Variations in the Diagnosis and Treatment of Somatic Dysfunction Between 4 Osteopathic Residency Programs

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Context: The American Osteopathic Association requires the integration of osteopathic principles and practice in all specialty residency training programs that it accredits, but the 4 residencies with the most integration of osteopathic manipulative medicine (OMM) have differences in training and emphasis on OMM as a primary treatment modality.

Objective: To study differences in OMM use for spinal pain between the neuromusculoskeletal medicine/OMM (NMM/OMM), the family practice/osteopathic manipulative treatment (FP/OMT), the integrated FP/OMT and NMM/OMM (FP/NMM), and the internal medicine and NMM/OMM (IM/NMM) specialty residency training programs.

Methods: Medical records were reviewed for patient encounters from September 2011 through October 2013 at NMM/OMM, FP/OMT, FP/NMM, and IM/NMM residencies in a family medicine and OMM specialty clinic. Records were screened for a diagnosis of cervicalgia, thoracalgia, lumbago, or backache. The identified encounters were compared to determine between-specialty differences in the number of chief complaints, non–somatic dysfunction assessments, body regions with diagnosed somatic dysfunction, body regions managed with OMT, and number and type of OMT techniques used.

Results: Eighteen residents had 2925 patient encounters that included 1 or more spinal pain diagnoses. Overall, 2767 patients (95%) received OMT. The probability (95% CI) of residents using OMT was 0.99 (0.98-0.99) for the NMM/OMM residents, 0.66 (0.55-0.77) for the FP/OMT residents, 0.94 (0.88-0.97) for the FP/NMM residents, and 0.997 (0.98-1.0) for the IM/NMM residents. The FP/OMT residents were less likely to manage spinal pain using OMT ($P<.001$) and documented fewer somatic dysfunction assessments and fewer musculoskeletal assessments ($P<.001$), but they documented significantly more non–somatic dysfunction assessments ($P<.001$). When using OMT, the FP/OMT residents diagnosed somatic dysfunction in fewer mean (95% CI) body regions (2.9 [2.4-3.5]) than the NMM/OMM (5.5 [4.9-6.2]), the FP/NMM (5.5 [4.8-6.3]), or the IM/NMM (4.6 [3.4-6.0]) residents ($P<.001$). The FP/OMT residents also managed fewer mean (95% CI) body regions with OMT (3.5 [3.0-4.1]) than the NMM/OMM (5.7 [5.2-6.3]), the FP/NMM (5.6 [5.0-6.3]), or the IM/NMM (4.7 [3.7-6.0]) residents ($P<.001$).

Conclusion: Although the FP/OMT residents used OMT less frequently than the other residents during spinal pain encounters, they provided care for a larger number and a wider variety of non–somatic dysfunction assessments.

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The American Osteopathic Association requires the integration of osteopathic principles and practice in all specialty residency training programs that it accredits.[1] The primary residencies that have the most integration of osteopathic manipulative medicine (OMM) are the neuromusculoskeletal medicine/OMM (NMM/OMM),[2] the family practice/osteopathic manipulative treatment (FP/OMT),[3] the integrated FP/OMT and NMM/OMM (FP/NMM),[4] and the integrated internal medicine and NMM/OMM (IM/NMM)[5] specialty residency training programs. However, these 4 residency programs have differences in training and emphasis on OMM as a primary treatment modality rather than a secondary or adjunctive modality.

The NMM/OMM residency requires the highest number of clinical hours with the use of OMM as a primary treatment, with an average of 3 half-days per week spent in an OMM specialty continuity of care clinic during the second and third postgraduate years (PGYs).[2] During those 2 years, the continuity of care experience must include a minimum of 1000 patient visits during which the resident evaluates and provides OMT for a minimum of 100 medical patients, 100 surgical patients, 100 pediatric patients, and 100 obstetric and gynecologic patients under the supervision of a specialist in NMM/OMM.[2] This residency also requires exposure to osteopathic principles, such as completion of a 40-hour basic course in osteopathic cranial manipulative medicine.[2] The FP/OMT residency training focuses on the use of OMM as an adjunctive treatment within a traditional family practice setting. However, this residency has vague requirements regarding exposure to OMM, with no specified rotation requirements or required number of patient encounters providing OMT.[1,6] The FP/NMM and IM/NMM residencies require residents to satisfy the standards of each individual specialty and specifically require a minimum of 4 months rotating in a NMM/OMM specialty setting during PGYs 2, 3, and 4.[4,5]

Because of these differences in training requirements, differences are expected in the use of OMM between residents in the 4 programs. The purpose of the current study was to examine the differences in residency programs in the use of OMM for spinal pain in an outpatient clinical setting using electronic medical records (EMRs). We hypothesized that the NMM/OMM residents would diagnose more somatic dysfunction and use a wider variety of OMT techniques in the evaluation and treatment of patients with diagnosed spinal pain than residents from the other residencies. Further, we expected that residents from the FP/NMM and the IM/NMM programs would diagnose more somatic dysfunction and use a wider variety of OMT techniques in the evaluation and treatment of patients with diagnosed spinal pain than the FP/OMT residents.

Methods

For the current retrospective medical record review, we obtained data from September 2011 through October 2013 for outpatient clinical encounters in the Gutensohn Clinical Associates (GCA) family medicine and OMM specialty clinics in Kirksville, Missouri, that included NMM/OMM, FP/OMT, FP/NMM, and IM/NMM residents. The study was reviewed by the local institutional review board and deemed exempt.

Patient encounters for residents from all PGYs from the specified programs were identified. Encounters were excluded from the current study if they occurred outside the family medicine and OMM specialty clinics of the GCA or if they were not documented using the EMR system, such as with hospitalized patients.

The GCA uses an EMR documentation system (Nextgen EMR) that allows somatic dysfunction diagnoses and OMM to be documented using searchable checkbox fields. Encounters were screened for 1 of the following 4 *International Classification of Diseases, Ninth Revision* (ICD-9)[7] spinal pain codes in the assessment field: neck pain 723.1 (cervicalgia), thoracic pain 724.1 (thoracalgia), low back pain 724.2 (lumbago), or nonspecific back pain 724.5 (backache).

After appropriate patient encounters were identified, the following information was extracted from the EMR system: patient demographics, the number of chief complaints (1-6), the number (0-8) and type of non–somatic dysfunction assessments, the number of body regions with diagnosed somatic dysfunction (0-10), the number of body regions managed with OMT (0-10), and the number (0-18) and types of OMT techniques used in each body region. For the types of OMT used in each body region, the EMR system had separate checkboxes for articulatory technique; integrated neuromuscular release; progressive inhibition of neuromuscular structures; cranial OMT; ligamentous articular strain; soft tissue; counterstrain; lymphatic; Still technique; facilitated positional release; muscle energy; visceral manipulation; high-velocity, low-amplitude (HVLA); neurofascial release; myofascial release; balanced ligamentous tension; and percussion vibrator.[8] The EMR system also had a checkbox for other techniques that did not fall into the above categories, such as biodynamics.

Non–somatic dysfunction assessments were categorized as musculoskeletal, neurologic, or non-neuromusculoskeletal based on ICD-9 classifications, where codes 710 through 739 corresponded to diseases of the musculoskeletal system and codes 320 through 389 corresponded to diseases of the nervous system.[7]

Statistical Analyses

Data were analyzed using SAS statistical software (version 9.3, SAS Institute Inc). The number of outpatient clinical encounters involving each of the spinal pain diagnoses, resident physicians from each residency program, and each of the clinic locations were summarized using frequencies and percentages. Logistic regression models were used to compare the residency programs for dichotomous outcome measures (eg, whether OMT was used or not used or whether a particular technique was used or not used). For outcome measures involving counts (eg, number of chief complaints, number of body regions managed with OMT), Poisson regression models were used to compare residency programs. General linear mixed models were used to compare the residency programs on the mean number of OMT techniques used per body region. The logistic regression, Poisson regression, and general linear mixed models, which included the resident in the model as a random effect, were used to estimate probabilities for dichotomous outcome variables and means for count and continuous variables with 95% CIs for these estimates. Because the patient characteristics differed between the residency programs, all comparisons of the programs were repeated using patient sex and age as covariates. Analyses of body regions with diagnosed and treated somatic dysfunction and of OMT techniques used compared only those spinal pain patient encounters that included OMT. $P \leq .05$ was considered statistically significant.

Results

Eighteen residents from the 4 residency programs had outpatient clinical encounters in the GCA family medicine and OMM specialty clinics. Of the 18 residents, 7 were NMM/OMM residents, 6 were FP/OMT residents, 4 were FP/NMM residents, and 2 were IM/NMM residents. Many residents of the current study were followed over several years: the NMM/OMM residency included 3 PGY I, 6 PGY II, and 3 PGY III residents; the FP/OMT residency included 2 PGY I, 2 PGY II, and 4 PGY III residents; the FP/NMM residency included 2 PGY I, 2 PGY II, 1 PGY III, and 1 PGY IV residents; and the IM/NMM residency included 2 PGY I, 1 PGY II, and 1 PGY III residents. During the study period, 1 FP/NMM resident transferred into the NMM/OMM residency program. Data from this resident were classified according to the residency assignment at the time of the office visit.

The 18 residents had 2925 outpatient clinical encounters that included 1 or more of the 4 ICD-9 codes in the assessment field. Of these, 1075 encounters (36.8%) were for lumbago, 549 (18.8%) were for cervicalgia,

442 (15.1%) were for thoracalgia, and 101 (3.5%) were for backache. For patient encounters with more than 1 ICD-9 code, 275 (9.4%) included cervicalgia and lumbago; 193 (6.5%) included cervicalgia and thoracalgia; 163 (5.6%) included thoracalgia and lumbago; 107 (3.7%) included cervicalgia, thoracalgia, and lumbago; 13 (0.4%) included cervicalgia and backache; and 7 (0.2%) included lumbago and backache. Of the 2925 outpatient clinical encounters, 1825 (62.3%) involved NMM/OMM residents with 1798 patients (99%) receiving OMT, 264 (9.0%) involved FP/OMT residents with 179 patients (68%) receiving OMT, 559 (19.1%) involved FP/NMM residents with 512 patients (92%) receiving OMT, and 279 (9.5%) involved IM/NMM residents with 278 patients (99.6%) receiving OMT. Of the encounters, 524 (17.9%) were at the GCA family medicine clinic and 2401 (82.1%) were at the OMM specialty clinic. Overall, 2767 patients (95%) received OMT for their spinal pain. The probability (95% CI) of residents using OMT to manage spinal pain was 0.99 (0.98-0.99) for the NMM/OMM residents, 0.66 (0.55-0.77) for the FP/OMT residents, 0.94 (0.88-0.97) for the FP/NMM residents, and 0.997 (0.98-1.0) for the IM/NMM residents. The FP/OMT residents were less likely to manage spinal pain using OMT than the other residents ($P<.001$).

Regarding the demographic characteristics of the patients involved in the encounters, 2169 patients (74%) were female and 756 (26%) were male; 2773 patients (95%) were white, 89 (5%) were other race/ethnicity, and 63 (2%) were unknown race/ethnicity. Patient ages ranged from 4 to 100 years (mean [SD] age, 48.2 [19.8] years). *Table 1* depicts the mean (95% CI) number of chief complaints addressed during the spinal pain encounters as well as the mean (95% CI) of non–somatic dysfunction assessments broken down by musculoskeletal, neurologic, and non-neuromusculoskeletal assessments.

No differences were noted between residents in the mean number of chief complaints documented during the spinal pain encounters ($P=.26$) (*Table 1*). The FP/OMT residents documented significantly more non–somatic dysfunction assessments than the other residents, and the NMM/OMM residents documented fewer of these assessments than the FP/NMM residents ($P<.001$). The FP/OMT residents documented significantly fewer musculoskeletal assessments than the other residents ($P<.001$). No difference was found between the residents in the mean number of neurologic assessments ($P=.39$). The FP/OMT and FP/NMM residents documented the most non-neuromusculoskeletal assessments, followed by the NMM/OMM residents; the IM/NMM residents documented the fewest non-neuromusculoskeletal assessments ($P<.001$). After adjusting for patient sex and age, results were consistent with the unadjusted analyses (data not shown).

No significant difference was noted between the 4 residencies for the probability of the residents using the ICD-9 diagnostic codes for thoracalgia, lumbago, or backache (all $P\geq.21$) (*Table 2*). Whereas the FP/OMT residents were significantly less likely to diagnose cervicalgia than the NMM/OMM and the FP/NMM residents, no differences were found between the FP/OMT residents and the IM/NMM residents ($P=.05$). After adjusting for patient sex and age, results were consistent with the unadjusted analyses (data not shown).

For the probability of residents diagnosing somatic dysfunction in each of the 10 possible body regions, a significant difference was found between the residency programs in 9 of the body regions (all $P\leq.04$) (*Table 3*). In all 9 of these body regions, the FP/OMT residents were less likely to diagnose somatic dysfunction than the NMM/OMM and the FP/NMM residents. The FP/OMT residents were also less likely to diagnose somatic dysfunction in the abdominal and lower extremity regions than the IM/NMM residents. The IM/NMM residents were less likely to diagnose somatic dysfunction in the thoracic region than the FP/NMM residents. After adjusting for patient sex and age, results were consistent with the unadjusted analyses (data not shown) except for somatic dysfunction diagnosis rates in the lumbar region, for which no differences were found ($P=.06$).

Table 1.
Chief Complaints and Clinical Assessments of Spinal Pain Encounters for Residents of 4 Osteopathic Specialty Residency Training Programs

	Mean (95% CI)					
		Residency Program				
Variable	Overall	NMM/OMM (N=1825)[a]	FP/OMT (N=264)[a]	FP/NMM (N=512)[a]	IM/NMM (N=278)[a]	*P* Value[b]
Chief complaints	1.4 (1.4-1.5)	1.4 (1.3-1.5)	1.4 (1.2-1.5)	1.6 (1.4-1.7)	1.5 (1.3-1.7)	.26
All assessments[c]	4.1 (3.6-4.7)	3.1 (2.7-3.6)	6.4 (5.4-7.7)	3.8 (3.2-4.6)	3.8 (2.8-5.3)	<.001[d]
Musculoskeletal assessments[c]	1.7 (1.5-1.8)	2.0 (1.8-2.2)	1.3 (1.1-1.5)	1.7 (1.5-2.0)	1.8 (1.4-2.3)	<.001[e]
Neurologic assessments	0.2 (0.1-0.2)	0.2 (0.1-0.2)	0.1 (0.1-0.2)	0.2 (0.1-0.3)	0.1 (0.1-0.3)	.39
Non-neuromusculoskeletal assessments[c]	0.2 (0.1-0.2)	0.2 (0.1-0.2)	0.4 (0.3-0.7)	0.3 (0.2-0.6)	0 (0-0.1)	<.001[f]

[a] N refers to the number of spinal pain encounters seen by the residents of the designated residency program during the study period.
[b] *P* values from Poisson regression models including the treatment provider as a random effect.
[c] Excludes somatic dysfunction assessments. The minimum number of assessments was 1, and the maximum was 8.
[d] FP/OMT>FP/NMM>NMM/OMM and FP/OMT>IM/NMM.
[e] NMM/OMM=FP/NMM=IM/NMM>FP/OMT.
[f] FP/NMM=FP/OMT>NMM/OMM>IM/NMM.

Abbreviations: FP/NMM, integrated family practice/osteopathic manipulative treatment and neuromusculoskeletal medicine/osteopathic manipulative medicine; FP/OMT, family practice/osteopathic manipulative treatment; IM/NMM, internal medicine and neuromusculoskeletal medicine/osteopathic manipulative medicine; NMM/OMM, neuromusculoskeletal medicine/osteopathic manipulative medicine.

Table 2.
Spinal Pain Diagnoses for Outpatient Clinical Encounters for Residents of 4 Osteopathic Specialty Residency Training Programs

	Probability of Diagnosis (95% CI)					
		Residency Program				
Diagnosis	Overall	NMM/OMM	FP/OMT	FP/NMM	IM/NMM	*P* Value[a]
Cervicalgia	0.30 (0.23-0.37)	0.36 (0.27-0.45)	0.18 (0.12-0.27)	0.35 (0.25-0.46)	0.32 (0.17-0.52)	.05[b]
Thoracalgia	0.25 (0.17-0.34)	0.28 (0.19-0.39)	0.15 (0.08-0.26)	0.26 (0.16-0.40)	0.32 (0.14-0.59)	.24
Lumbago	0.57 (0.50-0.64)	0.59 (0.51-0.67)	0.65 (0.54-0.74)	0.50 (0.40-0.61)	0.53 (0.35-0.71)	.21
Backache	0.02 (0-0.08)	0.02 (0-0.09)	0.04 (0.01-0.23)	0.02 (0-0.13)	0.01 (0-0.30)	.87

[a] *P* values from logistic regression models including the treatment provider as a random effect.
[b] NMM/OMM=FP/NMM>FP/OMT.

Abbreviations: FP/NMM, integrated family practice/osteopathic manipulative treatment and neuromusculoskeletal medicine/osteopathic manipulative medicine; FP/OMT, family practice/osteopathic manipulative treatment; IM/NMM, internal medicine and neuromusculoskeletal medicine/osteopathic manipulative medicine; NMM/OMM, neuromusculoskeletal medicine/osteopathic manipulative medicine.

Table 3.
Body Regions With Diagnosed Somatic Dysfunction During Spinal Pain Encounters for Residents of 4 Osteopathic Specialty Residency Training Programs

	Probability of Diagnosing Somatic Dysfunction (95% CI)					
		Residency Program				
Body Region	Overall	NMM/OMM	FP/OMT	FP/NMM	IM/NMM	*P* Value[a]
Head	0.44 (0.29-0.59)	0.64 (0.45-0.79)	0.23 (0.10-0.44)	0.60 (0.37-0.80)	0.31 (0.09-0.68)	.03[b]
Cervical	0.61 (0.53-0.68)	0.71 (0.63-0.78)	0.35 (0.25-0.48)	0.76 (0.64-0.84)	0.57 (0.38-0.75)	<.001[b]
Thoracic	0.84 (0.75-0.90)	0.90 (0.82-0.95)	0.69 (0.51-0.83)	0.94 (0.85-0.98)	0.69 (0.38-0.89)	.006[c]
Rib/chest	0.61 (0.38-0.80)	0.83 (0.61-0.94)	0.19 (0.05-0.50)	0.66 (0.32-0.89)	0.73 (0.20-0.97)	.02[b]
Lumbar	0.74 (0.64-0.81)	0.82 (0.73-0.89)	0.60 (0.44-0.74)	0.81 (0.66-0.90)	0.68 (0.42-0.86)	.04[b]
Sacral	0.60 (0.50-0.69)	0.76 (0.67-0.84)	0.32 (0.20-0.47)	0.71 (0.58-0.82)	0.55 (0.31-0.78)	<.001[b]
Pelvic	0.47 (0.36-0.59)	0.58 (0.45-0.70)	0.27 (0.15-0.44)	0.55 (0.39-0.70)	0.52 (0.25-0.78)	.04[b]
Abdominal	0.04 (0.02-0.08)	0.07 (0.04-0.12)	0 (0-0.03)	0.09 (0.05-0.18)	0.07 (0.02-0.25)	.04[d]
Upper extremity	0.11 (0.08-0.15)	0.14 (0.10-0.19)	0.06 (0.03-0.12)	0.16 (0.11-0.24)	0.11 (0.05-0.23)	.10
Lower extremity	0.20 (0.13-0.28)	0.35 (0.25-0.46)	0.03 (0.01-0.07)	0.29 (0.19-0.42)	0.38 (0.18-0.64)	<.001[d]

[a] *P* values from logistic regression models including the treatment provider as a random effect.
[b] NMM/OMM=FP/NMM>FP/OMT.
[c] NMM/OMM=FP/NMM>FP/OMT and FP/NMM>IM/NMM.
[d] NMM/OMM=FP/NMM=IM/NMM>FP/OMT.

Abbreviations: FP/NMM, integrated family practice/osteopathic manipulative treatment and neuromusculoskeletal medicine/osteopathic manipulative medicine; FP/OMT, family practice/osteopathic manipulative treatment; IM/NMM, internal medicine and neuromusculoskeletal medicine/osteopathic manipulative medicine; NMM/OMM, neuromusculoskeletal medicine/osteopathic manipulative medicine.

The FP/OMT residents diagnosed somatic dysfunction in significantly fewer body regions than the other residents ($P<.001$) (*Table 4*). The FP/OMT residents also used OMT in fewer body regions than the other residents ($P<.001$). The FP/NMM residents documented a wider variety of OMT techniques used than the NMM/OMM residents, but no differences were found between the FP/NMM residents and the FP/OMT and the IM/NMM residents in this measure ($P=.005$). After adjusting for patient sex and age, results were consistent with the unadjusted analyses (data not shown).

The NMM/OMM residents used articulatory technique more often than the FP/OMT and the FP/NMM residents ($P<.001$), facilitated positional release less often than the FP/NMM and the IM/NMM residents ($P=.01$), and progressive inhibition of neuromuscular structures and neurofascial release less often than the FP/NMM residents (both $P\leq.003$) (*Table 5*). The FP/OMT residents used HVLA more often than the NMM/OMM and the FP/NMM residents ($P=.01$). The FP/OMT residents used cranial OMT less often than the other residents, and the FP/NMM residents used cranial OMT less often than the NMM/OMM residents ($P<.001$). The FP/NMM residents used the Still technique more often than the other residents, and the NMM/OMM residents used Still technique more often than the FP/OMT residents ($P=.006$). The IM/NMM residents used lymphatic technique more often than the NMM/OMM residents ($P=.01$). Significant differences

Table 4.
Somatic Dysfunction Assessments and Osteopathic Manipulative Treatment Techniques Performed by Residents of 4 Osteopathic Specialty Residency Training Programs During Spinal Pain Encounters

	Mean (95% CI)					
		Residency Program				
Variable	Overall	NMM/OMM	FP/OMT	FP/NMM	IM/NMM	*P* Value
Body regions with diagnosed somatic dysfunction	4.5 (4.0-5.0)	5.5 (4.9-6.2)	2.9 (2.4-3.5)	5.5 (4.8-6.3)	4.6 (3.4-6.0)	<.001[a,b]
Body regions managed with OMT	4.8 (4.4-5.3)	5.7 (5.2-6.3)	3.5 (3.0-4.1)	5.6 (5.0-6.3)	4.7 (3.7-6.0)	<.001[a,b]
Types of OMT techniques used per body region	2.3 (1.8-2.7)	2.2 (1.6-2.7)	2.0 (1.3-2.7)	2.6 (2.0-3.2)	2.4 (1.2-3.7)	.005[c,d]

[a] *P* values from Poisson regression models including the treatment provider as a random effect.
[b] NMM/OMM=FP/NMM=IM/NMM>FP/OMT.
[c] *P* value from general linear mixed model including the treatment provider as a random effect.
[d] FP/NMM>NMM/OMM.

Abbreviations: FP/NMM, integrated family practice/osteopathic manipulative treatment and neuromusculoskeletal medicine/osteopathic manipulative medicine; FP/OMT, family practice/osteopathic manipulative treatment; IM/NMM, internal medicine and neuromusculoskeletal medicine/osteopathic manipulative medicine; NMM/OMM, neuromusculoskeletal medicine/osteopathic manipulative medicine; OMT, osteopathic manipulative treatment.

were found between the residency programs on the use of balanced ligamentous tension (*P*=.03). The NMM/OMM and the FP/NMM residents used balanced ligamentous tension most often, followed by the IM/NMM residents and the FP/OMT residents. A significant difference was found between the residency programs on the use of other techniques (*P*=.001). The IM/OMM residents used other techniques more often than the other residents, and the FP/OMT residents used other techniques more often than the NMM/OMM residents. After adjusting for patient sex and age, results were consistent with the unadjusted analyses (data not shown) except for the use of HVLA, for which no differences were found (*P*=.10).

Discussion

Our results suggest statistically significant differences in the diagnosis and treatment of somatic dysfunction for spinal pain between the residents of the NMM/OMM, FP/OMT, FP/NMM, and IM/NMM programs, which have been shown to have higher OMM integration standards than other osteopathic specialty residency programs.[1-5] Although all residents were just as likely to diagnose thoracalgia, lumbago, and backache, the FP/OMT residents diagnosed cervicalgia in significantly fewer patients than residents from the other 3 programs (*P*=.05). In 2010, low back pain was the most common and neck pain was the fourth most common cause of years lived with disability.[9] The discrepancy in cervicalgia diagnoses between the FP/OMT residents and the 3 types of NMM residents may be a result of variations in patient populations between the FP and OMM specialty clinics. Future studies could investigate variations in patient populations between family medicine and OMM specialty clinics by comparing final assessments with national ambulatory health care data.

The use of OMT for spinal pain varied between our residents with the FP/OMT residents least likely to use

Table 5.
Types of Osteopathic Manipulative Treatment Techniques Used by Residents of 4 Osteopathic Specialty Residency Training Programs During Spinal Pain Encounters

	Probability of Using Technique (95% CI)					
		Residency Program				
Technique	Overall	NMM/OMM	FP/OMT	FP/NMM	IM/NMM	*P* Value[a]
Any	0.97 (0.94-0.98)	0.99 (0.98-0.99)	0.66 (0.55-0.77)	0.94 (0.88-0.97)	0.997 (0.98-1.0)	<.001[b]
Articulatory	0.21 (0.06-0.53)	0.77 (0.40-0.94)	0.06 (0.01-0.40)	0.05 (0.01-0.23)	0.30 (0.01-0.94)	<.001[c]
INR[d]	0.02 (0.01-0.07)	0.01 (0-0.03)	0[d]	0.01 (0-0.04)	0.09 (0.01-0.47)	.21
PINS	0.03 (0.01-0.10)	0 (0-0.02)	0.04 (0.01-0.19)	0.06 (0.01-0.23)	0.07 (0-0.62)	.003[e]
Cranial OMT	0.11 (0.05-0.24)	0.39 (0.21-0.61)	0.01 (0-0.06)	0.19 (0.07-0.41)	0.15 (0.02-0.56)	<.001[f]
LAS	0.04 (0.01-0.13)	0.04 (0.01-0.13)	0.01 (0-0.06)	0.04 (0.01-0.15)	0.22 (0.02-0.81)	.20
Soft tissue	0.65 (0.33-0.87)	0.33 (0.10-0.68)	0.85 (0.45-0.98)	0.46 (0.16-0.79)	0.82 (0.16-0.99)	.09
Counterstrain	0.36 (0.25-0.47)	0.40 (0.28-0.54)	0.35 (0.21-0.53)	0.29 (0.17-0.44)	0.39 (0.16-0.68)	.44
Lymphatic	0.02 (0.01-0.04)	0.01 (0-0.02)	0.01 (0-0.05)	0.02 (0.01-0.05)	0.07 (0.02-0.18)	.01[g]
Still technique	0.47 (0.27-0.68)	0.66 (0.42-0.84)	0.21 (0.07-0.51)	0.83 (0.61-0.94)	0.20 (0.03-0.69)	.006[h]
FPR	0.21 (0.11-0.36)	0.11 (0.05-0.23)	0.12 (0.04-0.31)	0.22 (0.10-0.42)	0.51 (0.14-0.87)	.01[i]
Muscle energy	0.88 (0.78-0.94)	0.88 (0.76-0.94)	0.85 (0.65-0.94)	0.90 (0.78-0.96)	0.88 (0.54-0.98)	.92
Visceral	0.02 (0.01-0.06)	0.03 (0.01-0.09)	0 (0-0.03)	0.04 (0.01-0.11)	0.05 (0-0.34)	.23
HVLA	0.50 (0.39-0.60)	0.39 (0.28-0.51)	0.70 (0.55-0.82)	0.48 (0.34-0.62)	0.42 (0.20-0.68)	.01[j]
Neurofascial release	0.02 (0-0.08)	0.01 (0-0.07)	0.01 (0-0.07)	0.05 (0.01-0.23)	0.02 (0-0.54)	<.001[e]
Myofascial release	0.82 (0.56-0.94)	0.92 (0.69-0.98)	0.34 (0.08-0.76)	0.87 (0.42-0.98)	0.92 (0.32-1.0)	.07
BLT	0.44 (0.23-0.67)	0.42 (0.21-0.67)	0.10 (0.02-0.32)	0.40 (0.18-0.67)	0.88 (0.37-0.99)	.03[k]
Percussion vibrator	0.07 (0.02-0.19)	0.10 (0.03-0.25)	0.01 (0-0.06)	0.13 (0.04-0.33)	0.22 (0.02-0.78)	.08
Other	0.05 (0.03-0.09)	0.01 (0-0.03)	0.05 (0.02-0.14)	0.03 (0.01-0.10)	0.26 (0.07-0.60)	.001[l]

[a] *P* values from logistic regression models including the treatment provider as a random effect.
[b] NMM/OMM=IM/NMM>FP/NMM>FP/OMT.
[c] NMM/OMM>FP/OMT=FP/NMM.
[d] The FP/OMT residency program was not included in the analysis because no residents from that program used the technique.
[e] FP/NMM>NMM/OMM.
[f] NMM/OMM>FP/NMM>FP/OMT and IM/NMM>FP/OMT.
[g] IM/NMM>NMM/OMM.
[h] FP/NMM>NMM/OMM>FP/OMT and FP/NMM>IM/NMM.
[i] FP/NMM=IM/NMM>NMM/OMM.
[j] FP/OMT>FP/NMM=NMM/OMM.
[k] NMM/OMM=FP/NMM=IM/NMM>FP/OMT.
[l] IM/NMM>FP/OMT>NMM/OMM and IM/NMM>FP/NMM.

Abbreviations: BLT, balanced ligamentous tension; FP/NMM, integrated family practice/osteopathic manipulative treatment and neuromusculoskeletal medicine/osteopathic manipulative medicine; FP/OMT, family practice/osteopathic manipulative treatment; FPR, facilitated positional release; HVLA, high-velocity, low-amplitude; IM/NMM, internal medicine and neuromusculoskeletal medicine/osteopathic manipulative medicine; INR, integrated neuromuscular release; LAS, ligamentous articular strain; NMM/OMM, neuromusculoskeletal medicine/osteopathic manipulative medicine; OMT, osteopathic manipulative treatment; PINS, progressive inhibition of neuromuscular structures.

OMT for spinal pain. This difference is likely because of the larger number of non–somatic dysfunction assessments evaluated by these residents during their spinal pain encounters. Katerndahl et al[10] found that family medicine practitioners typically see more complex patients than subspecialists because they coordinate or provide care for diagnoses from a wide variety of organ systems. Johnson et al[11] investigated the use of OMT by osteopathic family physicians; nearly one-third reported that they used OMT in less than 5% of patient encounters. Respondents also cited barriers to use of OMT, such as public association of manipulative medicine with chiropractic manipulation, limited time during patient encounters, and prioritization of other professional interests over OMT.[11] Although the FP/OMT residents in the current study provided OMT during 68% of the spinal pain encounters, the limited time during encounters with the additional non-neuromusculoskeletal diagnoses may explain the lower rate of OMT use by FP/OMT residents compared with residents from the other 3 programs.

In another study, Johnson and Kurtz[12] surveyed osteopathic specialists regarding their use of OMT. They found that OMM/NMM specialists performed OMT significantly more frequently in clinical practice than osteopathic family physicians ($P<.001$), and osteopathic family physicians used OMT significantly more frequently than pediatricians, internists, obstetricians and gynecologists, and non–primary care specialists ($P<.001$). That study[12] also found that OMT was used most frequently for musculoskeletal conditions, followed by neurologic and respiratory conditions. The body regions most frequently managed with OMT included the head, cervical, thoracic, and lumbar regions.[12] In the hospital setting, the top 3 reasons for ordering an OMM consultation were chest/rib pain, spinal pain, and lower respiratory infection; the OMM specialists most commonly diagnosed somatic dysfunction in the thoracic, cervical, rib, head, and lumbar regions.[13] The current study found that residents managed spinal pain in the cervical, thoracic, rib/chest, lumbar, and sacral regions more than 50% of the time.

In a survey assessing the use of specific types of OMT techniques by family physicians, other primary care physicians (ie, those in pediatrics, internal medicine, and obstetrics and gynecology), OMT specialists, and non–primary care specialists (ie, those in all other specialties),[14] the most commonly preferred OMT techniques were soft tissue, HVLA, muscle energy, and counterstrain. In addition, OMM specialists used a wider variety of techniques than physicians from all other specialties. In the hospital setting, NMM/OMM specialists most frequently used myofascial release, balanced ligamentous tension, muscle energy, and soft tissue.[13] The current study found that residents most commonly used muscle energy, myofascial release, soft tissue, and HVLA.

The current study had several limitations. The EMR program used by the GCA during the study limited assessment field entries to 6 chief complaints and 8 diagnoses. As a result, some chief complaints and diagnoses may not have been included in the study data. Residents from the different programs may have chosen which 8 diagnoses to include on the basis of which ones required the highest level of medical decision making. Although the current study had a large number of spinal pain encounters, a small number of residents saw spinal pain patients in both the GCA family medicine and OMM specialty clinics. Therefore, the effect of the clinical environment could not be studied. Additionally, because the IM/NMM residents also saw patients from an unaffiliated internal medicine specialty clinic, OMM use in that specialty setting could not be assessed. Finally, because a small number of residents were from the FP/NMM and the IM/NMM residency programs, the individual OMM preferences of residents may have affected OMT technique choice.

Conclusion

We found several statistically significant differences in the use of OMT between the 4 osteopathic residency programs with the highest integration of OMM. For

spinal pain encounters, the FP/OMT residents diagnosed somatic dysfunction in fewer body regions and used OMT less frequently than the other residents. These results may reflect other barriers to OMT use, such as a larger number of medical problems requiring management during an individual clinical encounter. The FP/NMM and the IM/NMM residents used OMT to a similar extent as the NMM/OMM residents. This finding suggests that the extra year of training in the NMM/OMM specialty environment for these residents may influence their use of OMT. Osteopathic educators, osteopathic physicians, and patients may benefit from this knowledge about differences between these 4 residency programs and the practice scope of the different specialties.

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Author Contributions

All authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; all authors drafted the article or revised it critically for important intellectual content; all authors gave final approval of the version of the article to be published; and Dr Snider agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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