

## HEALTH SERVICES RESEARCH

Results of the 2015 Scoliosis Research Society Survey on Single *Versus* Dual Attending Surgeon Approach for Adult Spinal Deformity Surgery

Justin K. Scheer, MD,<sup>\*</sup> Rajiv K. Sethi, MD,<sup>†</sup> Lloyd A. Hey, MD,<sup>‡</sup> Michael O. LaGrone, MD,<sup>§</sup> Malla Keefe, BS,<sup>¶</sup> Henry E. Aryan, MD,<sup>||</sup> Thomas J. Errico, MD,<sup>\*\*</sup> Vedat Deviren, MD,<sup>††</sup> Robert A. Hart, MD,<sup>‡‡</sup> Virginie Lafage, PhD,<sup>§§</sup> Frank Schwab, MD,<sup>§§</sup> Michael D. Daubs, MD,<sup>¶¶</sup> Christopher P. Ames, MD,<sup>¶¶</sup> and the SRS Adult Spinal Deformity Committee

**Study Design.** An electronic survey administered to Scoliosis Research Society (SRS) membership.

**Objective.** To characterize surgeon practices and views regarding the use of two attending surgeons for adult spinal deformity (ASD) surgery.

**Summary of Background Data.** The use of two experienced attending surgeons can decrease the operative time, estimated blood loss, and perioperative complication rates. However, the current practice patterns for the use of two attending surgeons remains unknown.

**Methods.** An electronic, 27-question survey regarding single/dual attending surgeons was administered to the SRS membership. Determinants included: surgeon/practice demographics, assistant type/level of training, and questions regarding use of two attending surgeons. Overall reporting and comparisons between groups

were made: US *versus* international, academic *versus* private practice, and experience <15 years *versus* >15 years.

**Results.** A total of 199 surgeons responded from 27 different countries. Overall and between the groups, the respondents significantly reported believing that two attending spine surgeons improves safety, decreases complications, and improves outcomes ( $P < 0.01$ ). Approximately, 67.3% reported using a second attending  $\leq 25\%$  of the time (33.2% do not), and 24.1% use one  $\geq 51\%$  of the time (similar between groups); 51.1% that have a second attending feel it's limited by reimbursement and access concerns and 71.9% have difficulty getting the second attending reimbursed. 72.3% use a second attending for ALL of the following reasons (no difference between groups): "it's safer/reduces complications," "it decreases operative time," "it decreases blood loss," "it results in improved outcomes," "it's less work and stress for me." If reimbursement was equal/assured for a second attending, 67.5% would use one "more often" or "always."

**Conclusion.** The respondents feel that having a second attending surgeon improves patient care, however most do not use one often. Reasons include reimbursement/access concerns and the majority would use one if reimbursement was equal and assured. Based on the current literature and these results, there is a need for working with third party payers to improve dual surgeon reimbursement rates in complex cases.

**Key words:** adult spinal deformity, complications, dual attending spine surgeon, insurance, policy, reimbursement, Scoliosis Research Society, single attending, spine surgery, surgery, survey.

**Level of Evidence:** 5  
**Spine 2017;42:932–942**

From the <sup>\*</sup>University of California San Diego, School of Medicine, La Jolla, CA; <sup>†</sup>Virginia Mason Medical Center, University of Washington, Seattle, WA; <sup>‡</sup>Hey Clinic, Raleigh, NC; <sup>§</sup>Private practice, Amarillo, TX; <sup>¶</sup>Department of Neurological Surgery, University of California, San Francisco, San Francisco, CA; <sup>||</sup>Department of Neurosurgery, Sierra Pacific Orthopedics, Fresno, CA; <sup>\*\*</sup>Department of Orthopedic Surgery, NYU Hospital for Joint Diseases, New York, NY; <sup>††</sup>Department of Orthopedic Surgery, University of California, San Francisco, San Francisco, CA; <sup>‡‡</sup>Department of Orthopedic Surgery, Oregon Health & Science University, Portland, OR; <sup>§§</sup>Spine Service, Hospital for Special Surgery, New York, NY; and <sup>¶¶</sup>University of Nevada, School of Medicine, Las Vegas, NV.

Acknowledgment date: April 17, 2016. First revision date: June 29, 2016. Second revision date: September 5, 2016. Third revision date: September 20, 2016. Acceptance date: September 26, 2016.

The manuscript submitted does not contain information about medical device(s)/drug(s).

No funds were received in support of this work.

Relevant financial activities outside the submitted work: board membership, consultancy, grants, payment for lectures, stocks, royalties, travel/accommodations/meeting expenses.

Address correspondence and reprint requests to Christopher P. Ames, MD, Department of Neurological Surgery, University of California, San Francisco, 400 Parnassus Avenue, A850, San Francisco, CA 94143; E-mail: christopher.ames@ucsf.edu

DOI: 10.1097/BRS.0000000000002070

932 www.spinejournal.com

Copyright © 2017 Wolters Kluwer Health, Inc. Unauthorized reproduction of this article is prohibited.

June 2017

Adult spinal deformity (ASD) surgery has repeatedly demonstrated significant improvements in pain, function, and health-related quality of life (HRQOL).<sup>1–13</sup> However, these procedures are technically challenging with a reported high complication rates.<sup>14–18</sup> These rates increase for patients of older age<sup>16,19–21</sup> and

those undergoing three-column osteotomies.<sup>22–26</sup> As with all surgical interventions, there is a strong drive to improve patient safety with one such recent approach involving the use of two attending surgeons.

This approach has been reported previously for other areas of surgery including esophagectomy, mastectomies, and bilateral anterior cruciate ligament reconstruction.<sup>27–30</sup> Recently this method has expanded to the realm of spine surgery, specifically for both adolescent idiopathic scoliosis<sup>31,32</sup> and adult spinal deformity patients.<sup>33,34</sup> Ames *et al*<sup>33</sup> found that two attending surgeons resulted in decreased operative time, estimated blood loss, 30-day major complication rate, and 30-day unplanned surgery. Sethi *et al*<sup>34</sup> also found that the dual surgeon approach (combined with a live multidisciplinary complex spine conference and an intraoperative coagulopathy protocol) demonstrated a significant reduction in perioperative complication rates.

Although these select centers have shown positive results with the use of two attending surgeons, there is currently no study investigating surgeons' practices and views regarding this approach. Understanding surgeons' current practice and views may allow for better education, can aid in reimbursement for third party payers, and contribute to future investigative work in this area for spine surgery. Therefore, the goal of the current study was to characterize surgeon practices and views regarding the use of two attending surgeons through a survey of a large international group of spinal deformity surgeons in the Scoliosis Research Society (SRS).

## METHODS

An electronic, 27-question survey (Tables 1–4) regarding the use of a single or two attending surgeons during ASD correction was administered to the SRS membership by the Adult Deformity Committee. Determinants included the

surgeons' type and country of practice, Orthopedic or Neurosurgery training, level of current training, the number of years in practice, percentage of practice involving pediatrics and adults, the number of 3-column osteotomies performed each year, and a number of questions regarding the type and level of training of an assistant and questions regarding the use of two attending surgeons. The survey was designed and administered using surveymonkey.com. The participants were recruited through email invitation and there were no incentives for participation.

Responses were collected and described qualitatively with percentages. Frequency analysis was used to compare responses using Pearson  $\chi^2$  analysis or Fisher exact test where appropriate. Comparisons of responses between the following groups were made: surgeons from the United States and all others (International), academic and private practice, and surgeon experience less than 15 years and those greater than 15 years. All statistical analyses were performed using commercially available software (SPSS v22, IBM, Armonk, NY) and the level of significance was set at  $P < 0.05$ .

## RESULTS

### Surgeon Demographics (Questions 1–9)

Both SRS members and candidate members were invited from around the world which included 1005 surgeons. A total of 199 (19.8%) responded from 27 different countries with the majority being from the United States (66.8%,  $n = 133$ ); 90.4% ( $n = 179$ ) of the respondents reported Orthopedics as their specialty and 98.0% ( $n = 194$ ) reported a training level of attending. Approximately, 68.7% ( $n = 136$ ) of the respondents have been in practice  $> 10$  years with 47.0% ( $n = 93$ ) having been in practice for  $> 15$  years (Table 1); 85.4% ( $n = 169$ ) of the

**TABLE 1. Questions 1 to 5 From the 27-Question Survey Administered to Spine Surgeons and the Percent Responses**

#	Question	Responses	N (%)
1	Country where you practice:	Numerous responses	NA
2	Type of specialty	Orthopaedic Surgery	179 (90.4)
		Neurosurgery	19 (9.6)
		Total	198 (100)
3	Level of training	Resident	1 (0.5)
		Fellow	3 (1.5)
		Attending	194 (98.0)
		Total	198 (100)
4	Type of practice	Academic	135 (68.2)
		Private Practice	50 (25.3)
		Other	13 (6.6)
		Total	198 (100)
5	Years in practice	<5 years	24 (12.1)
		5–10 years	38 (19.2)
		10–15 years	43 (21.7)
		>15 years	93 (47.0)
		Total	198 (100)

respondents reported that ≥26% of their practice involves deformity with 43.4% (n=86) having ≥51% of their practice involving deformity. Practice types included: 68.2% (n=135) academic practices, 25.3% (n=50) private practice, and 6.6% (n=13) from “other.” Moreover, 51.3% (n=102) and 36.0% (n=71) of respondents stated that ≥51% of their deformity practice involves adult patients or pediatrics, respectively. Most of the respondents (52.5%, n=104) perform one to 10 three-column osteotomies per year with 8.6% (n=17) performing ≥25 per year.

The international surgeons and those in an academic setting both had a significantly higher distribution of their practice involving deformity (≥51% of practice), than the surgeons from the US or in private practice, respectively (61.4% vs. 34.8%, and 53.0% vs. 20.0%,  $P < 0.01$  for both, Table 2 in online version). However, the US surgeons and those in private practice had a significantly greater distribution of their deformity practice involving adults (≥51% of practice), than the international and academic surgeons (63.2% vs. 28.2%,

and 70.0% vs. 45.3%,  $P < 0.01$  for both, Table 2 in online version). Thus the international and academic surgeons had a significantly higher distribution of their deformity practice involving pediatrics (≥51% of practice), than the US and private practice surgeons (51.0% vs. 28.8%, and 41.4% vs. 18.0%,  $P < 0.01$  for both, Table 2 in online version).

The number of years in practice (> 15 yrs vs. < 15 yrs) did not significantly impact the distribution of the following practice patterns: deformity ( $P = 0.57$ ), adults ( $P = 0.88$ ), or pediatrics ( $P = 0.92$ ). In addition, there were no significant differences between the groups for the number of 3-column osteotomies performed each year ( $P > 0.05$  for all, Table 2 in online version).

#### Assistant Characteristics (Questions 10–16)

Overall, a few of the respondents (7.1%) have a junior level resident, a senior level resident (15.2%), or a physician assistant /nurse practitioner (15.1%) as their only assistant ≥51% of the time (Table 3 in online version). Of the

**TABLE 2. Questions 6 to 9 From the 27-Question Survey Administered to Spine Surgeons and the Percent Responses for Each Group**

#	Question	Responses	Number (%)						
			All	International	US	Academic	Private	< 15 Years	> 15 Years
6	What percent of your practice is deformity?	0	0 (0.0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
		1–25	29 (14.6)	4 (7)	23 (17.4)	9 (6.7)	15 (30)	18 (17.1)	11 (12)
		26–50	83 (41.9)	18 (31.6)	63 (47.7)	54 (40.3)	25 (50)	47 (44.8)	36 (39.1)
		51–75	42 (21.2)	17 (29.8)	24 (18.2)	34 (25.4)	4 (8)	19 (18.1)	23 (25)
		76–99	36 (18.2)	16 (28.1)	16 (12.1)	30 (22.4)	5 (10)	17 (16.2)	19 (20.7)
		100	8 (4.0)	2 (3.5)	6 (4.5)	7 (5.2)	1 (2)	4 (3.8)	3 (3.3)
		Total	198 (100)	57 (100)	132 (100)	134 (100)	50 (100)	105 (100)	92 (100)
<i>P</i>	NA	<0.01	<0.01	<0.01	0.57				
7	What percent of your deformity practice is adults?	0	24 (12.1)	3 (5.3)	20 (15)	18 (13.3)	3 (6)	14 (13.3)	9 (9.7)
		1–25	46 (23.1)	23 (40.4)	20 (15)	36 (26.7)	6 (12)	24 (22.9)	22 (23.7)
		26–50	27 (13.6)	15 (26.3)	9 (6.8)	20 (14.8)	6 (12)	14 (13.3)	13 (14)
		51–75	25 (12.6)	12 (21.1)	13 (9.8)	16 (11.9)	7 (14)	11 (10.5)	14 (15.1)
		76–99	55 (27.6)	3 (5.3)	50 (37.6)	29 (21.5)	23 (46)	31 (29.5)	24 (25.8)
		100	22 (11.1)	1 (1.8)	21 (15.8)	16 (11.9)	5 (10)	11 (10.5)	11 (11.8)
		Total	199 (100)	57 (100)	133 (100)	135 (100)	50 (100)	105 (100)	93 (100)
<i>P</i>	NA	<0.01	0.02	0.88					
8	What percent of your deformity practice is pediatric?	0	22 (11.2)	1 (1.8)	21 (15.9)	16 (12)	5 (10)	11 (10.7)	11 (11.8)
		1–25	72 (36.5)	11 (19.3)	59 (44.7)	39 (29.3)	28 (56)	39 (37.9)	33 (35.5)
		26–50	32 (16.2)	16 (28.1)	14 (10.6)	23 (17.3)	8 (16)	16 (15.5)	16 (17.2)
		51–75	16 (8.1)	12 (21.1)	3 (2.3)	13 (9.8)	3 (6)	7 (6.8)	9 (9.7)
		76–99	33 (16.8)	14 (24.6)	17 (12.9)	25 (18.8)	3 (6)	17 (16.5)	16 (17.2)
		100	22 (11.2)	3 (5.3)	18 (13.6)	17 (12.8)	3 (6)	13 (12.6)	8 (8.6)
		Total	197 (100)	57 (100)	132 (100)	133 (100)	50 (100)	103 (100)	93 (100)
<i>P</i>	NA	<0.01	0.02	0.92					
9	What is the number of 3-column osteotomies you do per year?	None	18 (9.1)	4 (7)	14 (10.6)	9 (6.7)	6 (12)	9 (8.7)	9 (9.7)
		1–10	104 (52.5)	33 (57.9)	64 (48.5)	62 (46.3)	32 (64)	50 (48.1)	53 (57)
		10–25	59 (29.8)	15 (26.3)	43 (32.6)	48 (35.8)	10 (20)	36 (34.6)	23 (24.7)
		25–50	13 (6.6)	2 (3.5)	10 (7.6)	11 (8.2)	2 (4)	5 (4.8)	8 (8.6)
		>50	4 (2.0)	3 (5.3)	1 (0.8)	4 (3)	0 (0)	4 (3.8)	0 (0)
		Total	198 (100)	57 (100)	132 (100)	134 (100)	50 (100)	104 (100)	93 (100)
		<i>P</i>	NA	0.16	0.07	0.13			

















