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Frequency of use of diagnostic and manual therapeutic procedures of the spine taught at the Canadian Memorial Chiropractic College: A preliminary survey of Ontario chiropractors. Part 1 – practice characteristics and demographic profiles

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Background: *Students learn a plethora of physical examination and manual therapy procedures over the course of their chiropractic education. However, it is uncertain to what extent they continue to use these procedures in practice after graduation.*

Objective: *The purpose of this study was to determine which diagnostic and therapeutic procedures of the spine are most commonly utilized by chiropractors practicing in Ontario. In Part 1 of this study (presented here), the demographics and practice patterns of the respondents are presented. Part 2 of this study will present the results of the utilization rates of diagnostic and therapeutic procedures used by respondents.*

Methods: *The study consisted of a paper-based survey that was sent to 500 pseudo-randomly selected Ontario chiropractors who responded confidentially. Survey questions inquired into demographic and practice style characteristics.*

Contexte : *Les étudiants apprennent une pléthore d'examens physiques et de procédures de thérapie manuelle au cours de leur formation en chiropratique. Cependant, on ne sait pas dans quelle mesure ils continuent à utiliser ces procédures dans la pratique après l'obtention du diplôme.*

Objectif : *Le but de cette étude était de déterminer les procédures diagnostiques et thérapeutiques de la colonne vertébrale les plus couramment utilisées par les chiropraticiens qui exercent en Ontario. Dans la première partie de cette étude, décrite ici, les données démographiques et les habitudes de pratique des répondants sont présentées. La deuxième partie de cette étude présentera les résultats des taux d'utilisation des procédures diagnostiques et thérapeutiques utilisées par les répondants.*

Méthodologie : *L'étude était basée sur un questionnaire qui a été envoyé à 500 chiropraticiens de l'Ontario, choisis de manière pseudo-aléatoire, qui ont répondu de façon confidentielle. Les questions du sondage enquêtaient sur les données démographiques et les caractéristiques des styles de pratique.*

Résultats : *Il y avait 108 répondants au sondage, soit un taux de réponse de 22,4 %. De nombreux chiropraticiens se sont définis comme possédant plus d'une caractéristique de style de pratique. Par exemple, 72,4 % des chiropraticiens qui disent traiter en fonction*

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Results: *There were 108 respondents to the survey, giving a response rate of 22.4%. Many chiropractors self-identified themselves with more than one practice style characteristic such as 72.4% of the self-described pain-based chiropractors who also described themselves as evidence-based, compared with 51.9% of subluxation-based chiropractors who also described themselves as evidence-based. Diversified technique was the most commonly employed technique used by 90.7% of respondents, followed by trigger point therapy indicated by 57.4% of respondents.*

Conclusions: *Despite a low response rate, respondents reported practice characteristics in this study that were similar to practice characteristics previously published, particularly in terms of professional demographics and techniques employed. While Diversified was the most commonly used technique, respondents reported higher levels of use of proprietary soft tissue techniques systems and upper cervical techniques than have been previously reported.*

KEY WORDS: chiropractors, manual therapy, physical examination, survey

des douleurs, disent également prescrire des traitements fondés sur des preuves, alors que 51,9 % d'entre eux qui traitent les subluxations disent aussi prescrire des traitements fondés sur des preuves. La technique diversifiée est la technique la plus couramment employée par 90,7 % des répondants, suivi par le traitement de points de déclenchement indiqué par 57,4 % des répondants.

Conclusions : *Malgré le faible taux de réponse, les répondants de cette étude ont manifesté des caractéristiques de pratique qui étaient semblables aux caractéristiques de pratique d'études publiées précédemment, notamment du point de vue des données démographiques et des techniques professionnelles employées. Bien que la technique diversifiée ait été la technique la plus couramment utilisée, les répondants ont indiqué avoir utilisé beaucoup plus qu'auparavant des techniques exclusives de tissus mous et des techniques de manipulation des vertèbres cervicales supérieures.*

MOTS CLÉS : chiropraticiens, thérapeutique manuelle, examen physique, sondage

Introduction

Chiropractic students are taught numerous diagnostic and therapeutic procedures during their undergraduate education (UE) and clinical internships (CI). These procedures are principally directed to the cervical, thoracic, lumbar and pelvic regions (the 'spine') and the peripheral joints, although students are also taught assessment of other structures (eyes, ears, heart and so on) as well. The focus on the joints of the spine and peripheral joints is not surprising since the chiropractic scope of practice in many Canadian provinces specifically emphasize these regions (i.e. Ontario, Alberta, British Columbia)[1-3] and some authors have argued that chiropractic's cultural authority lays in adopting a 'spinal care specialist' model[4,5], essentially focusing on diagnostic and therapeutic procedures of the spine and peripheral joints.

Previous work in this area has involved surveying clinicians at the Canadian Memorial Chiropractic College (CMCC) outpatient clinics only, focusing on the degree of vertical integration between the undergraduate (preclinical) program and the clinical internships at that particular institution.[6,7] Although a significant degree of vertical integration was reported in those studies, it was found that a variety of the tests taught in CMCC's curriculum were not often used and/or were not recommended to be used by clinicians supervising interns at that institution's student clinics.[6,7]

The overall purposes of this study were to: (i) char-

acterize practice patterns and demographic information of a pseudo-random sample of Ontario chiropractors; (ii) determine which diagnostic tests of the spine and (iii) which therapeutic procedures of the spine were utilized by a pseudo-randomized sample of Ontarian chiropractors as well as how often (i.e. at what frequency) they were being used. As this was a descriptive survey, there were no hypotheses to be tested. Compared with previous work in this area[6,7] this study was unique in that it evaluated field practitioners for their patterns of use of different diagnostic and manual therapy procedures, as the results in this population may be different from those working in an academic clinical setting (clinicians supervising interns, for example). In addition, while the Job Analysis published semi-annually by the National Board of Chiropractic Examiner's (NBCE) in the United States does ask questions regarding physical examination and therapeutic procedures used in practice, it does not inquire into the frequency of use of specific tests and therapies.[8]

Methods

The CMCC Research Ethics Board (REB) provided approval of this study (project #112019). Funding was provided by the CMCC Division of Graduate Education and Research. Subjects did not receive compensation for participation in the study, but postage was provided, and subjects had the opportunity to be informed of the final study results. No deceit was used in this study.

Study design:

The study consisted of a paper-based survey of a pseudo-randomized sample of 500 licensed Ontario chiropractors. The authors weighed the option of distributing the survey on-line or by mail. Because the survey was over 16 pages in length, and because licensing bodies are reluctant to provide an updated list of member's e-mail addresses, it was decided to use a hard-copy paper survey (survey available from author).

Licensed Ontario chiropractors were selected via a pseudo-randomized method using the directory from the College of Chiropractors of Ontario (CCO), employing a systematic pseudo-random sampling method. Taking the last names listed in the CCO directory and starting at the beginning of each letter of the alphabet, every 6th name from the directory was selected for inclusion. Selected chiropractors were mailed a survey, which included a cover sheet explaining the purpose of the study, the manner in which confidentiality was to be protected, and instructions as to how to complete the survey (including two examples). It was emphasized that completion of the survey was voluntary. Respondents were required to sign and date an informed consent sheet (as per REB protocol). Respondents were given the option to receive the results of the study. If they chose that option, they were required to provide the investigators with the email address. Due to budget constraints, a second mailing could not be undertaken, nor could an advanced notice mailing or final reminder. A postage-paid addressed envelope was provided for the return of the completed survey and consent sheet.

Inclusion criteria:

Inclusion criteria consisted of being a practicing chiropractor registered with the CCO, and being involved in patient care (either performing third party assessments or providing patient care) and those who provided signed informed consent to participate in the study. Respondents could be graduates of any chiropractic college. Exclusion criteria consisted of subjects not being involved with patients at all (i.e. involved in teaching or research activities alone, or being retired or out of practice) and those who did not sign the included informed consent sheet.

Sample size:

An initial sample size of 500 was determined as it represented approximately one in six chiropractors in Ontario being surveyed. This sample size was also determined ad hoc to be feasible for the scope of this descriptive survey.

Confidentiality:

Participants were able to respond in anonymity and were assured confidentiality. The randomly selected chiropractors were each assigned a sequentially numbered code maintained on a Master list using Microsoft Excel. Subjects were mailed the survey package to the address they provided on the College of Chiropractors of Ontario directory. Each returned survey and informed consent form was marked with the numbered code for that chiropractor. Although each respondent had to sign the consent form allowing the investigators to review their survey results, anonymity was maintained as each sheet was separated from the survey itself prior to data analysis and stored separately in a safe location (a locked file cabinet). The Master

list containing the codes corresponding to the respondents' names and addresses was destroyed upon completion of the study. Returned surveys were kept in a locked filing cabinet and destroyed using confidentiality-preserving means (i.e. shredding) upon completion of the study.

Survey Items:

Previous surveys by one of the authors were used to inform the development of the current survey instrument.[6,7] The survey consisted of demographic questions (i.e. chiropractic college of graduation, year of graduation, age, gender) and practice pattern questions (style of practice, chiropractic techniques used). In addition, several tables were provided that listed all of the diagnostic/examination procedures and manual mobilization and spinal manipulative therapies taught in the CMCC curriculum. The list of procedures was generated by auditing the course outlines for all relevant clinical diagnosis courses as well as psychomotor skills (technique) lab courses. Additional sources of information included internally-published laboratory manuals of the Physical, Orthopaedic and Neurological (PON) diagnostic courses [9] and a manual of Diversified mobilization and manipulation taught at college CMCC.[10] Moreover, the Principal Investigator (PI) of this study teaches in both the orthopaedic and technique labs and had a working knowledge of which procedures were taught.

For this study, it was decided to focus only on physical, orthopedic and neurological assessment procedures of the spine as well as only manual mobilization and manipulative procedures of the spine. Other treatment modalities (such as nutritional advice, lifestyle coaching, prescription of exercises or orthotics or other supportive devices, electrical modalities and/or soft tissue techniques) were not included in the survey instrument.

In order to further enhance the comprehensibility of each listed procedure, a descriptor was provided alongside the name of each one, explaining how each named procedure was performed. This was to circumvent the possibility that a practitioner may not recall the exact name of a procedure but does perform it in private practice, and this strategy avoided the possibility that the name of a certain procedure may have changed since the time it was taught to the survey respondents.

Response scale:

Each procedure had a six-point scale for participants to indicate how frequently they perform these procedures. These responses varied from "Never used" to "Rarely used", "Sometimes used", "Often used, "Almost always used", and "No clinical cause to use this test" (with a suitable description of each category provided).

Pre-test:

As this was a descriptive survey, no pilot study was deemed necessary. The survey was essentially the same (albeit expanded) version of the survey instruments used in two previous studies[6,7]; therefore, those previous studies were deemed as the equivalent of a 'pretest' of the survey used in this study. However, as an over-abundance of caution, the survey was submitted to an independent external chiropractor for completion. She indicated that it was straight-forward and easy to complete and comprehend. This chiropractor took twenty minutes to complete the survey and did not have any recommendations for changes to it. Her responses were not included in the data analysis. It should be added that no recommendations to alter the survey instrument were made by the REB that approved this study.

Statistical analysis:

The returned survey data was entered into a Microsoft Excel spreadsheet. Descriptive statistics such as determining proportions were employed to determine the overall frequency with which the different procedures were performed, along with the results of the demographic and practice pattern questions. Response rates for the survey were also determined. The responses to the PON and manual therapy procedure frequency questions were collapsed from six categories as described above down to four categories: (1) Never / Rarely; (2) Sometimes; (3) Often / Almost Always; (4) Haven't had a patient to cause them to use it. This was done to aid with the readability of the survey results and to aid in analysis of practitioner self-reported practice style characteristics.

Results

From the 500 surveys mailed to pseudo-randomly selected Ontario chiropractors during August 2011, 108 were returned completed and deemed acceptable for inclusion giving a raw response rate of 21.6%. As mentioned above,

Table 1.
Demographic Results

Practice Style	Raw values and percentages of respondents
Male	75/108 = 69.4%
Female	33 / 108 = 30.6%
25 to 34 years old	28 / 108 = 25.9%
35 to 44 years old	44 / 108 = 40.7%
45 to 54 years old	22/108 = 20.4%
55 to 64 years old	9/108 = 8.3%
65 to 74 years old	4/108 = 3.7%
75 years old or greater	1/108 = 0.9%
CMCC graduates	81/108 = 75.0%
NYCC graduates	7/108 = 6.5%
National University of Health Sciences graduates	6/108 =- 5.6%
Logan University graduates	5/108 = 4.6%
Palmer College (Iowa) graduates	4/108 = 3.7%
Northwestern Health Sciences University graduates	2/108 = 1.9%
Life University, Southern California University of Health Sciences, or Palmer West graduates	1/108 each = 0.9% each
Involved in patient care	108/108 = 100%
Involved in research	3/108 = 2.9%
Involved in teaching	12/108 = 11.1%
Conduct 3rd party assessments	21/108 = 19.4%

Table 2.
Frequency of self-reported practice style characteristics+*

Practice Style	Raw values and percentages of respondents who indicated adhering to certain practice style
Function-based	73/108 = 67.6%
Pain-based	58/108 = 53.7%
Subluxation-based	54/108 = 50.0%
Structure-based	36/108 = 33.3%
Tonal-based	12/108 = 11.1%
Evidence-based	68/108 = 63.0%
Tonal-based who also indicated subluxation-based	10/12 = 83.3%
Pain-based who also indicated functional-based	52/58 = 89.7%
Pain-based who also indicated evidence-based	42/58 = 72.4%
Subluxation-based who also indicated evidence-based	28/54 = 51.9%

* Surveyed chiropractors were permitted to select all characterics they felt described their practice activities, thus the total percentages and raw numbers exceed 100%

\+ In general, chiropractors who characterize themselves as *pain-based* use pain and other symptoms as indicators to identify the clinical target for intervention. A *functional-based* chiropractor would rely on joint play, static and motion palpation as well as orthopedic tests to idenity the clinical target, whereas a *structural-based* chiropractor who emphasize the importance of posture, as assessed visually or by x-ray line marking. A *subluxation-based* chiropractor would posit that their principle role is to identify and correct subluxations, with or without the presence of symptoms. A *tonal-based* would posit that the spine cord has an optimal inherent vibratory tone or frequency, similar to the strings of a guitar, and that this optimal vibratory tone is compromised in the presence of vertebral subluxation.[11]

subsequent mailings were not performed due to budget constraints. Three subjects who returned their surveys were excluded, two because they were not actively involved in patient care (and thus did not complete the survey but still returned it to the authors), and one because they did not sign the informed consent sheet. Eighteen surveys were returned due to a change in practice location of the doctors in question, thus the adjusted response rate was 22.4%.

Demographic and Practice Pattern data

Table 1 provides the demographic information of the 108 included respondents, including gender, age, and college of graduation, along with indication of the professional

activities in which respondents are involved. All of the respondents (100%) indicated being involved in patient care (as was required for inclusion in the study).

Practice Patterns and Self-Reported Practice Characteristics

Subjects could indicate more than one style of practice, the results of which are depicted in Table 2. Predictably, when cross-tabulated, 83.3% of Ontario chiropractors who characterized themselves as 'tonal-based' also characterized themselves as 'subluxation-based', and 89.7% of chiropractors who identified themselves as 'pain-based' also identified themselves as 'functional-based'. Of particular interest, however, was the finding that 72.4% of self-described 'pain-based' chiropractors also characterized themselves as 'evidence-based' and, by contrast, only 51.9% of 'subluxation-based' chiropractors characterized themselves as 'evidence-based'.

Therapeutic Procedures Used for Patient Care

Respondents in this study reported they primarily use Diversified technique (since respondents could list all techniques they used in private practice, the percentage of techniques used exceeded 100%). However, there were high utilization rates of soft tissue therapies, most notably trigger point therapy (57.4%), Active Release Technique/Myofascial Release (38.9%) and Graston technique (13.9%). After Diversified technique (indicated by 90.7% of respondents), the most commonly used technique system was Activator (53.7%), Thompson Terminal Point (33.3%) and Upper Cervical techniques (14.8%); over a dozen other chiropractic technique systems were reportedly used in declining frequencies (see Table 3).

Table 3.
*Frequency of therapeutic procedures used for patient care**

Technique	Raw values and percentages of respondents who indicated using therapeutic procedure
Diversified	98/108 = 90.7%
Trigger point therapy	57.4%
Activator	58/108 = 53.7%
Active Release Techniques / Myofascial Release Technique	42/108 = 38.9%
Thompson	36/108 = 33.3%
Upper cervical	16/108 = 14.8%
Graston	15/108 = 13.9%
Flexion-Distraction	14/108 = 13.0%
Gonstead	12/108 = 11.1%
Cranial-sacral	10/108 = 9.3%
Sacro-occipital technique	8/108 = 7.4%
Chiropractic Biophysics	8/108 = 7.4%
Acupuncture	7/108 = 6.5%
Applied Kinesiology	7/108 = 6.5%
Torque Release Technique, Trigenics, Spinal decompression, Proadjustor	3/108 each = 2.8% each
Arthrostim	2/108 = 1.9%
Contact Release Analysis, Network, VF-Adjustor, Chirodontics, SFMA, VMTX, Stucky Integrated, Kinesiotape	1/108 each = 0.9% each

* Surveyed chiropractors were permitted to select all therapeutic procedures they use for patient care; thus the total percentages and raw numbers exceed 100%

Discussion

Studies from health care educational disciplines have emphasized that there ought to be a relatively seamless transition from a student's UE, through their CI and ultimately to clinical practice.[12-15] Arnold and Willoughby[12], who examined clinical integration in a medical program, reported that early exposure to integration resulted in increased context and relevance, ensuring a deeper level of learning. Wilkerson and Ablemann surveyed Harvard graduates who reported the most frequently reported reason medical students appreciated their education was when there was an emphasis on integration between basic sciences education and clinical practice.[13] A study by Wilgner-Meijer et al[14] surveyed six Dutch medical school programs and reported that curriculum with vertical integration made more definitive career choices earlier after graduation, needed less time and fewer applications to obtain residency positions and felt more prepared for practice than did graduates from non-vertically integrated medical programs.

Leone[16] and Watkins and Saranchuk[17] ascertained

graduates' perception with respect to the relationship between the curriculum taught to chiropractic students and their practice activities. Leone[16] reported there was positive relationship between manual therapeutic procedures taught to students and the ones they used upon graduation. Watkins and Saranchuk found that, in general, respondents to a survey opined that felt prepared for professional practice and that there was a linkage between it and their undergraduate education.[17] Of interest, graduates reported that it was their opinion too much time was devoted in the curriculum to embryology and histology; the results of that study, in addition to student surveys, have resulted in curricula changes that have compressed the amount of time devoted to those subjects (PI, personal communication).

The development of course content involves (i) the use of scientifically proven procedures (proven in terms of diagnostic sensitivity and specificity as well as therapeutic effectiveness, and published in the peer-reviewed literature) and (ii) the necessity to meet regulatory obligations and adherence to requirements set by chiropractic educational accreditation agencies (Canadian Federation of Chiropractic Regulatory and Educational Accrediting Board. or CFCREAB, in Canada).[18] That said, other less authoritative pressures exert force on curricular structure as well, including the importance of reflecting the cultural authority bestowed upon the profession by society, the influences of particular chiropractic educators (who may champion the continued use of various preferred- although as of yet unproven- procedures), and the propagation of pedagogical theory.[6,7] Not only that but components of any chiropractic curriculum often reflect the continuation of procedures taught by tradition.[6,7 and based on personal observation by the PI)] It is important to learn if students continue to use these procedures taught to them upon graduation and, if they do, how often this or that procedure is actually used for patient assessment and care. If practitioners either infrequently use procedures taught to them during their chiropractic education that lack a evidence base during their professional practice activities or, worse still, do not use them at all, this ought to be reflected in revised curriculum content. On the other hand, if practitioners do not use a procedure taught to them in a course that does have a strong evidence base behind it then this may speak to the issue of knowledge transfer (KT), an issue that has been the topic of considerable concern over the past few years.[19,20]

Nevertheless, some interesting results were identified though this sample, unrepresentative of all Ontarian chiropractors though they may be. Not surprisingly since this survey was conducted in Ontario, three-quarters of respondents were CMCC graduates, and almost 7% were graduates of the New York Chiropractic College, the college closest geographically to Ontario. One out of every four respondents was under the age of 34, approximately two-thirds were under the age of 44 years and over two-thirds of respondents were male.

With respect to practice pattern, we believe ours is the first study to inquire what percentage of respondents were involved in Independent Chiropractic Examinations (ICEs) or third-party assessments, and 19.4% of respondents indicated they were involved in this aspect of the profession. It was also noteworthy that 11% of respondents indicated they were involved in teaching.

This study inquired as to how surveyed chiropractors would self-characterize their practice styles. Since many of the diagnostic tests in the curriculum of CMCC are geared to reproduce pain, it is not surprising that two-third of respondents identify themselves as *'function-based'* and just over half of respondents identified themselves as *'pain-based'*. Despite the fact that CMCC would not be characterized as having a traditional, subluxation-based curriculum, 50% of respondents identified themselves as *'subluxation-based'*, although only approximately one in ten adhere to a *'tonal-based'* practice model. One-third of respondents identified themselves as *'structural-based'* and over 60% stated they considered themselves to be *'evidence-based'*. This speaks to the cross-identification many chiropractors seem to have about themselves, and how many chiropractors seem to resist being labelled with only one descriptor. It bears noticing that 72.4% of self-identified pain-based but only 51.9% of self-identified subluxation-based chiropractors stated they were also evidence-based.

These strong ideological self-identifiers were similarly reported in an early study by Biggs, Mierau and Hay, published in 2002.[21] In that study, based on data derived from 393 data sets in 1994, Biggs et al reported that Canadian chiropractors fell into three categories: what these investigators classified as 'rationalists' (presumably 'evidence' or 'science-based'), 'empiricists (those who rely on traditional chiropractor dogma) and those chiropractors who fall somewhere in-between the two. Biggs et al

reported 14.9% of respondents characterized themselves as rationalists, 28.4% as empiricists and 56.8% as in-between moderates, although the researchers did note that moderates tended to lean towards the empiricist end of the philosophy index, a scale derived from survey responses to create a continuum between rationalists and empiricists.[5] This data also showed that 23.5% of Canadian chiropractors accepted traditional chiropractic philosophy as espoused by D.D. Palmer, 36.7% rejected it and 39.7% of respondents were neutral. However, there was stronger support for the traditional chiropractic tenets of B.J. Palmer, wit 37.1% of respondents indicating support, 26.6% rejected them and 36.3% claiming neutrality. It must be emphasized that Biggs et al did report there were significant differences based on province and college of graduation, with CMCC graduates reporting a lower score (more 'rationalist') on the Philosophy Index than non-CMCC graduates and chiropractors practicing in Saskatchewan demonstrating a more 'rational-based' approach whereas chiropractors in Quebec demonstrated a more 'empirical' slant. Lastly, there were no distinct philosophical trends with respect to time of graduation or level of income.[21]

Ninety percent of the respondents in this survey reported using the "Diversified" chiropractic technique system, an eclectic non-proprietary corpus of high-velocity, low-amplitude (HVLA) manipulative thrusts often accomplished by cavitation[22], and 74.4% of respondents indicated they 'primarily' use Diversified technique for patient care. This is not surprising since Diversified is the only named technique system taught at CMCC, although the college has also recently incorporated instrumented soft-tissue therapies (such as Graston) as well. However, as reported in several recent surveys as well as the data dating back to the early 1990s, Ontarian (and other Canadian) chiropractors typically inculcate other technique systems for patient care, most notably instrumented adjusting (activator), drop-table (Thompson Terminal Point) adjusting as well as any number of soft tissue techniques, many of them proprietary (i.e ART, Graston).[17, 23-25] This finding is virtually identical to the findings from chiropractors in five Canadian provinces (including Ontario) by Mykietiuk et al.[25] In fact, the finding from this survey are quite consistent with previous studies in that Ontario chiropractors gravitate towards those technique systems most similar to Diversified technique in private practice.[17,23-25] Specifically, in the Canada-wide survey by Mykietiuk et al[25], after Diversified, chiropractors reported most commonly using Activator, Active Release Technique and Thompson Terminal Point. As indicated in that study, there is a notable trend towards the use of proprietary soft tissue therapies (ART, Graston) for patient care in addition to various chiropractic technique systems and other therapeutic procedures.[25] Respondents in this survey reported they used Upper Cervical techniques more commonly than acupuncture, Sacro-Occipital Technique (SOT) or Gonstead; this is a rather unique finding compared to other studies published over the past 20 years.

Limitation of this Study

The response rate for this survey was disappointing and that is the main limitation of this study. However, it was not out of line with previous response rates in surveys of chiropractors.[26] The response rate could have been improved through the use of advance notice mailings and sending reminder mailings[26]; however as mentioned previously, this was not feasible due to budget constraints, but could have been alleviated if we procured additional external funding. Participation in this cross-sectional study was completely voluntary as participants were not provided with added incentive to complete the survey and this factor can hinder response rates as well.[27] In addition, the survey was quite lengthy and time consuming despite the best efforts of the authors to minimize it, but due to the nature of the research question such length was necessary. Breaking the survey into smaller distinct components may have improved the response yield. The lower response rate may call into question how representative the sample is of the overall population of Ontario chiropractors and possibly add in an element of non-response bias, however using the pseudo-randomized sampling method should enhance the representativeness of the results. The authors considered distributing the survey electronically (via Survey Monkey for example) but licensing boards and advocacy associations are reluctant to provide current lists of member's current emails. With the benefits of hindsight, the authors are considering replicating this study electronically using the older email lists of Ontario chiropractors that are available or else by seeking external funding to allow for additional mail outs (pre-notification and reminders) to be conducted.

Since the data included non-CMCC graduates, it is pos-

sible that those chiropractors taught at other chiropractic colleges used the different therapeutic techniques taught in the curricular of those other colleges. This may have skewed the results. Lastly, although different 'technique clubs' go in and out of fashion at CMCC (PI- personal communication), it is possible they had an effect on utilization rates of this or that chiropractic technique system not taught in the curriculum; however, the degree of this effect is unknown and possibly unknowable. Finally, the ad hoc sample size determination could be again viewed as a limitation and a formal sample size calculation would have been beneficial, but the ad hoc sample size determination was pre-determined to be sufficient for the purposes of this study.

Conclusions

In general, the demographic profile of respondents to this survey was similar to respondents to previously published surveys. Respondents in this study were mostly male and graduates of CMCC. Most reportedly used Diversified technique and, notwithstanding the fact that is the principle technique taught to them, many field doctors continue to also use proprietary soft tissue techniques and often other chiropractic technique systems and therapeutic procedures not formally taught to them. Unlike previous studies, a relatively high number of respondents in this study reportedly used Upper Cervical techniques.

Respondents reported having more than one professional revenue stream, with almost one in five stating they were involved with performing third-party assessments and one in ten stating they were involved in education. Virtually all chiropractors in this study stated they had overlapping practice styles, typically pain-and-functional based or tonal-and-subluxation based; that said, the percentage of respondents who stated they were 'evidence-based' was substantially higher among self-identified pain-based chiropractors compared to self-identified subluxation-based chiropractors.

References

1. College of Chiropractors of Ontario. Scope of Practice Standard of Practice. http://www.cco.on.ca/site_documents/s-001.pdf. Accessed March 2, 2012
2. Alberta College and Association of Chiropractic. Standards of Practice. http://www.albertachiro.com/sitewyze/files/ACAC_Standards_of_Practice.pdf. Accessed March 2, 2012
3. College of Chiropractors of British Columbia. Regulations http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/10_414_2008#section2. Accessed March 2, 2012
4. Nelson CF, Lawrence DJ, Triano JJ et al. Chiropractic as spine care: A model for the professions. Chiropractic & Osteopathy. 2005;13:9 doi: 10.1186/1746-1340-13-9
5. Canadian Chiropractic Summit. Sponsored by the Canadian Chiropractic Association. Nov 18-19, 2011. Toronto, Canada.
6. Leppington C, Gleberzon B, Fortunato L, Doucet N, Vandervalk K. Degree of vertical integration between the undergraduate program and clinical internship with respect to cranial and cervical diagnostic and therapeutic procedures taught at a chiropractic college (abstract only). J Chiro Educ. 2011; 25(1): 87.
7. Vermet S, McGinnis K, Boodham M, Gleberzon BJ. 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 Chiro Educ. 2010; 24(1): 46-56.
8. Christensen MG, Kollasch MW, Hyland JK. Practice Analysis of Chiropractic 2010. A project report, survey analysis, and summary of chiropractic practice in the United States. Greeley, USA: National Board of Chiropractic Examiners, 2010.
9. Guerrero R. CMCC: Orthopedic Lab Manual. Self-published. January, 2011.
10. Gleberzon BJ, Ross K. Manual of Diversified Diagnostic and Therapeutic Procedures. Self-published. 2007.
11. Cooperstein R, Gleberzon BJ. Towards a taxonomy of subluxation-equivalents. Top Clin Chiro. 2001;8(1)49-60.
12. Arnold L, Willoughby TL. Curricular integration at the University of Missouri-Kansas City School of Medicine. Percep Mot Skills. 1993;76:35-39.
13. Wilkerson L, Abelmann WH. Producing physician-scientists: a survey of graduates from the Harvard-MIT program in health sciences and technology. Acad Med. 1993;68:518-21.
14. Wijnen-Meijer M, ten Cate OT. van der Schaaf M et al. Vertical integration in medical school: effect of the transition to postgraduate training. Med Educ. 2010;44:272-9.
15. Dahle LO, Brynhidsen J, Behrbohm A et al. Pros and cons of vertical integration within a problem-based undergraduate medical curriculum: examples and experiences from Linkoping, Sweden. Med Teach. 2002;24(3):280-5.
16. Leone A. Relationship between techniques taught and practice behaviors: education and clinical correlation. J Manipulative Physiol Ther. 1999;22(1):29-31.
17. Saranchuk R, Watkins T. Analysis of the relationship between program design and professional practice in

CMCC's undergraduate chiropractic program. J Can Chiro Assoc. 2000;44(4):230-44.
18. Canadian Federation: Chiropractic Regulatory and Educational Accrediting Boards. http://www.chirofed.ca/english/accreditation.html accessed March 2, 2012
19. Driver MJ. Are evidence-based practice and best practice the same? West J Nurs Res. 2002;24:591-7.
20. Grimshaw JM, Shirran L, Thomas R et al. Changing provider behavior: An overview of systematic reviews of interventions. Medical Care. 2001;39(8) supple 2:II-2-II-45.
21. Biggs L, Mierau D, Hay D. Measuring philosophy: a philosophy index. J Can Chiro Assoc. 2002;46(3):173-184.
22. Cooperstein R, Gleberzon B. Diversified Technique. In: Technique Systems in Chiropractic. Cooperstein R, Gleberzon BJ (ed). Churchill-Livingstone. 2004:p143-149.
23. Christenson M, Kerkhoff D, Kollasch MW, et al. The 1993 National Board of Chiropractic Examiners. Job Analysis of Chiropractic. A project report, survey analysis and summary of practice of chiropractic within the United States. Greely, USA: National Board of Chiropractic Examiners, p84.
24. Kopansky-Giles D, Papadopoulos C. Canadian Chiropractic Resource Databank (CCRD). A profile of Canadian chiropractors. J Can Chiro Assoc. 1997; 41(3): 155–191.
25. Mykieiuk C, Wambolt J, Pilipow T, Mallay C, Gleberzon BJ. Technique systems used by post-1980 graduates of the Canadian Memorial Chiropractic College practicing in five Canadian provinces: A preliminary survey. J Can Chiro Assoc. 2009;53(1):32-39.
26. Russell ML, Verhoef MJ, Injeyan HS, McMorland DG. Response rates for surveys of chiropractors. J Manipulative Physiol Ther. 2004; 27(1): 43-8.
27. Brealey SD, Atwell C, Bryan S, Coulton S, Cox H, Cross B, Fylan F, Garratt A, Gilbert FJ, Gillan MGC, Hendry M, Hood K, Houston H, King D, Morton V, Orchard J, Robling M, Russell IT, Torgerson D, Wadsworth V, Wilkinson C. Improving response rates using a monetary incentive for patient completion of questionnaires: an observational study. BMC Med Res Method. 2007; 7:12 doi: 10.1186/1471-2288-7-12.