Degree of Vertical Integration Between the Undergraduate Program and Clinical Internship With Respect to Cervical and Cranial Diagnostic and Therapeutic Procedures Taught at the Canadian Memorial Chiropractic College

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Objective: The purpose of this study was to determine if diagnostic and therapeutic procedures for the cervical and cranial spine taught to students during the undergraduate program at Canadian Memorial Chiropractic College are required to be used during their internship by their supervising clinicians and, if so, to what extent these procedures are used. **Methods:** Course manuals and course syllabi from the Applied Chiropractic and Clinical Diagnosis faculty of the undergraduate chiropractic program for the academic year 2009–2010 were consulted and a list of all diagnostic and therapeutic procedures for the cranial and cervical spine was compiled. This survey asked clinicians to indicate if they themselves used or if they required the students they were supervising to use each procedure listed and, if so, to what extent each procedure was used. Demographic information of each clinician was also obtained. **Results:** In general, most diagnostic procedures of the head and neck were seldom used, with the exception of postural observation and palpation. By contrast, most cervical orthopaedic tests were often used, with the exception of tests for vertigo. Most therapeutic procedures were used frequently with the exception of prone cervical and ``muscle'' adjustments. **Conclusion:** There was a low degree of vertical integration for cranial procedures as compared to a much higher degree of vertical integration for cervical procedures between the undergraduate and clinical internship programs taught. Vertical integration is an important element of curricular planning and these results may be helpful to aid educators to more appropriately allocate classroom instruction. (J Chiropr Educ 2012;26(1):51–61)

Key Indexing Terms: Chiropractic; Education

INTRODUCTION

Vertical integration (VI) has been defined by the General Practice Education and Training (GPET) Commonwealth of Australia as "the coordinated, purposeful, planned system of linkages and activities in the delivery of education and training throughout the continuum of the learner's stages of medical education."[1] There is an expectation by students on entering a vocation program, such as chiropractic, that there be a high degree of vertical integration between the undergraduate program (preclinical program) and clinical internship. This education ought to reflect best practices[2] of field practitioners, as developed by content experts, curricular planners, and faculty as well as empirical evidence from clinical outcomes. Ensuring that there is a strong degree of VI is essentially an exercise in quality control that can be described as a method of testing and evaluating the overall value, superiority, and relevance of the "product" (in this case, the program), including possible problems or risks that may be conveyed to the "consumers" (in this case, students).[3,4] In a vocational setting, the product offered ought to include a high level of VI that allows for a gradual transition from theoretical classroom training to clinical based learning[5] and ultimately to private practice.

However, several obstacles may impede this smooth transition from the undergraduate program to

The Journal of Chiropractic Education

Vol. 26, No. 1. Printed in U.S.A.
1042-5055/$22.00

clinical internship, chief among them being a disconnect between what has been taught to students by undergraduate faculty and what they are required to know or do during their internship, as directed by their supervising clinician. Clinicians are required to assess interns' clinical competencies throughout their internship in areas such as history taking, examination, report of findings, delivery of electrical modalities, and spinal manipulative therapy. However, there is no set requirement to perform any particular diagnostic or therapeutic procedure (eg, interns need not demonstrate how to perform a seated cervical Kemp's test or a supine rotary cervical adjustment), but rather interns are assessed based on the procedures they are demonstrating on their patients that day. In general, clinicians are familiar with curricular content since many of them graduated from the same chiropractic college in which they supervise interns and many of them teach the undergraduate courses as well.

Since an intern is providing patient care under the direct supervision of a licensed clinician, the clinician is the final arbiter in deciding what procedure may or may not be used for each chief complaint. If clinicians are unfamiliar with what is being taught in the undergraduate program, or if they simply choose to require their interns to use a different set of skills, this may undermine the perceived VI of a program This may cause anxiety among students who are receiving different sets of instructions from which to choose for patient care and it may result in friction at the undergraduate–clinical interface among faculty.

Another factor necessitating the need for quality assurance is the constraint of time.[5] All curricular planners are sensitive to the time constraints of developing a viable course program that does not overburden students and still preserves ample time and opportunities for appropriate student learning. Preferably, there is more time devoted to learning those skills needed most often for patient care and less time devoted to learning those skills rarely needed for patient care or that fall outside of a chiropractor's scope of practice.[5] The authors are not advocating that those clinical conditions rarely encountered in private practice and that may be outside the scope of chiropractic practice not be taught; rather, there ought to be an appropriate allocation of time toward conditions more commonly seen, which are clinically relevant and within the chiropractic scope of practice. Of course, at a minimum, students must be able to triage a patient appropriately and determine when a patient presents with a clinical condition best managed by another health care provider. Moreover, the cost of delivering a program is often a function of the number of hours of instruction delivered, which in turn affects student tuition. Bearing this in mind, it behooves an academic program to demonstrate teaching efficiency.

The purpose of this study was to determine if diagnostic and therapeutic procedures for the cervical and cranial spine taught to students during the undergraduate program at Canadian Memorial Chiropractic College are required to be used during their internship by their supervising clinicians and, if so, to what extent these procedures are used.

METHODS

Ethics Approval

This study was approved by the Ethics and Research Board of Canadian Memorial Chiropractic College.

Survey Design: Part A

Course manuals and selected texts in the course syllabi from the Applied Chiropractic and Clinical Diagnosis faculty of the undergraduate chiropractic program were used as a reference to compile this survey. The survey was a compilation of cervical and cranial diagnostic and therapeutic procedures that students were taught and assessed during the 2009–2010 academic year. The diagnostic procedures listed in the survey included posture, palpation (static, motion, joint play), neurological testing, orthopaedic testing, and specific tests pertaining to the eyes, ears, nose, and throat as well as vital signs. Since functional muscle testing and history taking are not taught in these courses, it was not included in this study.

Therapeutic procedures, as listed in the study, included mobilizations (low-amplitude, low-velocity repetitive motions) and manipulation (high-velocity, low-amplitude thrusts) of the cervical spine only. Soft tissue therapies such as Active Release Therapy, Graston, and trigger point therapy were not included in this study because of the infinite number and varieties of procedures and protocols taught inside and outside the traditional classroom setting, as well as the differing preferences by many supervising

clinicians. Auxiliary therapies (modalities) such as inferential current, microcurrent, ultrasound, Russian stimulation, and laser were also not included in this study, nor were exercise, nutritional advise, rehabilitation therapies, or recommendations for healthy lifestyle choices (ie, cessation of smoking, moderate alcohol consumption, use of seat belts, or fall preventive strategies). The survey instrument was populated by diagnostic and therapeutic procedures principally taught during clinical diagnostic and technique labs.

Survey Design: Part B

Part B of the survey sought to gather demographic information of each respondent clinician. This included such information as number of years in practice, type of practice (solo practitioner, associate, locum), and technique systems used in private practice. This approach allowed ease of comparison between this study and a similarly constructed study by Vermet et al[5] that investigated the VI of diagnostic and therapeutic procedures of the lumbopelvis taught at this college. It was also thought that gathering this information would allow the investigators to determine if the demographics of the teaching clinicians were representative of private practitioners.

Target Respondent Eligibility

Surveys were distributed electronically to all clinical faculty at college X ($n = 19$). Completed surveys were then returned to the secure electronic mailbox of the principal investigator.

Survey Distribution and Data Collection

An online survey using Survey Monkey (Palo Alto, CA) was distributed to all clinicians instructing at the six affiliated clinics of the college during the 2009–2010 academic year. Using a 5-point rating scale ("strongly agree," "agree," "neutral," "disagree," and "strongly disagree"), clinicians were instructed to rate the frequency with which they utilize or require their interns to utilize a procedure. Each question required a response before the participant could proceed to the next question.

Survey Monkey is a web-based software program that enables users to create their own web-based surveys and/or questionnaires. An enhanced paid account was made available through the existing license purchased by the college. Clinician e-mails were obtained through requesting a directory from the human resources department at the college. The e-mails were uploaded into Survey Monkey. E-mails consisting of a description of the study, as well as informed consent, were sent to the clinicians along with the survey URL. Clinicians were asked to read the description and informed consent form and were given an option to proceed with the study (implying agreement) or to decline from participation.

Clinicians were not asked to input any personal identifiers on the survey. Survey responses were collected using the "e-mail invitation collector" (EIC) option provided by Survey Monkey. EIC allowed the survey tool system to automatically generate unique links tied to a specific e-mail address. Only the recipient knew his or her link. Survey authors and data collectors were not able to see the assigned link inside the collector. As a person responded, only the e-mail was tracked as a status of having responded or completed the survey. No personal identifiers were linked to any particular survey. Data collection was handled by the authors of the survey who held the license to the "pro" account.

Confidentiality

Clinicians were not required to identify themselves in any way on the survey. Electronic identifiers only included e-mail addresses, which were removed from the raw data before analysis by the principal investigator.

Deception

There was no deception used in this study.

Data Analysis

On the completion of the surveys, all answers were compiled and analyzed using Survey Monkey. The first portion of the survey used a 5-point rating scale; however, this rating scale was collapsed into a 3-point rating scale for analysis purposes ("always used/often used" was assigned 1, "neutral" was assigned 2, "used somewhat/never used" was assigned 3). The results were compiled for each category and expressed as percentages for each diagnostic or therapeutic procedure. The second portion

of the survey included questions pertaining to the chiropractors' prior practice experience and the characteristics of his or her private clinic outside of Canadian Memorial Chiropractic College (CMCC). For the years of practice, the categories were as follows: less than 5 years = 1, 10–15 years = 2, 15–20 years = 3, 20–25 years = 4, and >25 years = 5.

RESULTS

Response Rate

Of the 20 clinicians at the college to whom the survey was distributed, 14 responded, yielding a response rate of 70%. All respondents completed part A of the survey, but only 13 of the respondents replied to part B.

Demographic Characteristics of Respondents

As shown in Table 1, of the 14 respondents, 10 indicated they were male and 4 indicated they were female: 5 indicated they were a clinician at CMCC for 1–5 years, 3 for 6–10 years, 3 for 16–20 years, and 2 for more than 20 years. With respect to practice activities, respondents were evenly split between solo practitioners ($n = 3$), partnership ($n = 2$), associateships ($n = 3$), and "others" ($n = 2$). None indicated they were locum doctors. When asked, 8 described their private practice as a "general practice," 4 described it as "sports medicine," and 4 as "multidisciplinary." Respondents could provide more than one answer to this question, thus resulting in a greater than 100% response rate. All respondents indicated they used diversified technique and one indicated she or he also used activator.

When asked what other services they provided, clinicians were able to respond to more than one option. This resulted in the total number of responses exceeding the number of respondents. The most common service provided by the respondents was "rehabilitation and exercise" ($n = 12$), acupuncture ($n = 10$), auxiliary therapies (modalities) ($n = 9$), orthotics ($n = 8$), nutritional counseling ($n = 6$), and "other" ($n = 3$).

Data Synthesis

The original survey had an option list with five responses (never used, used somewhat, neutral, often

Table 1. Demographic features of respondent clinicians (n = 14)

1. I have been a clinician at CMCC for _____.

Answer Options	Response Percent	Response Count
1–5 years	38.5%	5
6–10 years	23.1%	3
11–15 years	0.0%	0
16–20 years	23.1%	3
21–25 years	15.4%	2
	Answered question	*13*
	Skipped question	*1*

2. My private practice is best described as _____.

Answer Options	Response Percent	Response Count
Solo	25.0%	3
Partnership	16.7%	2
Associate	25.0%	3
Group	16.7%	2
Locum	0.0%	0
Other	16.7%	2
	Answered question	*12*
	Skipped question	*2*

3. My private practice is best described as _____.

Answer Options	Response Percent	Response Count
General practice	66.7%	8
Sports medicine	33.3%	4
Multidisciplinary	33.3%	4
Pediatric	0.0%	0
Other	0.0%	0
	Answered question	*12*
	Skipped question	*2*

4. Indicate the treatment technique(s) /system(s)primarily utilized in your practice.

Answer Options	Response Percent	Response Count
Diversified	100.0%	13
Activator	7.7%	1
MPI	0.0%	0
Applied kinesiology	0.0%	0
Gonstead	7.7%	1
Thompson	7.7%	1
Cranial sacral	7.7%	1
HIO	0.0%	0
Other	15.4%	2
	Answered question	*13*
	Skipped question	*1*

Table 1. Continued

5. Indicated the area(s) of special interest which you regularly include as part of your private practice.

Answer Options	Response Percent	Response Count
Nutritional counseling	46.2%	6
Auxiliary therapies (modalities)	69.2%	9
Rehabilitation and exercise	92.3%	12
Orthotics	61.5%	8
Acupuncture	76.9%	10
Other	23.1%	3
	Answered question	*13*
	Skipped question	*1*

CMCC, Canadian Memorial Chiropractic College; MPI, Motion Palpation Institute; HIO, hole-in-one.

used, and always used); however, to facilitate interpretation of the data, these were collapsed into the following three categories: (1) strongly agree/agree, (2) neutral/somewhat agree, and (3) never.

Diagnostic Procedures

Cranial (Head/Neck) Tests

As shown in Table 2, with the exception of inspection and palpation of the head and neck (85.7% report "always" or "often" used), virtually all other diagnostic tests to students during their undergraduate education, including auscultation and examination of the ears, eyes, sinuses, nose, and mouth, are not performed by clinicians or are required by clinicians to be performed on their interns' patients. Tests not taught at the college (use of bilateral weight scales, thermography, and surface EMG), although used by some chiropractors in the field, are not used by these respondents and interns are not required to perform these tests on their patients while under these clinicians' supervision.

General Inputs

As shown in Table 3, clinicians used or required their students to always use (response rate of 100%) only a few diagnostic procedures. These were active cervical range of motion, upper limb reflexes, sensory and motor testing, and rotary joint play. A number of other procedures were often used or required to be used by clinicians (response rate of 80% or above). Tests falling into this category include anterior, lateral, and posterior postural analysis; passive cervical ranges of motion; pathological reflex testing and segmental posterior to anterior; lateral flexion; and lateral spinous joint play challenges. With respect to performing assessments of a patient's vital signs, the procedure most commonly performed was blood pressure testing (92.9% "always/often") followed by charting a patient's height, weight, and resting heart rate (78.6% "always/often"). Charting a patient's temperature or ankle-brachial index was rarely done (42.9% and 78.6% "somewhat/never," respectively).

Procedures either "somewhat" or "never" used included most of the Waddell testing (for pain of a nonorganic origin), muscle girth, spinous percussion, and most of the cervical motion palpation procedures taught in the technique courses, with the notable exception of anterior rotation and lateral flexion of the upper and lower cervical segments.

Orthopaedic Tests

As shown in Table 4, the only orthopaedic test always used by clinicians or that they required their interns to do was Kemp's test, although Spurling's test, Jackson's test, cervical compression, and EAST (elevated arm stress test) were also very commonly used. Cranial nerve testing was either performed by clinicians or required to be performed by their interns over 85% of the time. On the other end of the spectrum, the Dix-Hallpike test and rotary chair test, used to diagnose benign paroxysmal positional vertigo or cervicogenic vertigo, respectively, were somewhat or never used (the Dix-Hallpike was reportedly used 0% of the time). L'Hermittes test and tests to detect meningitis (Kernig's and Brudzinski's test) were reportedly rarely used. Most of the other orthopaedic tests taught in the undergraduate program were used "always/often."

Therapeutic Procedures

Mobilizations

In general, cervical mobilizations taught to students during their undergraduate education were typically used by clinicians or allowed to be used by the clinicians' interns, with long axis distraction being used most often ("always/often" used 92.9%) and segmental (forward) flexion mobilization used least often ("always/often" used 28.6%). Other mobilizations (global flexion, extension, lateral

Table 2. Diagnostic procedures taught in undergraduate program: cranial (head and neck)

Diagnostic Test	Always/Often	Neutral	Somewhat/Never
Head & neck exam			
Inspection/palpation	85.7	0	14.3
Auscultation			
Temporal artery	28.6	0	71.4
Carotid artery	35.7	0	64.3
Thyroid	21.4	0	78.6
Eye examination			
Inspection	35.7	14.3	50.0
Visual fields	42.9	7.1	50.0
Visual acuity	35.7	7.1	57.1
Internal eye exam	14.3	14.3	71.4
Ear examination			
Inspection/palpation	23.1	7.7	69.2
Internal ear exam	21.4	7.1	71.4
Whisper test	21.4	21.4	57.1
Weber test	14.3	14.3	71.4
Rinne test	14.3	14.3	71.4
Sensorineural vs conductive loss	16.7	16.7	66.7
Sinus, nose, mouth examination			
Nose observation/inspection	28.6	7.1	64.3
Internal nose inspection	21.4	0	78.6
Sinuses inspection	21.4	7.1	71.4
Sinus palpation	42.9	14.3	42.9
Transillumination test	14.3	7.1	78.6
Mouth/pharynx inspection	21.4	7.1	71.4
Mouth/pharynx palpation	14.3	7.1	78.6
Non-CMCC taught items			
Bilateral weight scales	0	0	100.0
Surface EMG	0	0	100.0
Thermography	0	0	100.0
Other	0	0	100.0

flexion, rotation and segmental extension, lateral flexion and rotation) were frequently used ("always/often" between 50% and 78%) (Table 5).

Cervical Adjustments

The most commonly used cervical adjustment was the supine rotary cervical with lateral flexion ("always/often" used 100%) closely followed by supine rotary cervical ("always/often" used 85.7%) (Table 6). In descending order, the next most commonly used adjustments were the lateral cervical (64.3%), lateral atlas (57%), and the rotary and lateral occipital adjustments (46.2% and 42.9%, respectively). Seated cervical adjustments were less commonly used (35.7%). Respondents indicated that prone cervical adjustments were used "always/often" only 14.3% of the time, and both atlas toggle recoil adjusting and occipital extension adjustments were used "always/often" only 7%. Procedures taught as "scalenii adjustments" (patient seated or supine with doctor contacting the patient's scalenii muscle with a knife edge or thumb contact, with a thrust in a line of drive along the muscle's orientation) are "always/often" used by 0% or 7.1% of the time.

DISCUSSION

Vermet et al reported the results of a similarly constructed study at CMCC that reviewed diagnostic and therapeutic procedures for the lumbar

Table 3. Diagnostic procedures taught in undergraduate program: general investigations

General Procedure	Always/Often	Neutral	Somewhat/Never
Posture			
Anterior	84.6	7.7	7.7
Posterior	84.6	0	15.4
Lateral	84.6	0	15.4
Gait			
Normal	71.4	7.1	21.4
Heel	64.3	7.1	28.6
Toe	64.3	7.1	28.6
Tandem	50.0	8.3	41.7
Range of motion			
Active	100.0	0	0
Passive	92.9	7.1	0
Resisted	78.6	21.4	0
Waddell's tests			
Simulation test(axial loading)	50.0	0	50.0
Distraction test (seated SLR)	35.7	0	64.3
Overreaction sign	35.7	14.3	50.0
Superficial tenderness	57.1	7.1	35.7
Cogwheeling	42.9	7.1	50.0
Reflexes			
Pathological	85.7	7.1	7.1
Achilles	64.3	0	35.7
Patellar	64.3	0	35.7
Triceps	100.0	0	0
Biceps	100.0	0	0
Brachioradialis	100.0	0	0
Sensory testing	100.0	0	0
Motor testing	100.0	0	0
Muscle girth	42.9	14.3	42.9
Soft tissue palpation	100.0	0	0
Joint play			
Broad PA	64.3	7.1	28.6
Segmental PA	85.7	0	14.3
Lateral spinous challenge (supine)	85.7	0	14.3
Flexion	71.4		28.6
Extension	78.6	7.1	14.3
Lateral flexion	92.9	7.1	0
Rotation	100.0	0	0
Spinous percussion	35.7	14.3	50.0
Other	0	100.0	0
Motion palpation			
Global lateral flexion (c curve)	57.1	7.1	35.7
Lateral flexion segmental (spinous deviation)	38.5	7.7	3.9
Anterior rotation	64.3	14.3	21.4
Posterior rotation	35.7	14.3	50.0
Flexion (anterior glide)	35.7	14.3	50.0
Jaw jut (C0/C1)	28.6	14.3	57.1
Lateral flexion (C0/C1)	71.4	7.1	21.4
Lateral flexion (C1/C2)	71.4	7.1	21.4
Rotation (C0/C1)	71.4	7.1	21.4
Flexion (C0/C1/C2)	50.0	7.1	42.9
Rotation (C1/C2)	71.4	7.1	21.4
Other			

(*continued*)

Table 3. Continued

General Procedure	Always/Often	Neutral	Somewhat/Never
Vital signs			
Height	78.6	0	21.4
Weight	78.6	0	21.4
Temperature	21.4	35.7	42.9
Heart rate	78.6	0	21.4
Blood pressure	92.9	7.1	0
Ankle-brachial index	14.3	7.1	78.6

SLR, straight leg raise; PA, posterior-anterior.

Table 4. Diagnostic procedures taught in undergraduate program: orthopaedic test of cervical spine

Cervical Orthopaedic Test	Always/Often	Neutral	Somewhat/Never
Spurling's	92.9	0	7.1
Jackson's	85.7	0	14.3
Shoulder abduction	64.3	7.1	28.6
Cervical ''doorbell''	71.4	0	28.6
Upper limb tension tests	71.4	7.1	21.4
Cervical compression	92.9	7.1	
Cervical Kemp's test	100.0	0	0
Soto-Hall	57.1	7.1	35.7
AST maneuver	85.7	0	14.3
Adson's test	64.3	14.3	21.4
Wright's test	71.4	7.1	21.4
Eden's test	71.4	7.1	21.4
Kernig's test	28.6	7.1	64.3
Brudzinski's test	35.7	7.1	57.1
L'Hermittes test	28.6	7.1	64.3
Rotary chair test	7.1	21.4	71.4
Dix-Hallpike maneuver	0	14.3	85.7
Cranial nerve exam	85.7	7.1	7.1
Other	0	0	100.0

spine and pelvis in a study published in 2010.[5] Those researchers found overall greater VI with respect to lumbopelvic procedures between the undergraduate and clinical programs than was found in this study. In this study, by contrast, there was very little requirement by clinicians to have their interns perform examination of the cranial structures (ears, eyes, nose, mouth) with the exception of general observation and palpation only. With respect to diagnostic procedures of the cervical spine, all clinicians either performed or required their interns to perform sensory, motor, and reflex testing of the upper limb; soft tissue palpation; active ranges of motion testing; and rotation joint play. Most other cervical spine assessment procedures were commonly used with the notable exceptions of Waddell testing and the majority of upper and lower cervical motion palpation procedures. VI of the orthopaedic tests taught in the undergraduate program compared to those used by clinicians or their interns is generally high, with the notable exception of tests of benign paroxysmal positional vertigo and cervicogenic vertigo. With respect to therapeutic procedures used for the cervical spine, there was a high degree of VI of both mobilization and manipulations taught to students during their undergraduate education, with the exception of occipital extension, prone cervical, atlas toggle recoil, and scalenii adjusting.

A recent article by Wijnen-Meijer et al[4] surveyed six medical schools in the Netherlands that had

Table 5. Therapeutic procedures taught in undergraduate program: cervical mobilizations

Mobilization	Always/Often	Neutral	Somewhat/Never
Long axis distraction	92.9	0	7.1
Figure 8	50.0	21.4	28.6
Segmental flexion	28.6	21.4	50.0
Global flexion	76.9	15.4	7.7
Extension	78.6	14.3	7.1
Segmental lateral flexion	57.1	21.4	21.4
Global lateral flexion	71.4	21.4	7.1
Segmental rotation	71.4	21.4	7.1
Global rotation	71.4	14.3	14.3

Table 6. Therapeutic procedures taught in undergraduate program: occipital and cervical manipulations/adjustments

Techniques/Adjustment	Always/Often	Neutral	Somewhat/Never
Rotary occiput	46.2	7.7	46.2
Lateral occiput	42.9	14.3	42.9
Occipital flexion	23.1	7.7	69.2
Occipital extension	7.1	21.4	71.4
Lateral atlas	57.1	0	42.9
Toggle	7.7	7.7	84.6
Supine rotary cervical	85.7	0	14.3
Supine rotary cervical with lateral flexion	100.0	0	0
Lateral cervical	64.3	7.1	28.6
Prone ipsilateral cervical	14.3	21.4	64.3
Prone contralateral cervical	14.3	14.3	71.4
Seated cervical	35.7	7.1	57.1
Beside cervical	28.6	14.3	57.1
Seated scalenii	0	14.3	85.7
Supine scalenii	7.1	7.1	85.7

either a VI or non-VI curriculum. They reported that graduates of VI curricula appeared to make definitive career choices (residency placements) earlier, needed less time and fewer applications to obtain residency positions, and felt more prepared for work and postgraduate training than did graduates of non-VI curricula medical schools. Bearing this in mind, if it is true that appropriate VI increases the confidence, professionalism, and quality of the program, it is highly important for vocational programs to achieve distinct measures of VI.

LIMITATIONS OF THE STUDY

This study mirrored the methodology used in the Vermet et al[5] study in order to enhance comparability of the data, since both studies were conducted at the same chiropractic college. However, by doing so, this study had the same design flaw as the Vermet et al study. Specifically, it is possible we erred when we assumed that what practitioners do for their patients in private practice will reflect what they require interns to perform under their supervision at the college. But this assumption may be erroneous since it does not account for the "shortcuts" that field doctors may have developed over the years by way of clinical experience. For example, field doctors may be more focused in their own practices, have learned which procedures are more reliable by virtue of accrued clinical acumen, and may not, subsequently, perform all core assessment procedures that they require their interns to perform. That is to say, although field doctors may actually rarely perform certain tests on their own patients (eg, lower limb reflexes), they may nonetheless feel compelled to require students to perform them on patients under

their supervision since clinicians are, in turn, scrutinized by clinical directors, accrediting agencies, and each other. Moreover, clinicians certainly wish to instill good doctoring skills in the interns under their supervision. In contrast, licensing bodies tend to set much less stringent requirements for "acceptable" or "reasonable" patient assessment. Bearing this in mind, now that a baseline data set has been obtained, future studies could separate responses between "what the clinician does in practice" versus "what the clinician requires interns under his or her supervision to do."

Including the option of "neutral" as a possible response was potentially open to respondents' interpretation. Since the survey required an answer for each question, respondents may have chosen the answer "neutral" not because they genuinely had no positive or negative position on the matter, but rather because they were required to select an answer in order to continue with the survey. Furthermore, a neutral response could be translated as a mixed opinion, in that personal clinical experience has shown some positive and some negative responses in treating the above listed conditions—again not a "true" neutral response. It can also be argued that, by responding "agree," "neutral," or "disagree," a respondent does not have a strong opinion at all. That said, surveys such as the one used in this study conventionally collapse "strongly agree" and "agree" together and "strongly disagree" and "disagree" together. In the future, this study may be replicated with the inclusion of an interview component that would clarify reasons for a neutral, agree, or disagree response.

In the instructions to clinicians we failed to define what was meant when we asked clinicians if they performed a procedure "occasionally," "seldom," or "rarely." The study by Vermet had the same design flaw and again we decided not to address this concern in the current study, to facilitate comparison between this study and the one by Vermet.[5]

Another significant design flaw of this study is that it is possible that a clinician has not encountered the particular clinical condition that would require a particular diagnostic input and thus indicated that he or she has "never" used a particular test. For example, if a patient has not presented with signs or symptoms of meningitis, there would be no reason for a clinician to perform Kernig's or Brudzinski's tests.

Finally, because this survey study was restricted to the 20 clinicians at the college during the 2009–2010 academic school year, the sample size was very small, and not all clinicians participated. Had all clinicians responded, the response frequencies may have been different.

CONCLUSION

In general, the diagnostic and therapeutic procedures taught during the undergraduate program are either used by clinicians or clinicians require their interns to use them while under their direct supervision of patient care. This integration is much more apparent with respect to diagnostic and therapeutic procedures of the cranium as compared to diagnostic and therapeutic procedures of the cervical spine. Future studies ought to better define the terms "occasional," "seldom," and "rarely" used, in addition to providing an option to indicate that respondents have not encountered the clinical condition that would require a particular diagnostic or therapeutic procedure be used. Other surveys could also include chiropractic faculty other than clinicians and, lastly, a larger study could be designed to gather similar data from field practitioners.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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REFERENCES

1. Dick ML, King DB, Mitchell GK, Kelly GD, Buckley JF, Garside SJ. Vertical integration in teaching and learning (VITAL): an approach to medical education in general practice. Med J Aust 2007;187(2):133–35.
2. Driver MJ. Are evidence-based practice and best practice the same? West J Nurs Res 2002;24:591–7.
3. Richmond T, Powers B. Business fundamentals for the rehabilitation professional. 2nd ed. Thorofare, NJ: SLACK Incorporated; 2009, p. 108.

4. Wijnen-Meijer M, ten Cate OT, van der Schaaf M, Borleffs JC. Vertical integration in medical school: effect on the transition to postgraduate training. Med Educ 2010;44:272–9.
5. Vermet, S, McGinnis K, Boodham M, Gleberzon B. Degree of vertical integration between the undergraduate program and clinical internship with respect to lumbopelvic diagnostic and therapeutic procedures taught at the Canadian Memorial Chiropractic College. J Chiropr Educ 2010;24(1):46–56.