dimensional animation can create motion that conveys information formerly unavailable or difficult to produce in traditional motion imaging and in the real world. How does this motion imagery, which depicts multiple views of a potentially enhanced information dynamic, compare with a static key view of the same phenomenon?

METHODS

A series of still and motion images of the upper cervical bones placed into misalignments was created. The motion views depicted the segments starting at perfect alignment and then moving to complete misalignment and stopping briefly, then repeating. The still images for the comparison study were exported from the motion views, showing the complete misalignment. A still image of perfect alignment was also generated. Students tested on the still images were given the perfectly aligned image and the completely misaligned images side-by-side for comparison.

RESULTS

The percentage of correct selections between the opposite angle or kink misalignment choices over all four questions was slightly higher for the motion group over the still group. The average degrees misalignment estimation of the motion groups was exaggerated in cases of smaller misalignments (cases 1 and 2) as compared with the still group. The standard deviations for this portion were somewhat high in all groups.

DISCUSSION

The results did not vary much between groups, suggesting that an advantage of any group is minimal. That the mixed group was a small group with a skewed perspective warrants separating this into two studies, the first of which includes the larger still and motion groups and is thus more reliable and indicates slight success of motion imaging. The high standard deviations suggest that many students did not understand the material. Future studies should include more control and a larger sample size. A poll of student enthusiasm ranked lowest in the still group compared with the motion and mixed groups, suggesting that adding motion to the test made it more interesting. The dynamic of student interest can influence many facets of learning and should certainly be considered as part of the criteria in evaluation.

CONCLUSION

Motion type imaging seems to have only a slight advantage for conveying orthogonal misalignment analysis. It may enhance conveyance of other forms of complex information to a greater extent. The fact that computer-generated motion simulation can reveal information that is difficult to otherwise visualize suggests that it has value for complex task visualization. Studies of this medium must extend beyond simple anatomical landmark identifications.



Survey of Demographics, Research Activities, Training Needs, Departmental Support, and Career Intentions of Junior Academic Chiropractors

David Skyba, D.C., **Chutima Phongphua**, M.D., D.C., M.B.A., M.P.H., and **Cynthia Long**, Ph.D., Palmer Center for Chiropractic Research

To date, no interinstitutional evaluation of chiropractic residency/fellowship training exists. The purpose of this study was to assess the research activity, perceived level of training, departmental support needs, characteristics, and career intentions of junior academic chiropractors in specialty or advanced training programs.

METHODS

This study employed a cross-sectional design. A survey format was used for the purpose of data collection. A postal, semi-structured questionnaire was designed and sent to all eligible junior academic chiropractors in academic departments at chiropractic institutions within North America. No comprehensive list of trainees existed. A sample of convenience was used. However, efforts to obtain as many current trainees as possible were undertaken. The questionnaire content was subdivided into different categories, including: demographics, perceptions of training in research and teaching, personal research activities, departmental support, and additional background information in related areas.

RESULTS

A total of 44 questionnaires were sent out to the eligible resident/ fellow chiropractors. Three questionnaires were returned uncompleted, as the addressees were no longer residents. In the first round, 58.5% of the cohort responded; 35.3% of the remainder responded in the second round, a 4-week reminder with questionnaire for the nonrespondents in the first round. In total, the response rate was 73.2% for this survey.

DISCUSSION AND CONCLUSION

Data analysis regarding the association between predictive variables including research productivity and perceived level of satisfaction with teaching training is ongoing. It is our hope that this study will serve as a much-needed first step for investigating the future potential of scholarship in chiropractic research, education, and training.



Chiropractic Interns Teach Health Promotion through Hands-on Care to Mentally Ill Chemical Abusers

Lana Slinkard, R.N., B.S.N., B.S., D.C., New York Chiropractic College

The Haven is a nonprofit government-supported day-care facility for mentally ill chemical abusers/addicts (MICA) on Long Island, New York. The 5-year-old MICA program became more holistic with inclusion of chiropractic care delivered by chiropractic interns.

METHODS

Three times a week, under clinician supervision, chiropractic interns provide services in the Haven facility. All clients receive a complete history evaluation and physical

examination, orthopedic and neurologic assessments, and spinal screening to determine if they could benefit from chiropractic care. Haven clients may also receive a radiologic evaluation, if indicated. Interns educate clients about the body's innate recuperative abilities and how chiropractic care can promote optimal body function. Clients experience a purely hands-on approach, using spinal manipulation and soft-tissue techniques. Our primary objective is for the clients to experience the benefits of chiropractic, and to learn through their positive experiences to seek out therapeutic human touch rather than drugs for relief of the stresses and physical discomforts associated with their recovery and in the future.

RESULTS

The team approach of chiropractic care in conjunction with the individual and group therapy, auriculotherapy for addiction, occupational therapy, art therapy, and other programs provided by the Haven staff is effective and is appreciated by the participating clients. Feedback from other health care professionals involved in the Haven clients' care has been very positive, and directors of other programs through the same county agency have requested on-site chiropractic programs to serve MICA clients after they complete the Haven rehabilitation. This optional program is one of the most popular at the college, with over 90% of the Long Island interns participating.

DISCUSSION

Healthy People 2000, National Health Promotion and Disease Objective, published by the U.S. Department of Health and Human Services Public Health Service, cites three goals for the Nation:

- Goal 1: Increase the span of healthy life for Americans
- Goal 2: Reduce health disparities among Americans
- Goal 3: Achieve access to preventive services for all Americans

The small local program at the Haven in which only 80 MICA patients have been served so far seems but a small effort in light of these lofty national aspirations. "Think globally but act locally" is a phrase which really describes our efforts. Chiropractic care as part of a healthy lifestyle is enjoyed only by a minority of Americans and MICA patients are one of the least served populations. An estimated 23 million adults in the United States are severely incapacitated from mental disorders, not including substance abuse, and a very large proportion of individuals with mental disorders do not even receive medical treatment. Health practitioner concerns about contracting HIV, hepatitis, and tuberculosis have resulted in increased fear and less willingness to care for mentally ill drug addicts, particularly those who are homeless. In New York State, chiropractic care is not covered under Medicaid, which limits service to poor MICA patients who are on the road to recovery. Providing free care to clients at the Haven is a small but meaningful effort on the road to achieving these three goals.

Achieving an increased healthy life span, reducing health disparities, and providing access to preventive services for all Americans can only occur when health care providers and educators are willing to step outside their respective comfort zones and commit to reaching out to those who are least served. One small step can become leaps and bounds through the cultivation of altruism in the interns who voluntarily participate in this program. Chiropractic interns at the Haven learn how it feels to reap the internal rewards that can be experienced through giving freely as a chiropractic volunteer.



The Use of Flexion-Distraction Procedure in the Management of an Acute Lumbar Disc Herniation A Case Report

Larry L. Swank, D.C., M.S., D.A.B.C.O., and **Julie A. Schrad**, D.C., M.S., Palmer College of Chiropractic

The purpose of the report is to describe the chiropractic management of a patient presenting with lumbar disc herniation involving two disc levels, L4 and L5, by the use of flexion-distraction procedure. This particular case describes an atypical presentation due to the L5 disc affecting two nerve roots, L5 and S1, via protrusion into the neuroforamen of L5-S1.

METHODS

Conservative management of this case consisted of manual flexion-distraction technique over a 12-week period of time. Minimal force and depth were initially applied with gradual

increases of force and depth applied as the patient progressed. Various modalities were applied throughout the course of care to assist in decreasing inflammation and to promote healing in the involved areas.

RESULTS

Chiropractic care utilizing the flexion-distraction technique provided the patient with immediate relief of symptoms, as reported by the patient via the visual analog scale, with a decrease of low back and buttock pain by 50% within the first week of care. The patient was able to return to work by the end of the eight week of care.

DISCUSSION

This atypical presentation of lumbar disc herniation provides an example of patient management by using flexion–distraction procedure (technique).

CONCLUSION

This case demonstrates successful use of the flexion–distraction procedure as a conservative approach to the management of lumbar disc herniation. Results encourage further investigation through a well-designed clinical trial study.



Use of the Computer to Manage the Curriculum and to Facilitate Student Learning in Chiropractic Education

Robert M. Waterson, Ph.D., Life University

For the past 3 years, Life University has worked to develop the use of computer technology in our academic programs. We conducted workshops, established a Technology Center for faculty training and support, and contracted for a self-tutorial, computer-based training program. It became clear that achieving “computer literacy” was only a beginning. A required second step was to develop a multimedia-based method of instruction.

The Biochemistry curriculum at Life University is a two-term course sequence. The first course emphasizes structures and functions of biomolecules and introductions to principles of enzymology, molecular biology, and bioenergetics. The second course includes detailed descriptions of the pathways of intermediary metabolism of carbohydrates, lipids and proteins, and the mechanisms of metabolic regulation.

Over the past 2 years, a multimedia program has been developed for the teaching of these courses. It is still “under construction” but worth discussing at its current state of development. Significant improvements have been derived from the use of interactive media, such as molecular modeling and selected on-line animations. This has been evidenced by improved student attention, interest, and motivation.

METHODS

Lectures have been developed primarily for presentation as Microsoft PowerPoint Slideshows, supplemented with on-line animations and other graphics from the Internet using the Netscape Navigator web browser. In-class presentation equipment includes a laptop computer equipped with an (Cross iPEN) electronic writing tablet, a digital projector, and a link to the Internet. Two additional, key software components are Shockwave animation and the CHIME molecular modeling software. Both are available as freeware (Macromedia and MDL, respectively). The iPEN has proven to be a very important accessory, allowing for direct annotation onto the projected computer screen, without having to switch to either a blackboard or an overhead transparency projector.

Items provided via the Web Course in a Box site include course syllabus, lecture schedule, and learning objectives; links to electronic “texts”; links to software; and links to charts, molecular models, animations, etc. presented in class. This added vehicle allows student access at their own time and pace out of class.

RESULTS, DISCUSSION, AND CONCLUSIONS

When asked to compare my computer-based instructional approach to other course formats, students responded with several common points:

- Use of technology saves teachers time and increases the quality of the presentation.
- Visuals help students comprehend difficult concepts.
- The simultaneous combination of pictures and lecture helps the student’s understanding.
- The PowerPoint custom-animated graphics allow step-by-step development of concepts from part to whole, or vice versa.
- There is no distraction from teachers walking to the blackboard or sloppy handwriting.
- Presentations are more interesting and motivational.
- Three-dimensional (3D) structures and visual rotation help students picture and understand the material.
- Chime is fantastic—3D movement of molecules helped to visualize structures and attachments for proteins, DNA, etc.
- Lecture material is reinforced out of class and/or at home with Internet sources—websites, animation links, and backup materials.

For the teacher, self-motivation is a major benefit. A very positive experience may be had in spite of the time-consuming effort required to develop a digital course. Clearly, computer technology improves the delivery of any graduate-level subject matter and has implications for other teachers of Chiropractic, for both in-class and distance education.



Student Performance on and Attitude toward an Examination that Challenges Answer Confidence

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This study was conducted to assess the performance and attitude of students to a multiple-choice examination format that offered the option of weighting their answers. The study additionally looked at relationships between attitude and utilization of the weighting option.

METHODS

One hundred fifty students were given a multiple-choice examination with instruction to answer each question three times. There was only one correct answer to each question. Students could therefore weight their response depending on their certainty. If the student was certain of his or her response, all three responses should be the same. If the student was uncertain of his or her response, he or she had the option of putting variable responses in the three blanks. Each question carried a weight of 3 points, one point for each of the three responses. After completing the examination, students rated the favorability of the format on a 0–10 scale. A rating of 0 indicates unfavorable and 10 indicates favorable. Complete statistical analysis of the data is currently in progress. The study will examine the relationships between student score, utilization of the weighted answer option, and the 0–10 favorability rating.

RESULTS

Seventy-four percent of the students utilized the weighting option by answering individual questions with more than one response. Fifty-one percent of the students favored the examination format, 30% did not, and 19% were neutral. Students utilizing the option of choosing multiple responses had a lower mean test score than those not utilizing the option. Differences in favorability of the examination format did not show a significant difference in the mean score. Over 66% of the students who did not favor the examination format utilized the option of weighting their response.

CONCLUSION

This sample of students favored the option of being able to weight their answers. Those who did not favor the option still overwhelmingly chose to utilize it. All groups choosing to utilize the option had a lower mean score than those who did not. This may be an indication of the level of confidence in student response. The examination format may expose instructional areas where student confidence is lacking. This format may be useful in aiding instructors to continually refine their teaching to focus on the areas needing attention.



Cervical Arthrosis: Influencing Factors of Biomechanical Stress, Location, Frequency, Age, and Gender within a Symptomatic Group

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Plain-film radiography can be an initial means of evaluating degenerative joint disease of the cervical spine. Much controversy exists regarding the correlation of radiographic findings to pain and dysfunction. The purpose of this investigation is to determine the frequency of cervical arthrosis as identified on neutral lateral cervical radiographs and assess its relation to biomechanical stress, location, age, gender, and subjective complaint.

METHODS

One hundred eighty-six neutral lateral cervical radiographs were reviewed for arthrosis by a chiropractic radiologist. A five-category severity scale was used to grade the arthrosis. The subjects' age, gender, and symptoms were recorded. Biomechanical stress was determined by analyzing

17 variables of alignment, geometry, and loading using a computer program. A quantitative, five-category, severity scale was used to grade the biomechanical stress.

RESULTS

The sample population of 186 subjects had a gender distribution of female to male 125:61. On average, there was severe biomechanical stress. Seventy-two subjects, 49 females and 23 males, had at least one level of arthrosis. More than half had a second level. On average, there was moderate arthrosis. Of those with arthrosis, 100% had anterior arthrosis with 79% having discogenic spondylosis and 7% having concomitant posterior arthrosis. The most common site of arthrosis was C5–C6 (39%), followed by C4–C5 (24%), C6–C7 (22%) and C3–C4 (11%).

The presence of arthrosis was found to be age dependent, with 6% in ages 15–30, 25% in ages 31–40, 75% in ages 41–50, 83% in ages 51–60, and 100% in the age group greater than 61. There was an 80% increase of arthrosis in males ages 31–40 and an 81% increase in females ages 51–60. There was equal occurrence of arthrosis in male and female ages 41–50 and ages greater than 60. Arthrosis was observed in 30% of headache subjects, 47% of neck stiffness subjects, 40% of neck pain subjects, 64% of upper extremity paresthesia subjects, 44% of thoracic pain subjects, 60% of shoulder pain subjects, and 44% of pain radiation subjects.

Overall, biomechanical stress was rated as severe for all descriptive symptoms with arthrosis. There was a 15% difference in the highest to the lowest amount of stress. A descending order of biomechanical stress to symptom

follows: thoracic pain, headache, shoulder pain, neck pain, neck stiffness, and radiation. In the age group of 31–40, males demonstrated arthrosis with 15% less stress. In the age group of 41–50, females demonstrated arthrosis with 12% less stress, and in the age group of 51–60, females demonstrated arthrosis with 21% less stress than males.

DISCUSSION

Females presented with a 2:1 ratio in this prospective study of 186 consecutive symptomatic subjects. The group as a whole was rated severe for adverse biomechanical stress. With this common variable, 75% of the sample population demonstrated moderate arthrosis after the age of 40. Females demonstrated arthrosis with less biomechanical stress than males after the age of 40. Gender seems to be a dependent variable with the initial onset of arthrosis highest in males within the age group of 31–40 and highest in females within the age group 51–60. The results support a differential pathologic response per gender.

CONCLUSION

Severe biomechanical stress was a common variable for both symptomatology and cervical arthrosis. A larger sample group needs to be collected across a broader range of biomechanical stress, particularly decreased stress, to better understand its contribution to the frequency of cervical arthrosis, symptoms, and gender relation.



The Effect of Chiropractic Adjustment on Body Surface Electromagnetic Field

John Zhang, MD, Ph.D., and **Brian J. Snyder**, D.C., Logan College of Chiropractic

Exposure to natural or man-made electromagnetic fields (EMFs) has been linked to many health hazards, such as cancer, abnormal behavior, memory loss, Parkinsons disease, and Alzheimer's disease. EMFs also affect the electrophysiology of the cardiovascular system. Despite many reports on the harmful effects of the high environmental EMF on animals and humans, very few studies focused on the beneficial effect of reducing EMF in humans. The purpose of this study is to investigate the body surface electromagnetic field changes using a sensitive magnetometer before and after a specific chiropractic adjustment in asymptomatic human subjects.

METHODS

All 44 subjects were randomly selected and assigned into control (20 subjects) and experimental (24 subjects) groups. The EMF in the research room and on the adjustment table was monitored and recorded. The subjects' body surface (cervical, thoracic, lumbar, and sacral areas) EMF was determined in the prone position before and after the chiropractic adjustment. A low-force chiropractic adjustment was applied to the cervical, thoracic, lumbar, and sacral areas as determined by the practitioner. The Triaxial Fluxgate

Magnetometer FGM-5DTAA (Walker Scientific, Worcester, MA) with five-digit display and resolution of 1 nanotesla (nT) was used for EMF detection. The instrument was calibrated according to the industrial standards for accurate EMF readings.

RESULTS

The EMF in the research room was recorded as 41,611 nT at the z axis (earth field), 13,761 nT at the x axis, and 7,438 nT at the y axis. The EMF on the adjusting table changed minimally during the 15-minute treatment period with an average of 42,167 nT at 0 minute, 42,537 nT at 5 minutes, 42,330 nT at 10 minutes, and 42,321 nT at 15 minutes. The EMF on the subjects' body surface showed a higher reading at the lumbar and sacral regions. The EMFs (mean \pm SD in nT) in the cervical, thoracic, lumbar, and sacral region were $42,461.61 \pm 1,099.84$, $42,383.26 \pm 820.01$, $43,3316.78 \pm 905.39$, and $43,440.30 \pm 922.17$ before the low-force chiropractic adjustment. After the chiropractic adjustment the EMF in the cervical, thoracic, lumbar and sacral regions were $41,682.65 \pm 1,206.17$ ($p < .01$), $42,001.35 \pm 1,333.79$ ($p > .05$), $43,036.17 \pm 960.75$ ($p > .05$), and $42,996 \pm 922.17$ ($p < .01$), respectively. A significant reduction of the body surface EMF was observed in the cervical and sacral regions. No significant changes of the body surface EMF were found in the control group.

DISCUSSION

It was well documented that electrical current exits at all muscle and nerve cells to maintain resting membrane potential and action potentials. This electrical current is easily measured on the body surface using the electrocardiogram (ECG) for recording of the electrical activities of the heart and using the electromyogram (EMG) for determining the muscle electrical activities. Electromagnetic field is produced whenever there is electrical current flowing around the tissue cells. The strength of the EMF on human body is very weak as compared to other sources of EMF on the earth surface. The EMF strength on the body surface is determined to a large extent by the muscle mass and nerves that supply the muscle fibers. Since there was a reduction of the body surface EMF after the chiropractic adjustment, it was hypothesized that the reduction of EMF was related to the muscle relaxation.

CONCLUSION

A low-force chiropractic adjustment in the cervical and sacral areas on the body surface resulted in a significant reduction of the body surface EMF that may be related to muscle relaxation. It was determined that the interference from the adjusting table and ambient EMF was minimal. Other subtle factors that may affect the EMF readings will be investigated further to provide evidence to support that reduction of EMF is produced by the low-force chiropractic adjustment.



The Effects of Auriculotherapy on Short-Term Heart Rate Variability in Normal Human Subjects

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Cardiovascular diseases lead to an estimated 500,000 heart attacks each year in the United States. Conservative methods of treatment using traditional Chinese ear acupuncture have gained more acceptances in recent years. Modern auriculotherapy, developed by a French physiologist, Nogier, has shown clinical efficacy for many conditions. However, there are no reports of randomized controlled studies of the auriculotherapy on the heart point and its effect on the autonomic nervous system. This randomized controlled study was designed to investigate the effect of auriculotherapy on the subject's electrocardiogram (ECG) and heart rate variability (HRV) to test the hypothesis that stimulation of the heart point in the ear affects the short-term autonomic nervous system balance.

METHODS

A total of 40 subjects were randomly assigned to the experimental group (20 subjects) and the control groups (20 subjects). Subjects were excluded from the study if they had a history of heart disease, chest pain, or shortness of breath.

The ECGs were recorded using the Electrocardiograph Auto Cardiner FCP 4101A. Subjects were instructed to refrain from talking and moving during the 6 minutes of ECG recording. The Stim Flex 400 machine was used for the auriculotherapy for both groups. The heart point of the right concha in the experimental group and the elbow point on the right helix in the control group were stimulated for 64 seconds. Stimulation intensity was selected at 60 microamps

at 5 Hz. The EKG was again recorded for 6-minute intervals as the post-treatment record.

Heart rate variability was determined from R–R interval of each subject's 6-minute ECG recording. The spectral analysis of this signal was obtained from a successive discrete series of R–R duration values taken from the ECG signal and transformed by the Fast Fourier technique. All postanalysis, including Fast Fourier Transforms, power spectral density, and time domain measurements were performed with digital signal processing software.

RESULTS

The heart rate in the experimental group increased from 67.72 ± 9.9 to 68.19 ± 10.7 BPM (beats per minute) but did not reach a significant level before and after the auriculotherapy. The heart rate in the control group showed a decrease from 69.15 ± 8.48 to 68.56 ± 8.72 BPM. The high-frequency component in the power spectral analysis showed statistically significant decrease ($p < .05$) from 348 to 267 ms^2/Hz in the experimental group before and after the auriculotherapy. The low-frequency component increased after auriculotherapy from 300.4 ± 212.7 to 428.19 ± 353.6 ms^2/Hz ($p = .058$). The LF/HF ratio increased from 1.395 \pm 1.104 to 2.376 ± 2.256 ($p < .026$). There were no significant changes in the control groups.

DISCUSSION

A significant decrease in the high-frequency component was found in the experimental group but not the control group, indicating that stimulation of the heart point and not the elbow point caused a reduction of the parasympathetic activity. The decreased parasympathetic stimulation was consistent in the findings that both the heart rate and LF/HF ratio were increased after the subjects received auriculotherapy.

This study demonstrates that stimulation on the heart point of the ear may induce inhibition of a parasympathetic response. It will be interesting to investigate long-term effect of auriculotherapy on the autonomic nervous system and the mechanisms behind the clinical efficacy of auriculotherapy for cardiac conditions.

CONCLUSION

Normal asymptomatic subjects responded to the auriculotherapy at the heart point with a decrease of the high-frequency component in the HRV analysis, indicating a possible short-term inhibition of the parasympathetic tone.