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Clinical evaluation tools: a survey of doctors of chiropractic and students at one chiropractic college

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Introduction: *The reliability and validity of many evaluation tools leading to clinical decision-making for spinal manipulation are varied. We surveyed senior students and DC employees at one chiropractic college regarding 1) which analysis tools should be used and 2) factors that influence their choices.*

Methods: *The survey queried which tools should be used on a routine patient encounter. Clinical evaluation tools included palpation, skin temperature analysis, leg length analysis, and radiographs.*

Results: *Surveys were collected from 58 doctors of chiropractic (DCs) and 74 students. Respondents from both groups reported to most commonly use static palpation, followed by motion palpation and leg length analysis. DC respondents ranked evidence and personal experience high for rationale; student respondents frequently chose patient preference.*

Introduction : *La fiabilité et la validité de nombreux outils d'évaluation menant à la prise de décision clinique pour la manipulation vertébrale sont variées. Nous avons interrogé les étudiants de cycle supérieur et les employés chiropraticiens d'un collège de chiropratique concernant 1) les outils d'analyse à utiliser et 2) les facteurs qui influencent leurs choix.*

Méthodologie : *Le sondage interrogeait sur les outils qui devraient être utilisés lors d'une rencontre ordinaire avec un patient. Les outils d'évaluation clinique comprenaient la palpation, l'analyse de la température de la peau, l'analyse de la longueur des membres inférieurs et les radiographies.*

Résultats : *58 chiropraticiens et 74 étudiants ont répondu au sondage. Les répondants de ces deux groupes ont mentionné l'utilisation très fréquente de la palpation statique, suivie de la palpation dynamique et de l'analyse de la longueur des membres inférieurs. Les chiropraticiens ont souligné l'importance de se fonder sur les preuves et l'expérience personnelle; par contre,*

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Conclusion: *DC and student respondents reported use of clinical evaluation tools consistently. However, some variations in rationale were noted. It is important for educators to provide a balanced presentation of the strengths and limitations of clinical analysis procedures to support the development of well-justified evidence-based clinical decision-making skills.*

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KEY WORDS: chiropractic, spinal manipulation, palpation, decision making

les étudiants interrogés ont choisi souvent la préférence du patient.

Conclusion : *Les chiropraticiens et les étudiants interrogés ont signalé l'utilisation régulière des outils d'évaluation clinique. Cependant, quelques variations dans la justification ont été notées. Il est important que les éducateurs fournissent une présentation équilibrée des points forts et des limites des procédures d'analyses cliniques afin de soutenir le développement de compétences décisionnelles cliniques bien justifiées et fondées sur des preuves.*

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MOTS CLÉS : chiropratique, manipulation vertébrale, palpation, prise de décision

Introduction

Doctors of chiropractic (DCs) use information from multiple sources to render clinical decisions regarding where, when, and how to perform spinal manipulative procedures.[1,2] Information is obtained from static and motion palpatory findings, skin temperature analysis, postural and leg length analysis, radiographic assessment, symptoms, the primary diagnosis of the condition being treated, and other physical examination findings.[3] Additional information derived from the patient interview includes prior response(s) to care, patient preferences, co-morbid conditions, and goals. Incorporating multi-faceted information into clinical decision-making is therefore, a complex process.[4,5]

Evidence-based practice suggests skillfully incorporating research evidence, patient values, and practitioner experience when determining which clinical evaluation tools to use and how to appropriately weigh the clinical information gleaned from them when rendering clinical decisions.[6] However, the reliability and validity of many evaluation tools leading to clinical decision-making for spinal manipulation (SM) have not been robustly established,[7–17] leaving evidence-based practitioners to depend more on clinical experience, patient values, and other aspects of the clinical presentation. Despite limited reliability and the lack of research studying the validity of some analysis procedures, patients with a range of musculoskeletal conditions often improve following SM performed by doctors of chiropractic using a variety of analysis tools and technique methods.[18] Evaluation tools are learned in educational settings, where students are challenged to develop appropriate patient assessment habits and decision-making skills.

The purpose of this study is to survey chiropractic students and DC employees at a United States chiropractic college regarding 1) which clinical analysis tools should be used during routine patient encounters when evaluating patients for SM, and 2) what factors most influence respondent choices.

Methods

The Human Protections Administrator determined this study exempt from full IRB review, IRB Assurance # X2013-7-12-M. The study was conducted in 2013.

Participants

The survey was administered both to chiropractic students in the ninth term (final year) and all DC employees (faculty, staff and administrators) at the Davenport campus of Palmer College of Chiropractic. Respondents were not compensated in any way for participating.

Students in ninth term were surveyed as a convenience sample of interns who had previously completed coursework covering spinal analysis protocols, taught in 2nd

Figure 1.
Survey instrument inquiring of DC employees and senior students regarding use of chiropractic evaluation tools

Consider a routine patient encounter and the evaluation prior to performing a chiropractic adjustment.

	1a. On how many patient encounters do you think the following procedures should be performed? (**mark only one**)				1b. Which of the following reasons best describe your rationale for the answers provided for each procedure? **(mark only one most influential)**			
	All patient encounters	**Most patient encounters**	**Some patient encounters**	**No patient encounters**	**Personal Experience**	**Personal Philosophy**	**Patient Preference**	**Research Evidence**
Palpation								
Static/soft tissue prominence	❍	❍	❍	❍	❍	❍	❍	❍
Motion palpation								
Seated	❍	❍	❍	❍	❍	❍	❍	❍
Supine	❍	❍	❍	❍	❍	❍	❍	❍
Instrumentation/Skin Temperature Assessment								
Galvanic/Dual Probe [1]	❍	❍	❍	❍	❍	❍	❍	❍
Tytron [2]								
Segmental	❍	❍	❍	❍	❍	❍	❍	❍
Pattern	❍	❍	❍	❍	❍	❍	❍	❍
Fossa Differential	❍	❍	❍	❍	❍	❍	❍	❍
Leg Check								
Supine	❍	❍	❍	❍	❍	❍	❍	❍
Prone (extension only)	❍	❍	❍	❍	❍	❍	❍	❍
Cervical Syndrome	❍	❍	❍	❍	❍	❍	❍	❍
+D [3]	❍	❍	❍	❍	❍	❍	❍	❍
- D [4]	❍	❍	❍	❍	❍	❍	❍	❍
Sacral Leg Check (SLC) [5]	❍	❍	❍	❍	❍	❍	❍	❍
Radiographs (x-rays)								
Biomechanical analysis (segmental listings)	❍	❍	❍	❍	❍	❍	❍	❍
Additional findings (Abnormal curvatures [global], degenerative changes, spondylolisthesis)	❍	❍	❍	❍	❍	❍	❍	❍

[1] Galvanic/dual probe instruments measure skin temperature conductance and are used to determine sharp differences in bilateral skin temperature from one vertebra to another.
[2] Tytron® infrared skin temperature analysis used to compare bilateral spinal temperature either from one vertebral level to another (segmentally) or as changes from sacrum to occiput (pattern). This infrared instrument can also be used to show bilateral difference between the region superficial to the atlas transverse processes (fossa differential).
For +D and –D, leg length is viewed in extension (position 1) and then flexed to 90° (position 2) while the patient is prone.
[3] +D implicated when an observed short leg in position 1 appears to be longer when viewed in position 2.
[4] –D implicated when an observed short leg in position 1 appears to stay short when viewed in position 2.
[5] SLC observes a patient's ability to symmetrically lift each leg individually presumably evaluating the associated sacroiliac joint and sacral deviation.

through 7th terms.[19] Students surveyed were engaged in outpatient care under the direct supervision of licensed college faculty members. The paper-based survey was implemented during a clinical instruction class in 2013, in which 111 students were registered. We chose the students from ninth term (of 10) as the convenience sample because they 1) completed prior training regarding chiropractic analysis tools, 2) participated in some supervised patient care activities, and 3) were in the final term of required classroom attendance.

Table 1.
Respondent demographics (n=132)

	n(%)
Group one (students)	74(67)
Anticipated graduation	
February 2014 (following term)	74(100)
Group two (DC employees)	58(61)
Licensed	55(95)
Currently seeing patients	29(50)
Seeing patients off campus	9(16)
Primary Department	
Academic Health Center	8(14)
Administration	11(19)
Campus Health Center	4(7)
Diagnosis & Radiology	5(9)
Life Sciences	2(3)
Philosophy & Practice Mgmt	1(2)
Rehab & Sports Injury	2(3)
Research	9(16)
Technique	11(19)
Other	4(7)

Table 2.
Respondent reported technique use

Group one (students) n=74	n(%)	**Group two (DC employees) n=58**	n(%)
Palmer Package	54(73.0)	Palmer Package	43(74.1)
Diversified	24(32.4)	Diversified	42(72.4)
Gonstead	23(31.1)	Gonstead	29(50.0)
Drop	23(31.1)	Thompson	24(41.4)
Thompson	18(24.3)	Drop	22(37.9)
Activator	15(20.3)	Activator	18(31.0)
Other	13(17.6)	Flexion/Distraction	17(29.3)
Flexion/Distraction	6(8.1)	Toggle-Recoil	14(24.1)
Toggle-Recoil	4(5.4)	Other	11(18.9)
SOT	3(4.1)	SOT	4(6.8)
Atlas Orthogonal	3(4.1)	Atlas Orthogonal	3(5.2)
NUCCA	3(4.1)	Blair	2(3.4)
Pettibon	1(1.4)	NUCCA	1(1.7)
Blair	0(0)	Pettibon	1(1.7)

Table 3.

Responses from senior students regarding a routine patient encounter and the evaluation prior to performing a chiropractic adjustment (n=74).

	On how many encounters should this procedure be performed?					*Which best describe your rationale for this frequency?*				
Procedure	**All n(%)**	**Most n(%)**	**Some n(%)**	**Never n(%)**	**Missing n(%)**	**Personal Experience n(%)**	**Personal Philosophy n(%)**	**Patient Preference n(%)**	**Research Evidence n(%)**	**Missing n(%)**
Palpation-static/soft tissue prominence	62(83.4)	11(14.9)	1(1.4)	0(0)	0(0.0)	8(18.6)	12(27.9)	21(48.8)	2(4.7)	2(2.8)
Leg checks (prone, extension only)	41(55.4)	18(24.3)	10(13.5)	5(6.8)	0(0.0)	28(38.9)	3(4.2)	31(43.1)	10(13.9)	2(2.8)
Palpation-motion supine	40(54.8)	22(30.1)	8(11.0)	3(4.1)	1(1.4)	26(36.6)	9(12.7)	27(38.0)	9(12.7)	3(4.2)
Leg checks (+D)	34(46.0)	19(25.7)	16(21.6)	5(6.8)	0(0.0)	26(36.1)	3(4.2)	34(47.2)	9(12.5)	7(13.7)
Leg checks (cervical syndrome)	33(45.2)	20(27.4)	14(19.2)	6(8.2)	1(1.4)	29(40.3)	2(2.8)	31(43.1)	10(13.9)	2(2.8)
Leg checks (-D)	32(43.2)	19(25.7)	18(24.3)	5(6.8)	0(0.0)	26(36.1)	3(4.2)	34(47.2)	9(12.5)	2(2.8)
Leg checks (sacral leg check)	28(37.8)	23(31.1)	18(24.3)	5(6.8)	0(0.0)	31(43.1)	3(4.2)	29(40.3)	9(12.5)	2(2.8)
Palpation-motion seated	20(27.4)	21(28.8)	29(39.7)	3(4.1)	1(1.4)	28(40.0)	8(11.4)	23(32.9)	11(15.7)	4(5.7)
Radiographs (abnormal curvatures, degenerative changes, spondylolisthesis)	20(27.8)	24(33.3)	27(37.5)	1(1.4)	2(2.8)	24(34.8)	2(2.9)	14(20.3)	29(42.0)	5(7.3)
Leg checks (supine)	14(19.2)	8(10.1)	27(50.1)	26(35.6)	1(1.4)	22(31.9)	4(5.8)	33(47.8)	10(14.5)	5(7.3)
Instrumentation (galvanic/dual probe)	12(16.4)	1(1.4)	33(45.2)	27(37.0)	1(1.4)	6(10.0)	8(13.3)	29(39.2)	17(28.3)	14(23.3)
Radiographs (biomechanical segmental analysis)	11(15.1)	16(21.9)	33(45.2)	13(17.8)	1(1.4)	19(29.2)	2(3.1)	22(33.9)	22(33.9)	9(13.9)
Radiographs (other)	8(18.6)	12(27.9)	21(48.8)	2(4.7)	31(72.1)	15(20.3)	2(4.8)	11(26.2)	14(33.3)	32(76.2)
Instrumentation (Tytron fossa differential)	7(9.6)	3(4.1)	28(38.4)	35(48.0)	1(1.4)	8(14.8)	4(7.4)	29(53.7)	13(24.1)	20(37.0)
Instrumentation (Tytron segmental)	4(5.5)	2(2.7)	30(41.1)	37(50.7)	1(1.4)	7(12.5)	4(7.1)	32(57.1)	13(23.2)	18(32.1)
Instrumentation (Tytron pattern)	4(5.5)	4(5.5)	28(38.4)	37(50.7)	1(1.4)	7(12.5)	4(7.1)	32(57.1)	13(23.2)	18(32.1)

Table 4.

Responses from DC faculty regarding a routine patient encounter and the evaluation prior to performing a chiropractic adjustment (n=58).

	On how many encounters should this procedure be performed?					*Which best describe your rationale for this frequency?*				
Procedure	**All n(%)**	**Most n(%)**	**Some n(%)**	**Never n(%)**	**Missing n(%)**	**Personal Experience n(%)**	**Personal Philosophy n(%)**	**Patient Preference n(%)**	**Research Evidence n(%)**	**Missing n(%)**
Palpation-static/soft tissue prom	49(84.5)	7(12.1)	2(3.5)	0(0.0)	0(0.0)	40(74.1)	3(5.6)	2(3.7)	9(16.7)	4(7.4)
Palpation-motion seated	31(53.5)	13(22.4)	14(24.1)	0(0.0)	0(0.0)	39(75.0)	4(7.7)	3(5.8)	6(11.5)	6(11.5)
Palpation-motion supine	24(44.4)	13(24.1)	15(27.8)	2(3.7)	4(6.9)	39(80.0)	10(18.5)	0(0.0)	4(8.2)	9(18.4)
Leg checks (prone, ext only)	15(26.8)	14(25.0)	17(30.3)	10(17.9)	2(3.6)	31(62.0)	4(10.0)	2(4.0)	12(24.0)	8(16.0)
Radiographs (biomechanical segmental analysis)	11(19.3)	9(15.8)	27(47.4)	10(17.5)	1(1.2)	24(43.6)	7(12.7)	0(0.0)	24(43.6)	3(5.5)
Leg checks (cervical syndrome)	10(18.9)	9(17.0)	15(28.3)	19(35.9)	5(9.4)	30(61.2)	5(10.2)	2(4.1)	12(24.5)	9(18.4)
Instrumentation (galv/dual probe)	10(18.2)	2(3.6)	11(20.8)	29(52.8)	3(5.5)	23(42.6)	10(18.5)	0(0.0)	21(38.9)	4(7.4)
Leg checks (sacral leg check)	10(18.9)	11(20.8)	17(32.1)	15(28.3)	5(9.4)	33(63.5)	4(7.7)	2(3.9)	13(25.0)	6(11.5)
Radiographs (abnormal curvatures, degenerative changes, spondylolisthesis)	10(17.5)	18(31.6)	29(50.9)	0(0.0)	1(1.1)	22(39.3)	4(7.1)	0(0.0)	30(53.6)	2(3.6)
Leg checks (+D)	9(17.0)	12(22.6)	13(24.5)	19(35.9)	5(9.4)	33(64.7)	3(5.9)	2(3.9)	13(25.5)	7(13.7)
Leg checks (-D)	8(15.4)	10(19.2)	15(28.9)	19(36.5)	6(11.5)	31(62.0)	4(8.0)	2(4.0)	13(26.0)	8(16.0)
Leg checks (supine)	6(11.3)	4(7.6)	27(50.1)	16(30.2)	5(9.4)	32(60.4)	6(11.3)	2(3.8)	13(24.5)	5(9.4)
Instrumentation (Tytron segmental)	5(9.4)	4(7.6)	11(20.8)	31(62.0)	5(9.4)	17(34.7)	10(20.4)	0(0.0)	22(44.5)	9(18.4)
Instrumentation (Tytron fossa diff)	5(10.0)	5(10.0)	9(18.0)	31(62.0)	8(16.0)	17(36.2)	9(19.2)	0(0.0)	21(44.7)	11(23.4)
Instrumentation (Tytron pattern)	4(7.8)	4(7.8)	13(25.5)	30(51.7)	7(13.7)	16(33.3)	10(20.8)	1(2.1)	21(43.8)	10(20.8)

DC employees (93 faculty, staff, and administrators) were sent a paper survey (11" x 17") via campus mail in a hand-addressed envelope one month following the student survey in 2013, which included a signed descriptive cover letter from the principal investigator and an informed consent disclaimer. Respondents were asked to return the completed survey (re-folded as an anonymous self-mailer) to the principal investigator (BM), thus maintaining confidentiality and blinding investigators. All DC employees received follow-up e-mail reminders during three consecutive weeks including a reminder that they could request an electronic copy for anonymous submission directly to the data manager.

Survey Instrument

This survey queried respondents on which clinical evaluation tools (including palpation, paraspinal skin temperature measurement, leg length inequality, and/or radiographic analysis) should be used during patient encounters when evaluating a patient prior to delivering chiropractic SM. The survey instrument was designed in consultation with chiropractic college faculty with expertise in teaching SM techniques. Clinical evaluation tools queried are taught in the core curriculum. Response choices included "all," "most," "some," or "no" patient encounters and were not further defined. Respondents were asked to rate which of the following reasons best describes the rationale for the rating: "personal experience," "personal philosophy," "patient preference," or "research evidence." See Figure 1.

Data Analysis and confidentiality

The Data Manager collected and secured hardcopy data collection forms. The Data Manager prepared form keys and data entry formats with validation schemes. Data entry clerks entered and verified data through a Windows-based application for double key-entry verification. Data entry formats and electronic data files in a secured server environment. Hardcopy data form packets were stored in a locked cabinet during key-entry process. Final project datasets were assembled by transferring data from flat data entry files to SAS System for Windows (Release 9.2). The Data Manager wrote and tested SAS programs to create datasets as requested by the Principal Investigator. The analyzable dataset was imported into SPSS (Version 17.0.0, SPSS, Inc. Somers, NY). Survey results are reported with descriptive statistics.

Results

Response rate

Surveys were completed for 74 of 111 students for a response rate of 67%. All students anticipated graduating by the end of the following (10^{th}) term. Fifty-eight of 93 DC employees returned surveys for a response rate of 61%, representing 10 department affiliations; 55(95%) held a current license to practice chiropractic, and 29(50%) reported actively rendering care to patients. See Table 1.

Chiropractic analysis tools favored by ninth term student respondents

Eighty-three percent reported that static palpation should be performed on *all* routine patient encounters. Prone leg length inequality (LLI) assessment ranked next, ranging from 38-55% depending upon type and variation of leg length analysis. Supine LLI assessment faired much lower at 20%. Nearly 55% of respondents rated motion palpation should be performed on all patient encounters for supine cervical assessment while only 27% for seated patient positioning. While 28% of respondents reported that radiographic assessment for general biomechanical alignment and patterns should be used on all routine encounters; approximately 15% responded that radiographic vertebral segment analysis should be used on all encounters. Only 16% reported that a paraspinal dual temperature analysis should be used on all routine encounters, while 5-10% reported Tytron® infrared thermography (for paraspinal skin temperature readings, as a skin temperature pattern assessment, or for bilateral mastoid fossa temperature measurements) should be used on all encounters.

Twenty-two and 45% of respondents reported biomechanical segmental analysis of radiographs should be used on *most* and *some* patient encounters, respectively; the range of those reporting that radiographic assessment should be used as a visual aid to further inform the practitioner about abnormal curvatures or degenerative changes on most/some patient encounters was 33/38%. Between 10 and 31% responded that prone LLI should be used on some/most encounters. Supine LLI was rated for use on most encounters by 10%, on some encounters by

50%. While 28-45% of student respondents reported various forms of paraspinal thermographic instrumentation should be performed on some patient encounters, only 3-6% reported some form of this measure should be used on most routine encounters.

Fifty percent of student respondents reported that Tytron® infrared thermography should *never* be used during patient encounters, and 37% reported that galvanic/dual probe should never be used. Less than 10% reported prone LLI should never be used while 36% reported supine LLI should never be used. Eighteen percent conveyed that segmental radiographic analysis should never be used. Zero percent of student respondents reported that static palpation should never be used.

Chiropractic analysis tools used by DC employee respondents

Eighty five percent of DC employee respondents reported that static palpation should be performed on *all* encounters. Next frequent, they reported motion palpation (seated) 54% and motion palpation (supine) 44%. While 27% reported prone LLI should be performed on all encounters, other LLI analyses responses ranged from 11-19%. Less than 20% of DC employee respondents indicated radiographic biomechanical segmental analysis or other radiographic findings should be used on all patient encounters. Eighteen percent reported that paraspinal dual probe temperature analysis should be used on all patient encounters, while 4-5% reported Tytron® or paraspinal infrared thermographic measurements should be used all of the time.

Fifty percent of DC employee respondents stated that radiographs should be performed on *some* encounters; 32% reported *most* encounters. Ten to 17% of respondents considered some component of prone LLI assessment as an evaluation that should be performed on some/most encounters; 4% rated supine LLI for most encounters, while 50% related supine for LLI some encounters. Respondents reported 4/26% for most/some patient encounters regarding all types of paraspinal temperature measurement. Motion palpation was chosen by about ¼ of respondents for most/some, while static palpation was chosen most by 12% and some by 4%.

Sixty-two percent of respondents reported that Tytron® infrared thermography should *never* be performed, while 53% reported that galvanic or dual probe paraspinal temperature analysis should never be performed. LLI was reported as should never be performed by 28-36% of respondents, except for LLI prone, extension only, which was reported "never" by 18% of respondents. Eighteen percent reported that biomechanical segmental analysis of radiographs should never be performed.

Rationale for use of chiropractic analysis tools by ninth term students

Thirty-six to 43% of student respondents reported personal experience as their rationale for their use of LLI and motion palpation. Nearly 35% used personal experience as their rationale for responses to using radiographic analysis. Less than 15% of student respondents reported personal experience as rationale for use of paraspinal temperature measurements.

The use of static palpation originated from personal philosophy for 28% of student respondents. Student respondents chose personal philosophy less than 15% of the time for all other categories. Ranking close with personal experience, nearly one half of student respondents chose patient preference at their rationale for reporting various analysis tools.

Forty-two percent of student respondents chose research evidence as their rationale for their use of radiographs to assess abnormal curvatures and degenerative changes, which most responded should be used or referenced on most or some encounters. This rationale was chosen by less than 15% for static and motion palpation as well as LLI assessments. Further, between 23-28% of respondents chose research evidence as rationale for their use of various thermographic assessment methods, considered by most respondents to be used some or never during patient encounters.

Rationale for use of chiropractic analysis tools by DC employees

Thirty-three to 80% of DC employee respondents chose personal experience as their rationale when recommending frequency of use of chiropractic analysis tools. Personal experience was also chosen as a frequent rationale (60-80%) regarding palpation and LLI assessment. Personal experience was chosen infrequently as rationale for instrumentation use (33%).

Only 20% of DC respondents chose personal philosophy rationale, as recorded in the thermography categor-

ies. The highest percentage of DC employee respondents chose patient preference (only 6%) for seated motion palpation.

Forty-three and 53% of respondents chose research evidence for use of radiographs (biomechanical segmental analysis) and (abnormal curvatures), both recommended by nearly half of respondents for use on some patient encounters. Research evidence was ranked as rationale for thermography, chosen by 39-45% of responders, most of which ranked thermographic measurements to be used "never" for patient encounters.

Technique systems used by senior students

Seventy-three percent of students responded with "Palmer Package" as a technique used. Palmer Package is comprised of components from Diversified, Gonstead, and Thompson or drop table SM techniques. Closely following is Activator, chosen by 20% of respondents.

Technique systems used by DC employees

Over 70% of DC employees responded with Palmer Package or Diversified for technique used, with Gonstead, Thompson, Drop, following. Activator was ranked by 32% of respondents, flexion/distraction by 30%, Toggle-Recoil by 25%. See Table 2.

Discussion

This survey quantifies perceptions of DC employees and senior students at a single chiropractic college regarding the use of clinical analysis procedures used prior to performing SM. Static palpation was rated most consistently as a necessary procedure. This result may not be surprising given a manually delivered treatment often requires some palpation component to identify anatomical landmarks, local tissue characteristics and tenderness. Segmental motion palpation was not rated as highly by survey respondents in both groups. In a recent comprehensive review of methods that can inform providers about treatment localization for SM, static palpation, motion palpation, and LLI assessment (pelvic only) were favorably recommended with limitations; radiographic imaging, paraspinal skin temperature, and galvanic skin response were unfavorably recommended.[3] While this review was published in the same year that the current was performed, it is unlikely that survey respondents were intimately familiar with its recommendations due to a lag in dissemination. Further, a challenge to change practice behavior may occur if "new" recommendations are different from an individual's clinical experience.

Over half of DCs rated research evidence as a rationale for their opinion regarding radiographic analysis, although the preponderance of rationale reported for other procedures is personal experience. Note that most DC employees reported the use of radiographic interpretation on some, but not most or all, patient encounters. DC respondents more commonly reported personal experience as rationale for clinical decision-making than students. It is logical to expect practitioners with a larger reservoir of clinical experience to use personal experience as a rationale more often than students.

Research evidence was rated slightly higher than personal experience among DC respondents for their rationale regarding the use of thermography; most (over half) recommended it never be used and over 20% suggested only on some encounters. Over 80% of students reported that paraspinal temperature measurements should never be used or only on some encounters. These responses are likely influenced by the lack of available evidence demonstrating validity as an assessment measure, a lack of personal experience with this type of assessment tool, or both. Similarly, research evidence ranked slightly above personal experience in rationale for recommending the frequency of use of radiographic analysis, even though research evidence is unfavorable for using radiography to determining the site of routine spinal manipulative care.[3] However, it is unclear whether respondents who indicated radiographic analysis was important on routine encounters considered it as necessary for determining the site of care or as additional clinical information that should be reviewed at each encounter when available. It appears that the research evidence rationale increases as the frequency and specificity of the recommendation decreases, e.g., research evidence rationale increases by 10% from segmental analysis to overall curvature and degenerative changes. A similar trend may be observed when advancing from a simple prone LLI evaluation to more elaborate (and less reliable) leg length procedures. This could suggest that respondents used research evidence in a negative rather than a supportive manner.

DC respondents commonly chose research evidence second highest to those procedures rated as useful for "some" or "no" patient encounters. This suggests that re-

spondents answered this question in 2 ways, 1) to justify use of a clinical evaluation tool; and 2) to justify why they rarely or never use it because they believe research evidence does not support regular use. Students rarely chose research evidence as rationale, which may represent a lack of awareness of, experience with, or confidence interpreting scientific evidence regarding procedures included in the survey. It may also represent the general lack of high-quality research evidence available for many diagnostic procedures, an area noted by Haas *et al*. as a research priority for the chiropractic profession.[20]

Technique systems reported were similar between faculty and students, which may be expected when most respondents were educated at the same institution, although DCs did report greater use of Activator® and Flexion/distraction techniques. It could be surmised that attitudes of students will similarly follow faculty attitudes. This phenomenon does seem to exist, with some exceptions.

The lack of research evidence informing the appropriate use of some clinical analysis procedures included in this survey may have led respondents to rely more on personal experience and patient preference to influence their clinical decision-making. Survey responses indicating the use of clinical assessments unsupported by research evidence or considered to be fair, poor, or unknown suggests the following question. What is the most appropriate way to incorporate the practitioners' art and experience into an educational curriculum dedicated to teaching evidence-based principles, skills, and decision-making? For procedures that have demonstrated poor reliability or validity, it seems clear that further use in educational settings is not well justified. Because evidence-based care includes what has been learned from experience, we do not suggest that chiropractic educators refrain from sharing their unique beliefs, as long as those unsupported by research are clearly stipulated as such. We suggest that it is vital for educators to provide balanced presentations of available literature describing both strengths and limitations of existing clinical analysis procedures and to consider the negative ramifications of directly or indirectly supporting the use of procedures no longer considered valid.

Limitations

This was the initial application of this survey, which has not been validated. The questionnaire asked respondents to consider a routine patient encounter, which was not further defined. Also, the terms "most" and "some" were not defined for participants. Therefore individual respondents likely defined this differently. While the entire faculty was surveyed, only one term of current students were surveyed. It cannot be generalizable to the entire student body during that period.

Respondents cited research evidence as the reason for and against using certain procedures, and the survey was conducted using a convenience sample at a single chiropractic college campus. This survey gathered data regarding the use of clinical tools and reasons that primarily influenced their use.

Future Recommendations

It is beyond the scope of this survey to speculate how students and faculty are using assessment procedures included in this survey to make decisions based on evidence-informed principles. Major categories could be consolidated and the more defined rationale collected to identify how research evidence (or other motivation) is driving respondent's decisions for or against clinical use. Descriptions of specific clinical scenarios could also be more clearly defined. We suggest that it is important to assess faculty and students opinions regarding applicability and interpretation of research in daily clinical decision-making. Subsequent research seeking to further understand how diagnostic information informs care decisions is necessary to inform both the teaching of and the practice of skilled evidence-based clinical decision-making.

Conclusions

The majority of respondents from both students and DC employees reported that static palpation should be used on all patient encounters. Survey responses were varied for other clinical evaluation methods, perhaps due to the lack of available research on many procedures. Respondents reported often relying primarily on experience and provider and patient preferences for evaluation procedures used. An evidence-based educational and clinical setting requires a balanced presentation of practitioner experience and available literature for clinical analysis procedures.

References:

1. Van de Veen EA, de Vet HCW, Pool JJM, Schuller W, de Zoete A, Bouter LM. Variance in manual treatment of nonspecific low back pain between orthomanual physicians, manual therapists, and chiropractors. J Manipulative Physiol Ther. 2005;28(2):108-116.
2. Gleberzon B, Stuber K. Frequency of use of diagnostic and manual therapeutic procedures of the spine currently taught at the Canadian Memorial Chiropractic College: A preliminary survey of Ontario chiropractors. Part 2 - procedure usage rates. J Can Chiropr Assoc. 2013;57(2):165-175.
3. Triano JJ, Budgell B, Bagnulo A, et al. Review of methods used by chiropractors to determine the site for applying manipulation. Chiropr Man Therap. 2013;21(1):36.
4. Goertz CM, Pohlman KA, Vining RD, Brantingham JW, Long CR. Patient-centered outcomes of high-velocity, low-amplitude spinal manipulation for low back pain: a systematic review. J Electromyogr Kinesiol. 2012;22(5):670-691.
5. Vining R, Potocki E, Seidman M, Morgenthal A P. An evidence-based diagnostic classification system for low back pain. J Can Chiropr Assoc. 2013;57(3):189-204.
6. Sackett DL, Rosenberg WMC, Gray JAM, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. 1996. Clin Orthop Relat Res. 2007;455:3-5.
7. Cooperstein R, Young M, Haneline M. Interexaminer reliability of cervical motion palpation using continuous measures and rater confidence levels. J Can Chiropr Assoc. 2013;57(2):156-164.
8. Cooperstein R. Heuristic exploration of how leg checking procedures may lead to inappropriate sacroiliac clinical interventions. J Chiropr Med. 2010;9(3):146-153.
9. Cooperstein R, Haneline M, Young M. Interexaminer reliability of thoracic motion palpation using confidence ratings and continuous analysis. J Chiropr Med. 2010;9(3):99-106.
10. Haneline M, Cooperstein R, Young M, Birkeland K. An annotated bibliography of spinal motion palpation reliability studies. J Can Chiropr Assoc. 2009;53(1):40-58.
11. Haneline MT, Young M. A review of intraexaminer and interexaminer reliability of static spinal palpation: a literature synthesis. J Manipulative Physiol Ther. 2009;32(5):379-386.
12. Harrison DE, Harrison DD, Troyanovich SJ. Reliability of spinal displacement analysis of plain X-rays: a review of commonly accepted facts and fallacies with implications for chiropractic education and technique. J Manipulative Physiol Ther. 1998;21(4):252-266.
13. Harrison DE, Harrison DD, Colloca CJ, Betz J, Janik TJ, Holland B. Repeatability over time of posture, radiograph positioning, and radiograph line drawing: an analysis of six control groups. J Manipulative Physiol Ther. 2003;26(2):87-98.
14. Hart J, Neely C. Allowing a possible margin of error when assessing student skills in spinous process location. J Chiropr Educ. 2011;25(2):182-185.
15. Hestbaek L, Leboeuf-Yde C. Are chiropractic tests for the lumbo-pelvic spine reliable and valid? A systematic critical literature review. J Manipulative Physiol Ther. 2000;23(4):258-275.
16. Hubbard TA, Vowles BM, Forest T. Inter- and intraexaminer reliability of the Blair protractoview method: examination of a chiropractic radiographic technique. J Chiropr Med. 2010;9(2):60-68.
17. Kilby J, Heneghan NR, Maybury M. Manual palpation of lumbo-pelvic landmarks: a validity study. Man Ther. 2012;17(3):259-262.
18. Goertz CM, Long CR, Hondras MA, et al. Adding chiropractic manipulative therapy to standard medical care for patients with acute low back pain: results of a pragmatic randomized comparative effectiveness study. Spine (Phila Pa 1976). 2013;38(8):627-634.
19. Curriculum - D.C. Palmer College of Chiropractic. http://www.palmer.edu/CurriculumDC/. Accessed February 23, 2015.
20. Haas M, Bronfort G, Evans RL. Chiropractic clinical research: progress and recommendations. J Manipulative Physiol Ther. 29(9):695-706.