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Current trends in the technical performance of lumbar zygapophyseal joint interventions☆

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ABSTRACT

Objective: To survey how interventional pain physicians are currently performing lumbar facet interventions, with an emphasis on fellowship training.
Design: Survey Study.
Methods: An online electronic survey disseminated via Research Electronic Data Capture (REDCap) software to current and expired attending physician members of the Spine Intervention Society (SIS). Responses were stratified by fellowship training type: ACGME Pain Medicine (APM), ACGME Sports Medicine (ASM), Interventional Spine and Musculoskeletal Medicine (ISMM), or None.
Results: As a whole, a majority of respondents indicated on independent questions they require 2 diagnostic medial branch blocks (MBBs) performed with 0.5 cc or less of anesthetic to result in at least 75% pain relief before proceeding with a radiofrequency neurotomy (RFN), performed via parallel approach with 18g or larger needle and 10 mm active tip and a lesion of at least 80–85° C and 90–119 s of duration. Statistically significant differences as stratified by APM vs ISMM fellowship training included: the use of corticosteroids at the time of RFN (43/79 (54.4%) vs 16/63 (25.4%), typically treating 3 segments or more 22/79 (27.8%) vs 7/73 (9.6%), and MBB volume injectate of $\geq$ 1 cc 22/79 (27.8%) vs 7/63 (11.1%) respectively.
Conclusions: There is largely agreement upon the technical performance of lumbar facet interventions by members of SIS. Physicians who completed an APM fellowship were more likely to report using corticosteroids at the time of RFN, using higher anesthetic volumes and treating 3 or more spinal segments.

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1. Introduction

Back pain emanating from the lumbar zygapophyseal joints is mediated by the medial branches of the lumbar dorsal rami, rendering them a target for interventional pain procedures. Despite the presence of established consortium guidelines [1] and practice guidelines [2], debated aspects of interventions targeting the lumbar zygapophyseal joints remain. RFN has been shown to provide durable pain relief and functional improvement for individuals with lumbar zygapophyseal pain [3]. Certain variables, such as patient selection criteria of dual MBBs and use of a parallel technique (defined with respect to the angle of radiofrequency cannula and junction of transverse process and superior articular process, where the medial branch is known to traverse) have been shown to result in improved outcomes [4,5]. However, adhering to this paradigm may not always be preferred by the interventional pain physician, for a variety of reasons [6–8]. Beyond patient selection criteria and technique, other potentially relevant variables that may differ depending upon the individual interventional pain physician include the diagnostic injection parameters, concomitant use of corticosteroid at the time of MBB or RFN, and radiofrequency lesion parameters. These other practices may be due to beliefs of theorized benefit, or lack thereof, but have not necessarily been shown to have direct associations with outcomes following RFN. Literature on this topic is sparse, though one recent study found significant variation in type of local anesthetic used for comparative diagnostic blocks and the use of contrast injection during diagnostic MBB [9]. Some of the other reported practices such as the

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concomitant use corticosteroids also have safety considerations.

In the United States, lumbar facet joint interventions were performed at a rate of 3909 per 100,000 Medicare beneficiaries (2,091,134), including lumbar RFN, which were performed at a rate of 899 per 100,000 Medicare beneficiaries (480,723 total) in 2014 [10]. With this in mind, there is value in describing potential nuanced differences in practice patterns. These potential differences in practice patterns may be due to a combination of factors including differing guidelines, differing interpretation of available literature, and training practices. While many of these factors may be difficult to clearly identify, fellowship training is one potential variable that can be measured.

The objective of this study was to describe practice patterns of physicians when performing lumbar zygapophyseal joint targeted procedures. This was accomplished by utilizing the survey service that the Spine Intervention Society has in place to query its members. Data were stratified by fellowship training type as a potential variable that may explain potential differences.

2. Material and methods

Institutional Review Board (IRB) exemption status was approved by Vanderbilt University Medical Center policy as no identifiable protected health information was obtained or utilized.

An online electronic survey (multiple choice questionnaire) was disseminated via Research Electronic Data Capture (REDCap) software to current and expired attending physician members of the SIS on January 2021 and remained open until March 2021. Responses were anonymous, and no compensation was provided for participation. Respondents provided information regarding provider demographics and practice patterns. After seven basic demographics questions, participants were asked a total of 18 questions regarding their experience with lumbar facet interventions (Appendix A).

Responses were then statistically analyzed and stratified by fellowship training type: ACGME Pain Medicine (APM), ACGME Sports Medicine (ASM), Interventional Spine and Musculoskeletal Medicine (ISMM), or None.

3. Theory/calculation

Chi square tests of proportions were used to compare survey responses. Using SPSS (Version 26.0, (IBM Corporation, Armonk, NY)), statistical significance was set at alpha <0.05.

Two secondary analyses were performed. Multivariate logistic regression modelling analysis was used to compare the relationship between the use of corticosteroid during RFN and approach to RFN, and potential predictor variables. Models were adjusted for physician age, sex, practice environment, and geographic location.

4. Results

A link to the survey was distributed via email to 5711 addresses. The email was opened 1825 times, with 223 individuals clicking and opening the survey. Of the 223 individuals who opened the survey, 206 completed it (92%). Basic demographic information is shown in Table 1.

There was overwhelming agreement amongst the majority of survey responses; no statistically significant differences were found in 14 out of 18 questions when stratified by fellowship training (Table 2). As a whole, 50% of responders reported doing >60 RFN per year. The most represented specialty was Physical Medicine & Rehabilitation (PM&R) (123/206, 59.7%). With regard to fellowship training: 79 (38.3%) completed APM fellowship, 63 (30.5%) completed an ISMM fellowship, 11 (5.3%) completed an ASM fellowship and 53 (25.7%) did not complete a fellowship.

Of all responders, 170 (82.5%) use MBB as their diagnostic injection with an additional 33 (16.0%) reported using a combination of intra-articular block and MBB. The most common medication used for diagnostic injection was local anesthetic only (158/206, 76.7%) and the most common volume used for MBB was 0.5 cc (148/206, 71.8%). 204/206 (99.0%) reported requiring at least 75% pain relief or more to consider a diagnostic injection positive and 178/206 (86.4%) reported performing 2 diagnostic injections before proceeding to RFN.

With respect to RFN approach, 144 (69.9%) reported using a parallel approach, 48 (23.3%) reported using a hybrid approach, and 11 (5.3%) reported using a perpendicular approach. The most commonly use needle gauge was 18g (125/206, 60.7%), followed by 20g (55/206 26.7%) and 16g (26/206, 12.6%). 187 of 206 (90.8%) reported using a 10 mm active tip. The most common RF lesion parameters were 80–85 C degrees (170/206, 82.5%), 90–119s duration (138/206, 67.0%), and monopolar lesion (183/206, 88.8%).

While the most common number of segments that were targeted per procedure was 2 (155/206, 75.2%), there was significant variation in how often unilateral vs bilateral diagnostic blocks were done and how often planned bilateral RFN lesions were done simultaneously vs separately (Table 2).

Statistically significant differences in responses were seen in only four survey questions: number of RFNs performed per year, concomitant injection of corticosteroid during RFN, MBB volume and number of segments typically treated.

Firstly, interventional pain physicians with fellowship training in APM and ISMM performed significantly more RFNs per year than those with ASM or no fellowship training.

80/206 (38.8%) reported administering corticosteroid concomitantly at the time of RFN. Statistically, there was a difference between fellowship training groups, with 43/79 (54.4%) of APM fellowship graduates reporting the use of corticosteroids compared to only 16/63 (25.4%) of ISMM fellowship graduates.

Categorizing MBB volume as 0.2 cc, 0.5 cc or $\geq$1 cc there was a difference ($p < 0.04$). 10/63 (15.9%) ISMM fellowship graduates utilize 0.2 cc, 46/63 (73.0%) use 0.5 cc, and 7/63 (11.1%) use $\geq$ 1 cc. Comparatively, for APM graduate, 4/79 (5.1%), 53/79 (67.1%), and 22/79 (27.8%) utilize 0.2 cc, 0.5 cc, and $\geq$1 cc respectively.

Dichotomizing the number of segments typically treated to either $\leq$2 versus $\geq$3, another statistically significant difference is evident ($p < 0.014$). Only 7/73 (9.6%, 95% CI 3.9–9.6) of ISMM fellowship trained physicians treat 3 segments or more, compared to 22/79 (27.8% 95% CI 18.4–27.9) of APM fellowship graduates.

Concomitant injection of corticosteroid was further analyzed through multivariate logistic regression analysis. Multivariate logistic regression analysis was used to compare the relationship between the use of corticosteroid during RFN and potential predictor variables (Table 3). After controlling for age, sex, practice environment, and geographic location, interventional pain physicians with APM fellowship training were 321% more likely to include steroid in injectate during lumbar RFN when compared to physicians with ISMM fellowship training (OR 3.21, $p = 0.004$). Multivariate logistic regression analysis was also used to compare the relationship between the approach to RFN (orientation of radiofrequency probes) and potential predictor variables (Table 4). None of the measured variables were predictive of parallel vs perpendicular or hybrid approach to RFN (OR 0.64, $p = 0.324$).

5. Discussion

Here we present practice patterns of physicians when performing lumbar zygapophyseal joint targeted procedures via a survey of SIS members. Generally speaking, there is a fair amount of homogeneity within the practice trends of respondents. For many of the variables questioned, there was a clear majority of respondents favoring a specific selection. Notably this includes a majority of respondents indicating on independent questions they require 2 diagnostic MBB performed with 0.5 cc or less of anesthetic to result in at least 75% pain relief before proceeding with an RFN performed via parallel approach with 18g or larger needle and 10 mm active tip and a lesion of at least 80–85° C and

90–119 s of duration. This is largely in agreement with current SIS Practice Guidelines recommendations [2]. Overall, this overwhelming agreement was maintained when survey responses when stratified by fellowship training. Given this was a survey of SIS members, this is perhaps unsurprising.

Inversely, there was agreement in certain practices not being routinely performed. For example, very few physicians reported using intra-articular injections as a block to select patients for RFN, regardless of fellowship training. A relatively small number of physicians utilize corticosteroids in diagnostic blocks as well. This seems consistent with literature demonstrating that IA blocks are not predictive of response to RFN [4], that MBB with steroid do not have therapeutic effect [11], and that intraarticular zygapophyseal joint steroids injections have no therapeutic benefit over saline [12].

However, differences in practice do appear even once fellowship training was accounted for. The volume of procedures being greater for APM and ISMM fellowship trained physicians compared to ASM fellowship trained and no fellowship trained physicians seems self-explanatory. It is reasonable to expect that physicians with sub-specialty training are more likely to regularly be performing procedures within that scope of sub-specialty practice. The other differences, in volume of MBBs, number of segments treated, and concomitant use of corticosteroids during RFN, warrant further discussion.

With respect to volume used for MBB, the theoretical balance between insufficient volumes leading to a false negative response must be balanced against the risk of a false positive with excessive anesthetic volumes. One cadaveric study evaluated the spread of different volumes of injectate and found a smaller volume (0.25 cc) adequately coated the lumbar medial branches without spreading to the dorsal branches distally that was seen with a larger volume (0.5 cc) [13]. The authors postulated that even 0.5 cc of injectate may produce an unintended adjacent-level nerve block which could theoretically decrease the specificity of the procedure. While this study suggests 0.25 cc may be optimal, some guidelines recommendation less than or equal to 0.5 cc of injectate for lumbar MBBs [1].

Additional multivariable regression analysis was performed where feasible, and found that the difference between fellowship training and the concomitant use of corticosteroids during RFN was independent of other factors. Specifically, APM physicians reported administering corticosteroids at the time of RFN lesion at a significantly higher rate than non-APM physicians. Historically, corticosteroids have been administered immediately after RFN lesion through the neurotomy cannula, typically with the noble intent of lessening post-procedural pain. No study to date has characterized the rate at which this practice is performed.

One reported type of post-RFN pain is colloquially known as post-neurotomy neuritis (PNN) and described as a localized, topical burning sensation presenting with or without dysesthesias, It is postulated to result from inadvertent lesioning of the lateral branches of the spinal dorsal rami during RFN, given their close proximity to the medial branches [14]. In the lumbar spine, reported rates of post-RFN pain include 0%, 1%, 6.4%, 8.8% 12.9%, and 17% [15–20]. Our study shows the administration of corticosteroids seems to be a relatively common practice (38.8%), likely in hopes of controlling post-procedure pain. However, given this relatively low incidence of post-RFN pain in the lumbar spine, the question arises of whether the benefits of indiscriminate corticosteroid administration at the time of lesion outweigh the risks.

Current consensus guidelines state permissibility with selectively offering injection of corticosteroid after RFN to lessen post-procedure pain [1]. However, this must be counterweighed with the well-known risks of exogenous glucocorticoids including deleterious effects of bone health, metabolism, insulin sensitivity, and immune function [21]. Outcomes from this practice remain sparsely reported. One retrospective study showed no significant decrease in the incidence of post-neurotomy neuritis in patients who received corticosteroids after lumbar RFN compared to those who did not [15]. Another retrospective study reported an incidence of PNN of 0% in both those who did and who did not receive corticosteroid at the time of RFN [16]. A small observational study, which interestingly reported the highest rate of post RFN pain, found that 6/34 patients (17%) reported post-procedural back pain up to three weeks post procedure despite also being given concomitant methylprednisolone at the time of RFN as well as oral ibuprofen three times per day for five days afterwards [20]. A recent pilot study compared dexamethasone to saline placebo after RFN, and in the lumbar spine there was no significant difference in the incidence of PNN between control (6/35) and steroid (3/35) groups [19]. The parent randomized clinical trial is currently underway (NCT03247413). Summarily, there is no current evidence that demonstrates efficacy of concomitant corticosteroid injection at the time of lumbar RFN in reducing pain.

Regarding the number of segments typically treated, this survey suggests that APM fellowship trained physicians more commonly treat 3 or more segments. However, it is notable that even among APM fellowship trained physicians, the most common response was to treat 2 or less segments. While it is a larger discussion beyond the scope of this paper, information such as this begs the question of how often physicians are practicing at the maximum of what is covered by payors versus ensuring full capture of the painful segments. While as a whole, 42/206 (20.4%) of physicians responded as treating 3 segments, only 2/206 (0.97%) reported treating more than 3 segments. Interestingly, at the time of this study 3 bilateral segments were the maximum covered by most Centers for Medicare and Medicaid Services (CMS) Local Coverage Determination (LCD). Updated CMS facet LCDs in 2022 now only allow for 2 bilateral segments (https://www.cms.gov/medicare-coverage-database/view/lcd.aspx?LCDId=38803), and as such our data may already be dated from this perspective.

There are numerous limitations to this study. As a survey, there is inherent recall bias. More specifically, a physicians' recall of their typical practice may not be directly correlated with their actual practice patterns. Some of this data such as number of segments treated are likely better explored via CPT billing and registry data, which may be more revealing from a utilization perspective. A low overall response rate of less than 10% could result in non-responder bias. Much of the homogeneity of our data may be explained by the weakness that our survey only queried one professional society and these trends may not be generalizable to physicians that are members of other pain related societies. Furthermore, our respondents were predominantly male and PM&R specialty, which may further limit generalizability.

Typically, residency training alone is not sufficient to attain competence to independently perform interventional pain procedures and typically these skills are gained during the fellowship year of training [22,23]. Thus, it is plausible that variations in the technical performance of these procedures are related to the type fellowship training one completes. This survey study found that many aspects of treating facet pain are common to most physicians and irrespective of fellowship training. However, the volume of anesthetic used for MBBs, number of spinal segments treated, and whether or not corticosteroids are concomitantly administered at the time of RFN were associated with the type of fellowship training a physician completed.

6. Conclusions

Current trends from our survey reveal overwhelming agreement upon the technical performance of lumbar facet interventions by interventional pain physicians. Physicians who completed an APM fellowship were more likely to report using higher anesthetic volumes and treat 3 or more spinal segments. After controlling for age, sex, practice environment, and geographic location, physicians with APM fellowship training were 321% more likely to include steroid in injectate during lumbar RFN when compared with ISMM trained physicians (OR 3.21, $p = 0.004$).

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

1. Approximately how many lumbar RFNs do you perform per year? 2. What percentage of pain relief do you consider a positive block? 3. What is your typical block regimen prior to RFN? 4. What type of block do you typically administer prior to RFN? 5. When conducting a diagnostic MBB or IA block, what type of agent do you use? 6. If conducting MBB prior to RFN, what volume of injectate do you typically use per nerve? 7. If conducting IA blocks prior to RFN, what volume of injectate do you typically use? 8. What approach do you use for RFN? 9. What gauge needle do you most commonly use for RFN? 10. What size active tipped do you typically use for RFN? 11. What temperature do you most commonly use for the RFN lesion? 12. What duration of lesion do you typically use for RFN? 13. For RFN, what type of lesion do you most commonly opt for? 14. When performing RF, how many lesions at a single nerve do you typically apply? 15. When performing RFN, do you concomitantly inject corticosteroid? 16. How many lumbar segments do you most commonly target for RFN on a given patient? 17. On a given patient for an episode of pain, what percentage of the time do you perform unilateral vs. bilateral RFN? 18. If performing bilateral RFN on a patient for an episode of pain, how often do you lesion both sides at the same visit?

Table 1
Basic Demographics, Stratified by Fellowship Type

Fellowship	Pain	Spine	Sports None		Total
Total	79	63	11	53	206
Sex					
Male	62	58	9	47	176
Female	7	3	2	2	14
Other	1	0	0	0	1
No response	9	2	0	4	15
Years in Practice					
0–5	23	17	3	1	44
6–10	9	16	4	3	32
11–15	10	9	1	7	27
16–20	8	7	2	11	28
21–25	10	9	0	5	24
26–30	6	3	1	14	24
31–35	8	0	0	6	15
36+	1	0	0	4	6
No response	4	2	0	2	6
Practice Type					
Private solo	12	4	0	15	31
Private group	29	26	5	28	88
Hospital employed	23	20	2	7	52
Academic hospital	25	13	4	3	35
Location					
East Coast	14	12	3	9	38
Midwest	20	14	7	9	50
Southeast	15	16	0	17	48
Southwest	7	6	0	5	18
West Coast	20	9	1	6	36
No response	3	6	0	7	16
Age					
30–39	25	19	4	2	50
40–49	20	20	6	11	57
50–59	20	21	1	18	60
60–69	13	2	0	18	33
70+	1	0	0	2	3
No response	0	1	0	2	3

Table 2
Survey Responses, Stratified by Fellowship Type

Survey Question	Pain (%)	Spine (%)	Sports (%)	None (%)	Total	p
Total	**79**	**63**	**11**	**53**	**206**	
Specialty						
PM&R	31	57	10	25	123	
Anesthesiology	47	5	0	23	75	
Other	1	1	1	5	8	
RFNs per year						
<20	4	3	2	4	**13**	0.033

(*continued on next column*)

Table 2 (*continued*)

Survey Question	Pain (%)	Spine (%)	Sports (%)	None (%)	Total	p
20-40	10	22	3	12	**47**	
41-60	17	15	3	8	**43**	
61-100	18	3	0	9	**30**	
>100	30	20	3	20	**73**	
Pain relief for positive block						
<50%	0	0	0	0	**0**	0.704
50%	2	0	0	0	**2**	
75%	24	21	5	14	**64**	
80%	31	29	4	23	**87**	
100%	22	13	2	16	**53**	
Block regimen						
No block	1	0	0	0	**1**	0.086
Single positive	10	8	0	9	**27**	
Two positive (irrespective duration)	40	38	3	19	**100**	
Two positive (concordant duration)	28	17	8	25	**78**	
Type of block						
Medial branch	69	51	9	41	**170**	0.202
Intraarticular	1	1	1	0	**3**	
Combination IA + MBB	9	11	1	12	**33**	
Block agent						
Local anesthetic	61	49	9	39	**158**	0.853
Combination anesthetic + steroid	16	10	2	12	**40**	
Other	2	4	0	2	**8**	
Volume of MBB						
0.2 cc	4	10	0	3	**17**	0.0399
0.5 cc	53	46	10	39	**148**	
1.0 cc or greater	22	7	1	11	**41**	
IA volume						
0.5 cc–1.0 cc	50	28	3	31	**112**	0.000
1.1 cc–2.0 cc	8	11	2	6	**27**	
>2.0 cc	1	0	0	0	**1**	
RFN approach						
Parallel	53	48	10	33	**144**	0.139
Perpendicular	7	3	0	1	**11**	
Hybrid	18	11	1	18	**48**	
RFN needle gauge						
16 g	5	10	3	8	**26**	0.214
18 g	43	38	5	28	**114**	
20 g	23	13	3	16	**55**	
22 g	6	2	0	0	**8**	
Other	2	0	0	0	**0**	
Active tipped size						
5 mm	2	7	0	5	**14**	0.306
10 mm	74	56	11	46	**187**	
Other	2	0	0	1	**3**	
RFN temperature						
<80 C	1	3	0	1	**5**	0.483
80–85 C	67	51	10	42	**170**	
86–90 C	9	9	1	7	**26**	
>90 C	0	0	0	2	**2**	
Other	0	0	0	0	**0**	
Duration of lesion						
<60 s	1	0	0	0	**0**	0.240
60–89 s	16	9	2	13	**40**	
90–119 s	45	50	9	34	**138**	
120–180 s	14	3	0	4	**21**	
>180 s	3	1	0	1	**5**	
Type of lesion						
Monopolar	68	55	11	49	**183**	0.212
Bipolar	6	4	0	3	**13**	
Cooled RF	4	1	0	0	**5**	
Other	0	3	0	0	**3**	
Lesions at single nerve						
>3	2	1	1	1	**5**	0.645
1	38	26	3	21	**88**	
2	28	31	6	22	**87**	
Concomitant steroid						
No	36	47	10	31	**124**	0.001
Yes	43	16	1	20	**80**	

(*continued on next column*)

Table 2 (*continued*)

Survey Question	Pain (%)	Spine (%)	Sports (%)	None (%)	Total	p
Number of segments						
Less than 3 segments (eg, L4-5 and L5-S1 joint)	57	56	11	37	**161**	0.014
3 Segments or more (eg, L3-4, L4-5 and L5-S1 joint)	22	7	0	15	**44**	
Unilateral vs Bilateral						
100% Unilateral,	10	16	2	13	**41**	0.073
75% Unilateral 25% Bilateral,	14	10	6	13	**43**	
50% Unilateral 50% Bilateral,	23	20	2	12	**57**	
25% Unilateral 75% Bilateral,	28	16	1	13	**58**	
100% Bilateral	4	0	0	1	**5**	
Bilateral both sides?						
Bilateral lesions at same visit 90–100% of the time	29	14	3	14	**60**	0.482
Unilateral lesions at 2 separate visits 90–100% of the time	29	22	5	17	**73**	
Bilateral lesions 50–89% of the time	9	14	0	10	**33**	
Staged unilateral lesions 50–89% of the time	12	9	3	8	**32**	

Table 3
Logistic regression for concomitant use of corticosteroid during RFA, adjusted for all other variables.

Descriptor	Odds Ratio	p	95% Confidence Interval	
Sex				
Male	(ref)	(ref)	(ref)	(ref)
Female				
Fellowship				
Pain	3.21	0.004	1.44	7.15
Sports	0.36	0.366	0.40	3.29
None	1.30	0.613	0.47	3.60
Spine	(ref)	(ref)	(ref)	(ref)
Practice type				
Private solo	(ref)	(ref)	(ref)	(ref)
Private group	0.64	0.427	0.20	1.97
Hospital employed	0.90	0.856	0.27	2.93
Academic hospital	0.50	0.318	0.13	1.96
Location				
West Coast	(ref)	(ref)	(ref)	(ref)
Midwest	1.00	0.998	0.36	2.80
Southwest	2.37	0.207	0.62	9.05
Southeast	2.39	0.115	0.81	7.02
East Coast	1.34	0.600	0.45	3.98
Age				
30-39	(ref)	(ref)	(ref)	(ref)
40-49	1.55	0.337	0.64	3.76
50-59	1.08	0.874	0.42	2.74
60-69	1.80	0.317	0.57	5.69
70+	0.44	0.576	0.26	7.62

Table 4
Logistic regression for parallel approach of RFA, adjusted for all other variables.

Descriptor	Odds Ratio	p	95% Confidence Interval	
Sex				
Male	2.26	0.210	0.63	8.04
Female	1			
Other	1			
Fellowship				
Pain	0.64	0.324	0.26	1.55
Sports	3.00	0.339	0.32	28.6
None	0.63	0.413	0.21	1.90
Spine	(ref)	(ref)	(ref)	(ref)
Practice type				
Private solo	(ref)	(ref)	(ref)	(ref)
Private group	1.17	0.800	0.36	3.82
Hospital employed	1.27	0.707	0.37	4.39
Academic hospital	1.28	0.734	0.31	5.37
Location				
West Coast	(ref)	(ref)	(ref)	(ref)
Midwest	1.03	0.956	0.35	3.03
Southwest	0.83	0.792	0.20	3.38

(*continued on next column*)

Table 4 (*continued*)

Descriptor	Odds Ratio	p	95% Confidence Interval	
Southeast	0.96	0.943	0.31	3.00
East Coast	1.38	0.606	0.41	4.63
Age				
30-39	(ref)	(ref)	(ref)	(ref)
40-49	1.25	0.640	0.49	3.19
50-59	2.02	0.189	0.71	5.79
60-69	0.93	0.908	0.29	3.04
70+	0.32	0.412	0.02	4.94

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