

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

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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, based on a list of currently taught procedures at CMCC. In Part 1 of this study (published previously), the demographics and practice patterns of the respondents were presented. Part 2 of this study (presented here) reports on the utilization rates of spinal diagnostic and therapeutic procedures by the respondents.

Methods: The study consisted of a paper-based survey that was sent to 500 randomly selected Ontario chiropractors who responded confidentially. Survey questions inquired into demographic and practice style characteristics as well as the frequency with which spinal diagnostic and therapeutic procedures were performed.

Results: There were 108 respondents to the survey, giving a response rate of 22.4%. Frequency of use of diagnostic procedures fell into three broad categories: (i) those tests that are almost always performed, (ii) those tests that are almost always performed by two-

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, en fonction d'une liste de procédures enseignées au Canadian Memorial Chiropractic College (CMCC). Dans la première partie de cette étude (publiée précédemment) les données démographiques et les habitudes de pratique des répondants ont été présentées. La deuxième partie de cette étude (décrite ici) rapporte les résultats des taux d'utilisation des procédures diagnostiques et thérapeutiques pour la colonne vertébrale utilisées par les répondants.

Méthodologie : L'étude a été menée par l'entremise d'un questionnaire papier envoyé à 500 chiropraticiens de l'Ontario, choisis de manière aléatoire et qui ont répondu de façon confidentielle. Les questions du sondage enquêtaient sur les données démographiques et les caractéristiques des styles de pratique ainsi que la fréquence à laquelle les procédures diagnostiques et thérapeutiques pour la colonne vertébrale sont effectuées.

Résultats : Il y avait 108 répondants au sondage, soit un taux de réponse de 22,4 %. La fréquence de l'utilisation de procédures diagnostiques se classe dans trois grandes catégories : (i) ces tests sont presque toujours effectués, (ii) ces tests qui sont utilisés sur deux-

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thirds to one-half of patients, and (iii) those tests that are virtually never used. By comparison, respondents utilized the same therapeutic procedures for patients care less consistently.

Conclusions: *Despite a low response rate, respondents reported mostly relying on static and motion palpation, joint play, neurological tests, and ranges of motion when assessing their patients. Due to a low response rate, the results of this study may not be generalizable to all Ontario chiropractors.*

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

Introduction

Chiropractors are taught numerous diagnostic and therapeutic procedures during their undergraduate education and clinical internship. These procedures are principally directed towards the cervical, thoracic, lumbar and pelvic regions (the spine) and peripheral joints, although students are also taught how to assess other structures (eyes, ears, heart and so on) as well. Two previous studies sought to determine if the diagnostic and therapeutic procedures taught during the undergraduate programme at the Canadian Memorial Chiropractic College (CMCC) are required to be used by fourth year students during their internship when providing patient care under the direct supervisions of chiropractic clinicians.^{1,2} In general, these studies reported a relatively high degree of vertical integration of procedures between the undergraduate and clinical internship with respect to the cervical, thoracic and lumbopelvic spine but a very low degree of vertical integration with respect to assessment procedures of the cranium.^{1,2} This study took those investigations one step further by attempting to ascertain if the diagnostic and therapeutic procedures currently taught to students are subsequently utilized for patient care after graduation.

The overall purposes of this study were to: (i) characterize practice patterns and demographic information of a pseudo-random sample of Ontario chiropractors; (ii) determine which diagnostic tests of the spine and (iii) which

tiers à la moitié des patients, et (iii) ces tests qui ne sont presque jamais utilisés. En comparaison, les répondants ont utilisé les mêmes procédures thérapeutiques concernant les soins pour les patients de façon moins systématique.

Conclusion : *En dépit d'un taux de réponse faible, les répondants ont rapporté qu'ils utilisaient généralement la palpation statique et dynamique, des mobilisations d'articulation et plusieurs méthodes dynamiques lors de l'évaluation de leurs patients. En raison d'un faible taux de réponse, les résultats de cette étude ne devraient pas être généralisés à tous les chiropraticiens de l'Ontario.*

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

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. The first objective (characterization of practice patterns and demographic information) has been accepted for publication.³ We present here the second and third objectives of this study; namely, which diagnostic and therapeutic procedures currently taught to chiropractic students are used by a pseudo-randomized sample of Ontario chiropractors and how often (i.e. at what frequency) these tests were being used.

Methods

The methods employed in this study have been described in detail elsewhere³, and modelled after two previously published studies on this topic^{1,2}. Briefly, this study received approval from the CMCC Research Ethics Board (project #112019) and funding from the CMCC Division of Graduate Education and Research. Subjects were mailed a cover sheet and consent form, a paper-based survey and an addressed postage paid envelope to return the survey. The survey consisted of demographic questions, questions regarding practice patterns, and several tables that listed and described all of the spinal diagnostic/examination procedures and manual mobilization and spinal manipulative therapies currently taught in the college's curriculum, ascertained by auditing courseware of

technique, orthopaedic and clinical diagnosis courses.^{4,5} A six-point scale was provided for subjects to indicate the frequency with which they perform each procedure. Response options were “never used”, “rarely used”, “sometimes used”, “often used” and “almost always used” as well as “no clinical cause to use this test”. The survey was based on previous published studies on this topic by one of the authors^{1,2}, and further pre-tested on a single independent external subject.

The surveys were distributed to a systematically pseudo-randomized sample of 500 licensed Ontario chiropractors selected from the directory of the College of Chiropractors of Ontario (CCO) (the licensing body of that province). Subjects were included if they were a practicing chiropractor registered with the CCO who was involved in patient care and signed the informed consent form for participation. Confidentiality was assured and participants could respond anonymously. Descriptive statistics were employed to determine the overall frequency with which the different procedures were performed, along with determining the results of the demographic and practice pattern questions and a response rate. The six options available to respondents used in the survey (see above) were collapsed into four categories to facilitate response pattern analysis. These categories were: ‘Never/Rarely’ (N/R) used, ‘Sometimes’ used (ST), ‘Almost Always/Often’ (AA/O) used and ‘Haven’t Had a Patient to Use it on’ (HH-P).

Results

Diagnostic Examination Procedures

Cervical Spine (Table 1)

All respondents (100%) reported they AA/O perform cervical ranges of motion, and almost all respondents reported they perform joint play (96.3%) and static palpation (95.4%) during examination of the cervical spine. Over 80% of respondents reported AA/O performing motion palpation (84.3%) and Kemp’s test (82.4%). Roughly half of respondents indicated they AA/O perform Cervical Compression (63%), Distraction (58.3%), Jackson’s (50.9%) and Spurling’s (46.3%) tests, while the Valsalva’s and Doorbell tests were AA/O performed by slightly less than half of respondents, although the results for these tests increase substantially if combined with

the responses from respondents who reported that they ‘sometimes’ perform them.

Conversely, over 85% of respondents reported they N/R performed Naffziger’s test. Houle’s test, a test that purportedly screens for patients at-risk of experiencing a vertebrobasilar stroke during cervical manipulation⁶, was never used by 70.4% of respondents. Other tests commonly N/R used included Cervical Flexion-Rotation, L’Hermitte’s, Upper Limb Tension and Soto-Hall. The Rotary Chair and Dix-Hallpike tests, used to differentially diagnose dizziness as either cervicogenic vertigo or benign paroxysmal positional vertigo (BPPV) respectively⁷, were both N/R used by 70.4% of respondents, with roughly 7% indicating that they never had opportunity or cause to perform these tests (see Table 1). Other tests commonly N/R used included EAST, Adson’s and Wright’s tests, used to diagnose Thoracic Outlet Syndrome as well as Kernig’s and Brudzinski’s tests, used to identify meningeal irritation.⁸

The majority of respondents indicated they AA/O conduct motor (85.3%), reflex (83.3%) and sensory (75%) neurological testing. However, only 10.2% indicated they AA/O perform Hoffman’s test.

Thoracic Spine (Table 2)

A high percentage of respondents reported they AA/O perform static palpation (96.2%), joint play (95.3%) and ranges of motion (93.4%) testing when assessing the thoracic spine, although only roughly two thirds perform Adam’s test. Many respondents indicated they AA/O perform a straight leg raise, motion palpation, Kemp’s, and rib springing. Other than Valsalva’s maneuver and Doorbell testing, most of the other tests on the questionnaire were never or rarely used, including Beevor’s test or Beevor’s sign, chest expansion test, Upper Limb Tension Testing, passive scapular approximation, Slump test, skin rolling, L’Hermitte’s, Soto-Hall, apparent or true leg length testing, and Kernig’s or Brudzinski’s tests. In this study, 56.1% of chiropractors reported they N/R performed chest percussion.

Lumbopelvic Spine (Table 3)

Respondents reported they AA/O perform a number of tests for the lumbopelvic spine, including static palpation (99.1%), joint play (96.3%), straight leg raise (95.3%), ranges of motion (95.3%), PSIS joint challenge (91.4%),

motion palpation (86.9%), gait analysis (85%), Kemp's (82.2%), crossed straight leg raise (79.2%), and Sacral Thrust (79%).

A number of tests were reportedly used AA/O by roughly one-half to two-thirds of the respondents, including the Patrick's FABER (Figure 4), Ely's, heel and toe walking, psoas palpation, Braggard's, Yeomans's, Hibb's, Thomas test, Valsalva's, Minor's sign, Gillet's (SI motion), tandem gait, and Bowstring's.

A number of tests were N/R used, including Schober's, Waddell's tests, FAIR, Thigh Thrust, Gaenslen's, spinous percussion, Ober's, Bowstring, Distraction, and Trendelenburg test. In this study, 61.3% of respondents never assessed lower limb pulses and 49.5% of respondents never performed abdominal percussion.

With respect to neurological testing, 90.6% of respondents indicated they AA/O performed motor testing, 84% AA/O assessed reflexes, and 74.5% assessed lower limb sensation. The plantar reflex was used AA/O by 53.8% of respondents. Conversely, 84.9% of respondents N/R assessed ankle-leg index, 81.9% N/R performed Heron-Pheasant's test and N/R assessed 53.8% muscle girth.

Cervical Spine – manual therapeutic procedures (Table 4)

The most commonly used cervical mobilization (cMOB) were long axis distraction (AA/O used by 76.2% of respondents), segmental rotation (65.7%), global lateral flexion (61.9%), segmental lateral flexion (60%), segmental extension (54.2%) and global rotation (49.5%). All listed mobilizations were used to some extent.

The cervical spinal manipulative procedures AA/O used by respondents in this study for the cervical spine were the Supine Rotary Cervical manipulation with Lateral Flexion (81%) and the Supine Rotary manipulation (74.3%). The next most commonly used procedures were the Lateral Break, Lateral Atlas, Seated and Prone cSMT. A number of other cSMT were N/R used by respondents, these were predominately the 'muscle adjustments'.

Thoracic spine – manual therapeutic procedures (Table 5)

With respect to thoracic spine mobilizations (tMOB), respondents reported AA/O or N/R using long axis distraction (50%), iliotransverse (42.5%), iliocostal (41.5%) and seated procedures (43.4%) in almost equal numbers.

The most commonly reported thoracic spinal manipulative therapies (tSMT) used AA/O were the Anterior (80.2%), Cross-Bilateral (74.5%), Carver (71.7%), Combination (65.1%) and Modified Anterior (61.3%). The other tSMT listed (Thumb Move, Reinforced Unilateral and First Rib) were AA/O or ST used by more than half of respondents. The only tSMT N/R used by a large number of respondents was the Lateral Recumbent Rib (67.9%).

Lumbar spine – manual therapeutic procedures (Table 6)

With respect to lumbar mobilizations (L-MOB), long axis distraction was used AA/O by 61.3% of respondents and iliomammillary mobilization was used AA/O by 49.1% of respondents

The lumbar spinal manipulative procedures most frequently reported as being AA/O used by respondents in this study were the Lumbar Roll ((81.1%), followed by the Lumbar Pull (68.9%), Lumbar Push (56.5%) and 'Bonyun'/Long Axis Distraction (54.5%). A number of other lumbar spinal manipulative therapies (L-SMT) were frequently reported as N/R, notably the Reverse Roll (84%), Seated (75.5%) and Disc Opening (61.3%) procedures.

Pelvic spine – manual therapeutic procedures (Table 7)

With respect to mobilizations of the pelvis, respondents reported to AA/O use the sacral pump, knee-chest, and iliofemoral, although it should be noted that 50% of respondents reported they N/R use the iliofemoral mobilization procedure.

The pelvic spinal manipulative procedure most frequently reported as being AA/O used by respondents in this study was the PSIS contact ('upper SI') spinal manipulative procedure (85.8%). Other pelvic spinal manipulative therapies (P-SMT) were AA/O used less frequently. In descending order these were Ischial contact ('lower SI'), Prone SI, and Sacral base. Respondents reported to AA/O or N/R use the Sacral Apex manipulative procedure at almost the same frequency (roughly 39%). The Sitting Iliac Flexion procedure was N/R used by 85.8% of respondents, lateral (or side posture) pelvic therapy was N/R used by 61.3% of respondents and the Supine Iliac Flexion procedure was N/R used by 59.4% of respondents.

Discussion

Three distinct categories of tests can be discerned from the results of this survey. There appears to be one group of tests that respondents to this survey ‘Almost Always’ or ‘Often’ use. These mainly consist of segmental joint play, static and motion palpation, ranges of motion and neurologic testing of the different spinal regions. Triano et al⁶ reported there was good evidence for some of these tests when used to identify the site of care (the clinical target of manipulation). The second category of tests identified in this survey was more condition-specific and AA/O used by roughly one half to two-thirds of respondents in this survey. For example, cervical compression tests (Kemp’s, Jackson’s or Spurling’s test) or nerve tension tests of the lumbar spine (Braggard’s or Bowstring’s test) may be required to be used on some – but not all – patients presenting to a chiropractor’s office depending on the presence of referred or radicular pain.

The third category of tests identified from the current survey are those that are ‘Never’ or ‘Rarely’ used by the majority of respondents. These include Naffzinger’s or L’Hermitte’s tests in the cervical spine, true and apparent leg length testing in the thoracic spine and Schober’s or Ankle-leg index testing in the lumbar spine.

Overall, the level of vertical integration reported by respondents in this study with respect to diagnostic and therapeutic procedures of the spine was lower than the level of vertical integration reported from clinical faculty from CMCC^{1,2}, especially of the thoracic spine.

Study Limitations

The most notable limitation of this study was its very low response rate of only 22.2%. This low response rate and the pseudo-randomized sample reduce confidence in the generalizability of our findings. Furthermore our study included graduates of CMCC and other institutions, so it is possible that those educated at institutions other than CMCC may not have been taught some of the tests and techniques in the CMCC curriculum. Our decision to use a pencil-and-paper survey distributed by mail rather than an electronic survey may have contributed to the poor response rate. Future studies could perhaps garner a higher response rate using an on-line survey.

We chose not to set parameters around what constituted ‘almost always’ versus ‘sometimes used’ or ‘often used’, instead relying on respondents to interpret what

these meant. Future studies could provide definitions of these terms (ie ‘almost always’ implies the test is used on more than 90% of patients) for respondents.

Conclusions

This study reported on the frequency of use of diagnostic and therapeutic procedures currently taught at CMCC by a group of pseudo-randomized Ontario chiropractors, most but not all of whom were CMCC graduates. The most commonly used diagnostic procedures for the cervical, thoracic, and lumbopelvic spine were joint play, static and motion palpation, neurological testing and ranges of motion. A number of other orthopaedic tests were less commonly used, and a number of tests were either rarely or not used at all, particularly in the assessment of the thoracic spine. With respect to therapeutic procedures of the spine, many mobilization and manipulative procedures are commonly used, with the exception of the ‘muscle’ manipulations of the cervical spine.

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Table 1.
Cervical spinal diagnostic examination procedure usage

TEST	Number of Respondents	% CATEGORY 1 Never / Rarely (n)	% CATEGORY 2 Sometimes (n)	% CATEGORY 3 Often/ Almost Always (n)	% CATEGORY 4 Haven't had a patient to cause them to use it (n)
Cervical spine Ranges of Motion	108	0 (0)	0 (0)	100 (108)	0 (0)
Joint Play	108	1.9 (2)	1.9 (2)	96.3 (104)	0 (0)
Static Palpation	108	4.6 (5)	0 (0)	95.4 (103)	0 (0)
Motion Palpation	108	2.8 (3)	13 (14)	84.3 (91)	0 (0)
Cervical compression	108	13 (14)	24.1 (26)	63 (68)	0 (0)
Jackson's	108	25 (27)	23.1 (25)	50.9 (55)	0.9 (1)
Spurling's	108	30.6 (33)	22.2 (24)	46.3 (50)	0.9 (1)
Kemp's	108	11.1 (12)	6.5 (7)	82.4 (89)	0 (0)
Distraction	108	22.2 (24)	19.4 (21)	58.3 (63)	0 (0)
Abduction	108	25.9 (28)	26.9 (29)	46.3 (50)	0.9 (1)
Doorbell	108	32.4 (35)	21.3 (23)	45.4 (49)	0.9 (1)
Upper limb tension	108	63 (68)	22.2 (24)	13 (14)	1.9 (2)
Soto-Hall	108	60.2 (65)	21.3 (23)	13 (14)	5.6 (6)
EAST	108	74.1 (80)	16.7 (18)	7.4 (8)	1.9 (2)
Adson's	108	45.4 (49)	30.6 (33)	22.2 (24)	1.9 (2)
Wright's	108	50 (54)	27.8 (30)	20.4 (22)	1.9 (2)
Eden's	108	55.6 (60)	24.1 (26)	18.5 (20)	1.9 (2)
Kernig's	108	54.6 (59)	15.7 (17)	22.2 (24)	7.4 (8)
Brudzinski's	108	50 (54)	19.4 (21)	19.4 (21)	11.1 (12)
L'Hermittes	108	61.1 (66)	20.4 (22)	9.3 (10)	9.3 (10)
Percussion	108	57.4 (62)	24.1 (26)	15.7 (17)	2.8 (3)
Valsalva	108	25.9 (28)	26.9 (29)	47.2 (51)	0 (0)
Rhomberg's	108	38 (41)	25.9 (28)	31.5 (34)	4.6 (5)
Rotary Chair	108	70.4 (76)	18.5 (20)	3.7 (4)	7.4 (8)
Dix-Hallpike	108	70.4 (76)	14.8 (16)	8.3 (9)	6.5 (7)
Cervical flexion-rotation	108	64.8 (70)	12 (13)	19.4 (21)	3.7 (4)
Naffziger's	108	85.2 (92)	4.6 (5)	2.8 (3)	7.4 (8)
Sensory	108	9.3 (10)	15.7 (17)	75 (81)	0 (0)
Motor	108	2.8 (3)	10.2 (11)	85.2 (92)	1.9 (2)
Reflex	108	4.6 (5)	11.1 (12)	83.3 (90)	0.9 (1)
Hoffman's	108	67.6 (73)	16.7 (18)	10.2 (11)	5.6 (6)
Houle's	108	70.4 (76)	10.2 (11)	14.8 (16)	4.6 (5)

Table 2.
Thoracic spine examination maneuver usage

TEST	Number of Respondents	% CATEGORY 1 Never / Rarely (n)	% CATEGORY 2 Sometimes (n)	% CATEGORY 3 Often/ Almost Always (n)	% CATEGORY 4 Haven't had a patient to cause them to use it (n)
Adam's	106	17.9 (19)	17 (18)	65.1 (69)	0 (0)
Thoracic spine Ranges of Motion	106	1.9 (2)	4.7 (5)	93.4 (99)	0 (0)
Joint play	106	4.7 (5)	0 (0)	95.3 (101)	0 (0)
Motion palpation	106	7.5 (8)	12.4 (13)	79.2 (84)	0.9 (1)
Static palpation	106	3.8 (4)	0 (0)	96.2 (102)	0 (0)
Slump	106	67.9 (72)	13.2 (14)	16 (17)	2.8 (3)
Kemp's	106	21.7 (23)	7.5 (8)	69.8 (27)	0.9 (1)
Chest expansion	106	73.6 (78)	12.3 (13)	10.4 (11)	3.8 (4)
Passive scapular approximation	106	66 (70)	7.5 (8)	25.5 (27)	0.9 (1)
Doorbell	106	38.7 (41)	23.6 (25)	37.7 (40)	0 (0)
Valsalva	106	28.3 (30)	27.4 (29)	44.3 (47)	0 (0)
Kernig's	106	61.3 (65)	15.1 (16)	17.9 (19)	5.7 (6)
Brudzinski's	107	51.4 (55)	17.8 (19)	20.6 (22)	10.3 (11)
L'Hermittes	107	64.5 (69)	20.3 (22)	4.7 (5)	10.3 (11)
Upper limb tension	107	68.2 (73)	17.8 (19)	12.1 (13)	1.9 (2)
Straight leg raise	107	11.2 (12)	3.7 (4)	84.1 (90)	0.9 (1)
Soto-Hall	107	62.6 (67)	16.8 (18)	15.9 (17)	4.7 (5)
Sternal Compression	107	57.9 (62)	17.8 (19)	23.4 (25)	0.9 (1)
Rib springing	107	26.2 (28)	22.4 (24)	51.4 (55)	0 (0)
True leg length	107	59.8 (64)	16.8 (18)	23.4 (25)	0 (0)
Apparent leg length	107	62.6 (67)	12.1 (13)	24.3 (26)	0.9 (1)
Percussion	107	56.1 (60)	23.4 (25)	19.6 (21)	0.9 (1)
Skin rolling	107	64.5 (69)	17.8 (19)	14 (15)	3.7 (4)
Beevor's sign	107	72.3 (78)	15.9 (17)	9.3 (10)	1.9 (2)
Beevor's test	107	84.1 (90)	8.4 (9)	4.7 (5)	2.8 (3)
Plantar reflex	107	39.3 (42)	23.4 (25)	36.4 (39)	0.9 (1)

Table 3.
Lumbopelvic diagnostic examination procedure usage

TEST	Number of Respondents	% CATEGORY 1 Never / Rarely (n)	% CATEGORY 2 Sometimes (n)	% CATEGORY 3 Often/ Almost Always (n)	% CATEGORY 4 Haven't had a patient to cause them to use it (n)
Lumbar static palpation	107	0.9 (1)	0 (0)	99.1 (106)	0 (0)
Motion palpation	107	5.6 (6)	7.5 (8)	86.9 (93)	0 (0)
Joint play	107	3.7 (4)	0 (0)	96.3 (103)	0 (0)
Lumbar spine Ranges of Motion	107	1.9 (2)	2.8 (3)	95.3 (102)	0 (0)
Gait	107	5.6 (6)	9.3 (10)	85 (91)	0 (0)
Heel / Toe walking	107	15.9 (17)	16.8 (18)	66.4 (71)	0.9 (1)
Tandem gait	107	38.3 (41)	17.8 (19)	42.1 (45)	1.9 (2)
Kemp's	107	7.5 (8)	9.3 (10)	82.2 (88)	0.9 (1)
Schober's	107	86 (92)	7.5 (8)	2.8 (3)	3.7 (4)
Trendelenburg	107	37.4 (40)	24.3 (26)	38.3 (41)	0 (0)
Gillet	107	44.9 (48)	9.3 (10)	45.8 (49)	0 (0)
Waddell	107	57.9 (62)	26.2 (28)	15.9 (17)	0 (0)
Valsalva	107	22.4 (24)	24.3 (26)	53.3 (57)	0 (0)
Percussion	107	48.6 (52)	24.3 (26)	25.2 (27)	1.9 (2)
Minor's sign	107	28 (30)	18.7 (20)	51.4 (55)	1.9 (2)
Sensory	106	13.2 (14)	12.3 (13)	74.5 (79)	0 (0)
Motor	106	3.8 (4)	5.7 (6)	90.6 (96)	0 (0)
Reflex	106	7.5 (8)	8.5 (9)	84 (89)	0 (0)
Plantar reflex	106	23.6 (25)	21.7 (23)	53.8 (57)	0.9 (1)
Straight leg raise	106	1.9 (2)	2.8 (3)	95.3 (101)	0 (0)
Crossed straight leg raise	106	12.3 (13)	8.5 (9)	79.2 (84)	0 (0)
Braggard's	106	19.8 (21)	17 (18)	63.2 (67)	0 (0)
Bowstring	106	41.5 (44)	17.9 (19)	40.6 (43)	0 (0)
Gaenslen's	106	55.7 (59)	16 (17)	28.3 (30)	0 (0)
Thomas	106	37.7 (40)	8.5 (9)	53.8 (57)	0 (0)
Muscle girth	106	53.8 (57)	30.2 (32)	16 (17)	0 (0)
Lower limb pulses	106	61.3 (65)	26.4 (28)	12.3 (13)	0 (0)
Ankle-leg index	106	84.9 (90)	4.7 (5)	1.9 (2)	8.5 (9)
FABER	106	12.3 (13)	18.9 (20)	68.9 (73)	0 (0)
Thigh thrust	106	55.7 (59)	14.2 (15)	29.2 (31)	0.9 (1)
Distraction	106	41.5 (44)	22.6 (24)	34.9 (37)	0.9 (1)
Psoas palpation	105	17.1 (18)	18.1 (19)	64.8 (68)	0 (0)
Ober's	105	45.7 (48)	25.7 (27)	28.6 (30)	0 (0)
FAIR	105	56.2 (59)	15.2 (16)	27.6 (29)	1 (1)
Ely's	105	18.1 (19)	14.3 (15)	67.6 (71)	0 (0)
Hibb's	105	26.7 (28)	14.3 (15)	59 (62)	0 (0)
Yeoman's	105	22.9 (24)	15.2 (16)	61.9 (65)	0 (0)
Herron-Pheasant	105	81.9 (86)	10.5 (11)	2.9 (3)	4.8 (5)
Sciatic notch tenderness	105	22.9 (24)	15.2 (15)	61.9 (65)	0 (0)
Spinous percussion	105	49.5 (52)	24.8 (26)	24.8 (26)	1 (1)
Sacral thrust	105	6.7 (7)	14.3 (15)	79 (83)	0 (0)
PSIS challenge	105	4.8 (5)	3.8 (4)	91.4 (96)	0 (0)

Table 4.
Cervical spinal manual therapy procedure usage

Procedure	Mobilization or manipulation	Number of Respondents	% CATEGORY 1 Never / Rarely (n)	% CATEGORY 2 Sometimes (n)	% CATEGORY 3 Often/ Almost Always (n)	% CATEGORY 4 Haven't had a patient to cause them to use it (n)
Cervical Long Axis Distraction	Mobilization	105	14.3 (15)	9.5 (10)	76.2 (80)	0 (0)
Forward flexion	Mobilization	105	40.4 (42)	20.2 (21)	39.4 (41)	1 (1)
Segmental lateral flexion	Mobilization	105	27.6 (29)	12.4 (13)	60 (63)	0 (0)
Global lateral flexion	Mobilization	105	23.8 (25)	14.3 (15)	61.9 (65)	0 (0)
Segmental rotation	Mobilization	105	19 (20)	15.2 (16)	65.7 (69)	0 (0)
Global rotation	Mobilization	105	33.3 (35)	17.1 (18)	49.5 (52)	0 (0)
Segmental extension	Mobilization	105	32.4 (34)	13.3 (14)	54.2 (57)	0 (0)
Segmental forward flexion	Mobilization	105	61 (64)	11.4 (12)	27.6 (29)	0 (0)
Figure 8	Mobilization	105	66.7 (70)	15.2 (16)	18.1 (19)	0 (0)
Rotary occiput	Manipulation	105	46.7 (49)	17.1 (18)	36.2 (38)	0 (0)
Lateral occiput	Manipulation	105	51.4 (54)	24.8 (26)	23.8 (25)	0 (0)
Occiput flexion	Manipulation	105	76.2 (80)	13.3 (14)	10.5 (11)	0 (0)
Occiput extension	Manipulation	105	72.4 (76)	13.3 (14)	14.3 (15)	0 (0)
Lateral atlas	Manipulation	105	30.5 (32)	24.8 (26)	44.8 (47)	0 (0)
Toggle recoil	Manipulation	105	81.9 (86)	5.7 (6)	12.4 (13)	0 (0)
Supine rotary cervical	Manipulation	105	19 (20)	6.7 (7)	74.3 (78)	0 (0)
Supine rotary with lateral flexion	Manipulation	105	13.3 (14)	5.7 (6)	81 (85)	0 (0)
Lateral cervical	Manipulation	105	27.6 (29)	14.3 (15)	58.1 (61)	0 (0)
Prone cervical	Manipulation	105	48.6 (51)	14.3 (15)	36.2 (38)	1 (1)
Seated cervical	Manipulation	105	49.5 (52)	21 (22)	39 (41)	0 (0)
Bedside cervical	Manipulation	105	68.6 (72)	15.2 (16)	15.2 (16)	1 (1)
Scalene	Manipulation	105	77.1 (81)	15.2 (16)	7.6 (8)	0 (0)
Semispinalis	Manipulation	105	90.5 (95)	5.7 (6)	3.8 (4)	0 (0)
Splenius	Manipulation	105	86.7 (91)	9.5 (10)	3.8 (4)	0 (0)
Sternocleidomastoid	Manipulation	105	82.9 (87)	9.5 (10)	7.6 (8)	0 (0)

Table 5.
Thoracic spinal manual therapy procedure usage

Thoracic Spinal Procedures	Mobilization or manipulation	Number of Respondents	% CATEGORY 1 Never / Rarely (n)	% CATEGORY 2 Sometimes (n)	% CATEGORY 3 Often/ Almost Always (n)	% CATEGORY 4 Haven't had a patient to cause them to use it (n)
Thoracic Long Axis Distraction	Mobilization	106	41.5 (44)	7.5 (8)	50 (53)	0.9 (1)
Iliotransverse	Mobilization	106	33 (35)	24.5 (26)	42.5 (45)	0 (0)
Iliocostal	Mobilization	106	40.6 (43)	17.4 (18)	41.5 (44)	0.9 (1)
Seated forward flexion, extension, rotation, lateral bending	Mobilization	106	38.7 (41)	17.9 (19)	43.4 (46)	0 (0)
Cross-bilateral	Manipulation	106	9.4 (10)	16 (17)	74.5 (79)	0 (0)
Reinforced unilateral	Manipulation	106	36.8 (39)	20.8 (22)	42.5 (45)	0 (0)
Carver	Manipulation	106	17.9 (19)	10.4 (11)	71.7 (76)	0 (0)
Thumb move	Manipulation	106	29.2 (31)	23.6 (25)	47.2 (50)	0 (0)
Combination	Manipulation	106	20.8 (22)	14.2 (15)	65.1 (69)	0 (0)
First rib	Manipulation	106	36.8 (39)	19.8 (21)	43.4 (46)	0 (0)
Anterior	Manipulation	106	15.1 (16)	4.7 (5)	80.2 (85)	0 (0)
Modified anterior	Manipulation	106	22.6 (24)	16 (17)	61.3 (65)	0 (0)
Lateral recumbent thoracic rib	Manipulation	106	67.9 (72)	12.2 (13)	18.9 (20)	0.9 (1)

Table 6.
Lumbar spinal manual therapy procedure usage

Lumbar Spinal Procedures	Mobilization or manipulation	Number of Respondents	% CATEGORY 1 Never / Rarely (n)	% CATEGORY 2 Sometimes (n)	% CATEGORY 3 Often/ Almost Always (n)	% CATEGORY 4 Haven't had a patient to cause them to use it (n)
Lumbar Long Axis Distraction	Mobilization	106	26.4 (28)	12.3 (13)	61.3 (65)	0 (0)
Iliomammillary	Mobilization	106	37.7 (40)	13.2 (14)	49.1 (52)	0 (0)
Lumbar roll	Manipulation	106	13.2 (14)	5.7 (6)	81.1 (86)	0 (0)
Lumbar push	Manipulation	106	30.2 (32)	13.2 (14)	56.6 (60)	0 (0)
Lumbar pull	Manipulation	106	16.0 (17)	15.1 (16)	68.9 (73)	0 (0)
Bonyun	Manipulation	106	29.2 (31)	16.0 (17)	54.7 (58)	0 (0)
Seated lumbar	Manipulation	106	75.5 (80)	19.8 (21)	4.7 (5)	0 (0)
Disc opening	Manipulation	106	61.3 (65)	12.3 (13)	26.4 (28)	0 (0)
Reverse roll	Manipulation	106	84.0 (89)	6.6 (7)	9.4 (10)	0 (0)

Table 7.
Pelvis manual therapy procedure usage

Pelvic Procedures	Mobilization or manipulation	Number of Respondents	% CATEGORY 1 Never / Rarely (n)	% CATEGORY 2 Sometimes (n)	% CATEGORY 3 Often/ Almost Always (n)	% CATEGORY 4 Haven't had a patient to cause them to use it (n)
Iliofemoral	Mobilization	106	50 (53)	15.1 (16)	34.9 (37)	0 (0)
Sacral pump	Mobilization	106	25.5 (27)	24.5 (26)	50 (53)	0 (0)
Knee chest	Mobilization	106	37.7 (40)	16 (17)	46.2 (49)	0 (0)
Supine iliac flexion	Mobilization	106	59.4 (63)	17.9 (19)	22.6 (24)	0 (0)
Sitting sacroiliac flexion	Mobilization	106	85.8 (91)	2.8 (3)	11.3 (12)	0 (0)
Lateral pelvis	Mobilization	106	61.3 (65)	5.7 (6)	33 (35)	0 (0)
Posterior superior iliac spine contact upper sacroiliac joint	Manipulation	106	8.5 (9)	5.7 (6)	85.8 (91)	0 (0)
Ischial contact lower sacroiliac joint	Manipulation	106	17.9 (19)	17 (18)	65.1 (69)	0 (0)
Sacral base	Manipulation	106	29.2 (31)	18.9 (20)	51.9 (55)	0 (0)
Sacral apex	Manipulation	106	38.7 (41)	21.7 (23)	39.6 (42)	0 (0)
Prone sacroiliac joint	Manipulation	106	22.6 (24)	15.1 (16)	62.3 (66)	0 (0)