SYMPOSIUM: CLINICAL RISK AND JUDICIAL REASONING

Surgeon Demographics and Medical Malpractice in Adult Reconstruction

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Published online: 7 November 2008

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Abstract Orthopaedic adult reconstruction subspecialists are sued for alleged medical malpractice at a rate over twice that of the physician population as a whole, and the rate appears disproportionately high in the first decade of practice. The overall risk of a malpractice claim is related to years spent in practice. After 30 years in an adult reconstruction practice, the cumulative rate of being sued at least once is over 90%. Previous investigations suggest

factors such as practice setting and size, fellowship training, years in practice, volume, and location of practice correlate with malpractice risk. In contrast, we were unable to identify any relationship between the type, size, or location of practice, fellowship training, or surgery volume and the risk of an adult reconstruction surgeon being named as a defendant in a malpractice suit.

Level of Evidence: Level V, economic and decision analysis. See the Guidelines for Authors for a complete description of levels of evidence.

Each author certifies that he or she has no commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

Each author certifies that his or her institution has approved or waived approval for the reporting of this case and that all investigations were conducted in conformity with ethical principles of research.

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Introduction

Physician specialty has been consistently associated with different malpractice claim rates, and orthopaedic surgery is among the highest [23]. Several theories to explain these findings have been suggested [17, 23], but none has proven conclusive. Variations may reflect differences related to the physician's practice (eg, frequency or difficulty of procedures), patient characteristics (age, attitude, or underlying morbidity), physician–patient relationship, imperfect compensation scheme for bad outcomes, or the actual quality of care.

To better understand the factors that contribute to orthopaedic medical malpractice, Kilmo and colleagues [15] performed a randomized nationwide survey of medical malpractice attorneys. They found physician error was the most common factor associated with orthopaedic malpractice and the lumbar spine was the most common anatomic area involved in lawsuits. A surgeon appearing rushed and uninterested was more likely to encounter patient litigation, possibly because of a suboptimal physician—patient relationship. Kilmo et al. [15] did not, however, distinguish between various subspecialty groups

within orthopaedics in their study. Fox and Richardson [12] reviewed International Classification of Diseases, 9th Revision (ICD-9) codes for common spine disorders and showed no major difference in the rate at which claims were paid relative to the primary diagnosis. Improper performance of a surgical procedure and diagnosis error resulted in the majority of paid claims. Upadhyay et al. [25] investigated malpractice experiences of adult reconstruction surgeons and reported 78% of responding surgeons had been named as a defendant in at least one lawsuit alleging medical malpractice. They did not report the possible contribution of demographic factors.

We sought to test whether this group of specialists (with a high rate of medical malpractice) might have certain demographic characteristics such as practice setting and size, fellowship training, years in practice, volume, and location of practice that predict medical malpractice.

Materials and Methods

We surveyed all 749 active members of the American Association of Hip and Knee Surgeons (AAHKS) using a questionnaire developed with the Research and Legal Committees of this professional body [25]. AAHKS promotes education, research, and advocacy related to the health and disorders of the hip and knee and is comprised of members who devote at least 50% of their practice to adult hip and knee arthroplasty. We used the survey methodology of Dillman to design the questionnaire [10]. Dillman's survey research-based tailored design methods have been developed and proven to obtain greater than 50% response rate from surveys of professional populations [10]. Each stage, element, and detail of this survey process has been found to statistically improve survey response rates from professional population samples [10].

We then used a four-stage mixed-mode survey of all AAHKS members during April and May 2006. In the first stage of the survey, a survey prenotice was emailed or faxed to active members followed by the second stage in which a cover letter with the questionnaire and a return envelope was sent from AAHKS to all active members by first class mail. The third survey stage consisted of a faxed reminder, and the fourth stage was a faxed reminder with a replacement questionnaire. The questionnaire (Appendix 1) was designed to inquire about prior experience with malpractice claims as well as basic demographic data of the respondent including type of practice setting, practice size, fellowship training in adult reconstructive surgery, years in practice, volume of arthroplasty surgeries in the previous year, and practice location. Surgeon location was categorized by US Census Bureau regions [7] (ie, Northeast, Midwest, South, and West). We considered categorizing study respondents by the state in which the surgeon practiced and the 10 Health Care Financing Administration regions [8], but the data lacked appropriate power for analysis.

Lawsuits were self-reported and included claims that were dismissed, settled out of court, won or lost at trial or by judicial ruling as well as claims that were still pending.

Table 1. Practice characteristics of 2006 AAHKS member survey respondents

Type of practice setting * (n = 413)	
Private orthopaedic practice	308 (72)
Academic practice	76 (18)
Multispecialty clinic	26 (6)
Hospital employee	9 (2)
Government or military	5 (1)
Health maintenance organization	3 (1)
Practice size $(n = 410)$	
Solo practice	41 (10)
2–10 physicians	211 (52)
11-20 physicians	110 (27)
21-50 physicians	42 (10)
51–400 physicians	6 (1)
Fellowship-trained in adult reconstructi	ve surgery $(n = 413)$
Yes	245 (59)
No	168 (41)
Years in practice $(n = 412)$	
1-10 years	64 (16)
11–20 years	181 (44)
21–45 years	167 (40)
Year 2005 total hip/knee arthroplasty so	urgery volume ($n = 408$)
0–49 cases ^a	6 (2)
50-100 cases	38 (9)
101–200 cases	116 (28)
201–500 cases	219 (54)
501–974 cases	29 (7)
U.S. Census Bureau region $(n = 415)$	
Northeast (Region 1)**	90 (22)
Midwest (Region 2) [†]	105 (25)
South (Region 3) [‡]	137 (33)
West (Region 4)§	83 (20)

^{*14} respondents indicated two types of practice settings.

[§] AZ, CO, ID, NM, MT, UT, NV, WY, AK, CA, HI, OR, WA.



^a Includes three respondents currently retired from surgery but still in practice.

^{**} CT, ME, MA, NH, RI, VT, NJ, NY, PA.

[†] IN, IL, MI, OH, WI, IA, KS, MN, MO, NE, ND, SD.

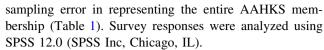
[‡] DE, DC, FL, GA, MD, NC, SC, VA, WV, AL, KY, MS, TN, AR, LA, OK, TX.

Table 2. Self-reported nature of claims in which AAHKS members have been named as malpractice defendant [25]

Nature of claim	Number of claims
Nerve injury after total joint procedure	64
Limb-length discrepancy	39
Infection after total joint procedure	34
Vascular injury	31
Dislocation or instability of implants	26
Compartment syndrome	22
Chronic pain after total joint procedure	19
DVT/nonfatal PE/fatal PE (related specific surgical procedure not named in most cases)	19
Fracture related to total joint procedure	18
Nontotal joint procedure adverse outcome	18
Adverse skin-related event/outcome/complication	17
Implant malpositioning	15
Death	14
Adverse fracture complication/outcome	13
Other claims (minimal or no information given)	13
Fall after total joint procedure	11
Premature arthroplasty revision surgery	9
Lower extremity injury/fracture	9
Nontotal joint procedure infection	9
Nontotal joint procedure nerve injury	9
Failure to diagnose	9
Nontotal joint pain/RSD-related	9
Adverse systemic event	9
Upper extremity injury/fracture	8
Trauma-related case	8
Arthrofibrosis	6
Wrong site/side surgery	5
Adverse medication event	5
Hardware/cement related	5
Adverse anesthesia event	4
Other total joint procedure adverse outcome	3
Sulzer cup case	2
Wrong procedure	2
Failure to consent	2
Nontotal joint procedure fall	1
Retained sponge	1
Impaired mobility	1
Workers' compensation - patient dissatisfaction with return to work date	1
Total	490

Note: Many respondents reported more than one claim type; respondents not asked to name number of claims in each category, only types of claims they have been named in.

The response rate for the survey was 56.3% (n = 422). Using Dillman's [10] survey sample size calculations, this rate corresponded to a 95% confidence level with a \pm 5%



Three hundred twenty-five (78%) respondents reported being named as a defendant in at least one claim alleging medical malpractice. The demographic characteristics of two groups (those reporting one or more of the previously reported claims for AAHKS members (Table 2) [25] and those reporting no claims) were compared to investigate the theory that factors such as practice setting and size, fellowship training, years in practice, volume, and location of practice correlate with malpractice risk (Table 3).

Differences in adult reconstruction surgeons who had reported being named in at least one malpractice claim among "practice setting," "practice size," "fellowship training," "years in practice," "practice volume," and "location of practice" were determined by Pearson chi square test univariate analysis. Those factors that correlated with a p value of < 0.05 were further examined by logistic regression multivariate analysis using Stata 10 (StataCorp, College Station, TX). A nonparametric trend analysis (based on sums of ranks) was used to confirm the regression study.

Results

Only years in practice predicted a malpractice suit (odds ratio, 1.1; p < 0.000) (Fig. 1). The cumulative risk of being sued over time for an adult reconstructive surgeon was evaluated (Fig. 2). (Univariate analysis of data originally identified years in practice and arthroplasty volume as predictors of medical malpractice, but multivariate analysis showed years in practice was the only independent variable.) Type of practice setting, practice size, fellowship training in adult reconstruction, and practice location (by US Census Bureau region) were not related to a claim of malpractice (Table 3).

Discussion

Based on prior studies showing relationships between medical malpractice and various surgeon demographics, we sought to determine if any relationships existed for these variables in the subspecialty of adult reconstructive orthopaedic surgery.

Several issues should be considered when evaluating our conclusions. The malpractice data from the AAHKS questionnaire is self-reported and, unlike closed-claim data, this study relies on surgeon recollection. It is difficult to compare the present data with other studies because our



Table 3. Practice characteristics of 2006 AAHKS member survey respondents and association to malpractice

Characteristics	All respondents*	Respondents named in one or more malpractice claims	p value**
Type of practice setting	413	323	0.992
Practice size	410	320	0.352
Fellowship-trained in adult reconstructive surgery	413	323	0.49
Years in practice	412	322	0.00
Year 2005 total hip/knee arthroplasty surgery volume	408	320	0.00
U.S. Census Bureau regions	415	324	0.289

^{*} Number of all respondents who completed survey question.

^{**} Pearson chi-square P value.

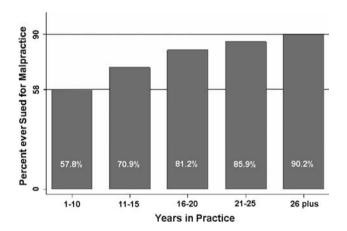


Fig. 1 This bar graph shows percentage of membership sued for malpractice versus years in practice.

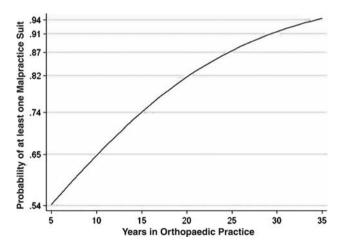


Fig. 2 Curve demonstrates the probability of at least one malpractice lawsuit depending on years in orthopaedic practice for adult reconstructive surgeons.

data include not only closed-claim, but also open- and pending-claims data. Also, we did not limit malpractice experience to a particular timeframe and therefore collected cumulative malpractice data. We did not specifically ask if malpractice related to total joints and did not stratify for referred cases. Future studies could examine trends in malpractice experience and the timing of such during the surgeon's career as well as quantifying risks associated with referral cases. It should also be pointed out that the conclusions for this association of specialty surgeons may not apply to all orthopaedic surgeons performing arthroplasty because of membership requirements (eg, higher volume, likely greater interest, and perhaps expertise).

An understanding of the trends and associations in medical malpractice claims could help decrease the incidence of lawsuits when surgeons and patients are faced with a poor outcome. Many theories have been proposed as to the cause of lawsuits alleging medical malpractice [9, 12, 17, 23, 24], and multiple studies have assessed physician and practice characteristics that correlate or do not correlate with the incidence of such claims (Table 4). We found years in practice correlated with malpractice, whereas type of practice, practice size, fellowship training in adult reconstruction, surgeon volume, and practice location did not correlate.

Physician malpractice claims have been paid at a rate between 1.9% (2003) and 0.9% (2007) per year for all doctors practicing in the United States, except those who are active military physicians [5, 21]. When analyzed by specialty, neurosurgery, orthopaedic surgery, and obstetrics have the highest reported claim rates [23], although actual claims data to support this contention are difficult to identify and obtain. When orthopaedic adult reconstruction surgeons were asked about their experience with malpractice claims, over 75% reported they had been sued [25]. If this number is divided by years in practice, the rate is more than twice the annual estimate for all physicians [5, 21] and three times as high in the first decade of practice. This disproportionately high rate of claims reported in the first 10 years of practice (5.8%) may be a reflection of surgeon inexperience or recent increases in malpractice claims [3, 6]. It should be underscored that these comparisons are only approximate because the national and



Table 4. Prior studies of statistical relationships between medical malpractice and various surgeon demographics

udy Type of physician		Characteristic			
Positive correlation					
Meadow et al. [17]	Neonatal intensivists	Years in practice			
		Community versus university setting			
Taragin et al. [23]	New Jersey doctors	Specialty			
		Neurosurgery			
		Orthopaedic surgery			
		Obstetrics / gynecology			
		Male gender			
Kahan et al. [13]	Urologists	Procedure type			
		Inpatient			
		Adult			
		Surgical procedures			
		Geographic location			
Sloan et al. [20]	Florida doctors	Prior malpractice claim			
Taragin et al. [22]	New Jersey doctors	Prior malpractice claim			
Abbott et al. [2]	Ophthalmologists	Increased surgical volume			
		Prior malpractice claim			
		For high-volume surgeons			
		Gender			
		Advertising use			
		Preoperative time spent			
		Co-management			
Taragin et al. [23]	New Jersey doctors	Specialty			
Waters et al. [26]	Physicians, three states	Medical school			
Ely et al. [11]	Florida family practice	Graduation from US/Canadian medical school			
		Board certification			
		AMA physician recognition award			
		AOA honor society			
Rodriguez [19]	Massachusetts physican organization	Specialty			
Kilmo et al. [15]	California members of liability protection trust	No fellowship training			
		No clinical faculty affiliation			
		Not a member of professional society			
		Not a graduate of US/Canadian medical school			
		No board certification			
		Not in group practice			
		Orthopaedists			
		No religious affiliation			
		No RN in office			
No correlation					
Meadow et al. [17]	Neonatal intensivists	Physician gender			
Fox and Richardson [12]	Spine surgeon	Procedure type			
Sloan et al. [20]	Florida doctors	Prestegious credentials			
Taragin et al. [23]	New Jersey doctors	Physician performance			
		Physician age, degree, site of training, certification status, severity of injury			
Rodriguez et al. [19]	Massachusetts physican organization	Care coordination			
		Quality of physician–patient interaction			
Moore et al. [18]	Not stated	Day of the week			



Table 4. continued

Study	Type of physician	Characteristic
Taragin et al. [24]	New Jersey doctors	Specialty
		Psychiatry
Kocher et al. [16]	Orthopaedists, three states	Board certification

orthopaedic subspecialist data were obtained in different ways: (1) our questionnaire data include both open and closed claims, whereas the national general physician data represent only closed claims; and (2) our data ask about one or more claims and the national data reports all claims.

Our analysis of the questionnaire data identified surgeon characteristics that correlate and do not correlate with the risk of being named in a malpractice claim. Type of practice, practice size, fellowship training in adult reconstruction, surgeon volume, and practice location (by US Census Bureau region) did not correlate with whether a surgeon had been named in a malpractice claim. In contrast, Adamson and coworkers [4] reported reduced claim rates among a general group of surgeons who had "exemplary modes of professional peer relationships and responsible clinical behavior." Examples of such predictive factors included fellowship training, belonging to a clinical faculty, and being a member of a group practice. Our findings may differ because of greater potential homogeneity in practice patterns among members of one subspecialty such as arthroplasty surgeons. Abbott et al. [1, 2] showed that for ophthalmologists performing certain procedures, the chances of incurring a malpractice claim correlated with surgical volume. Less preoperative time spent with the patient was a predictor of malpractice for high-volume surgeons. We suspect volume did not correlate in our cohort of subspecialists because they were all relatively high-volume surgeons; possibly the increased skills and decreased complications associated with a high volume of surgery [14] were offset by less favorable physician-patient relationships from decreased time available to spend with patients before and after surgery. Finally, Kahan et al. [13] showed some propensity for geography to play into malpractice rates in urologic surgery. However, when analyzed by relative distribution of urologists, the difference in malpractice rates was not meaningful, and because the geographic units were both smaller and different from those in the present study, it is not possible to compare the studies.

Of the variables examined, only years in practice correlated with malpractice risk for members of AAHKS. This dramatic correlation (Fig. 2) increases from 58% at

between 5 and 10 years to over 90% after 26 years in practice. This relationship has not been previously described, but makes sense in light of the cumulative risk of lawsuit exposure over time. It is interesting to note the curve is very steep in the first decade, near linear up to 20 years of practice, and tends to plateau toward three decades of practice. This could be because of the present experience of younger versus older surgeons with malpractice (ie, the fact that malpractice claims are more frequent in the past decade compared with 20 to 30 years ago [3]) or may relate to the previously demonstrated trend that surgeons who have not been sued are less likely to be sued [1, 2, 20, 22]. Also possible is the suggestion that as skill levels increase with experience, errors become less frequent, and the corresponding frequency of claims diminishes.

Our data suggest the high rate of medical malpractice experienced by adult reconstruction orthopaedic subspecialists is weighted toward the first decade of practice. Furthermore, for adult reconstruction subspecialists, the risk of a malpractice claim is related to years in practice. Practicing as an adult reconstruction surgeon exposes a physician to a cumulative risk of malpractice exposure that is not offset by any beneficial effects of surgeon experience gained over time with a high volume of a limited set of surgeries. The incidence of being named in a claim alleging malpractice is over 90% after 30 years in practice. Unlike many studies that show correlations of malpractice risk and surgeon demographics, we were unable to demonstrate a relationship to type, size, or location of practice, fellowship training, or surgery volume.

Acknowledgments We thank Frank deLibero, PhD (Data 2 Information, Inc, Lacey, WA) for his assistance with statistical analysis of the data and critique of the study design. Official sponsorship from the AAHKS was obtained for this study, and the questionnaire was developed in collaboration with and approved by the AAHKS research and legal committees. Human subjects criteria were used in the questionnaire development, survey distribution, and data management stages to protect the anonymity and confidentiality of AAHKS members. We are grateful to the AAHKS members for their time spent during the completion of the survey. Hopefully, the article will help them better understand the climate in which they work.



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2006 AAHKS MEMBER SURVEY: CONTEMPORARY LEGAL ISSUES IN HIP & KNEE SURGERY

This is an ANONYMOUS 2-page survey designed to investigate current trends in orthopaedic malpractice litigation. Your complete responses are important. Please return BOTH PAGES of the questionnaire in the enclosed envelope or via Fax 847-698-0704 no later than May 8, 2006. Questions? Call the AAHKS at 847-698-1200.

1.	How often do you disclose information about an ur		dverse d	outcome to the	ne patient?
^	NEVER SOMETIMES FREQUENTLY ALWA		laa falla.		
۷.	When disclosing information in (1) above, how ofte	en ao you ao t	ne ioliov	wing? (Cneck	one per item)
	Explain what happened				
	Promise to investigateNEVER Promise to share investigation resultsNEVER				
	Apologize for adverse outcomeNEVER	SOMETIMES	FRE	QUENTLY	ALWAYS
	Apologize for adverse outcomeNEVER	SOMETIMES	FREG	QUENTLY	ALWAYS
	Express sympathy	SOMETIMES	FREG	QUENTLY	ALWAYS
	Express regretNEVER				
	Acknowledge harm				
	Take responsibility for harm				
	Discuss remedial measures NEVER				
_	Offer compensationNEVER□				
3.	What have the following entities said to you about	apologizing a	rter an u	nexpected a	averse event?
	Hospital APOLOGIZE DON'T AF				
	Malpractice Insurer APOLOGIZE DON'T AF	OLOGIZE u	NO AD	VICE RECEIVED	ப
4.		averse outcon	ne arreci	is the risk of	a lawsuit?
	INCREASE RISK SUBSTANTIALLY				
	INCREASE RISK SOMEWHAT				
	No effect on risk				
	DECREASE RISK SUBSTANTIALLY				
_	OTHER EFFECT(S) OF APOLOGIZING (describe) What do you see as the barriers to a physician apo	logizing for o		o outcomo?	(places fill in).
5.	what do you see as the partiers to a physician apo	logizing for al	n advers	e outcome?	(piease IIII III):
6.	What do you see as the benefits of a physician apo	logizing for a	n advers	se outcome?	(please fill in):
7.	Which factor(s) below might increase likelihood of	out of court m	alpraction	ce lawsuit se	ttlements?
	(check all that apply):				
	Patient's fear of too low a judgment				🗖
	Judicial system, hospital and/or malpractice insure	r promotes sett	tlement		🗖
	The financial cost of defense and litigation				□
	Physician's inexperience with the civil legal process				
	Physician's fears of an excessive adverse judgmer				
	Physician's desire to avoid time and stress involved	d in civil trial			
_	Other reason(s) (describe)				
	Alternative dispute resolution (ADR) forums can res				
	Would you consider using each of the types of ADR				-
	YES	Possibly	No	Don't kno	DW .
	Mediation (Non-binding on parties)				
	Arbitration (Binding on parties)				
	Expert panel of trained judges				
	Jury with non-binding decision	_			
	Expert panel of lawyers Committee of AAHKS members				
		_	_	_	
0	Committee of AAOS members	as experts as	ntributo	to an increa	so in
9.	Do orthopaedic surgeons who are willing to testify medical malpractice litigation? YES□ POSSIBLY			io an increa	se III
10	. Have you ever testified as an expert in a medical m				П
ı U.	*If you answered YES TO #10, proceed with questions #11				
11					
	How many cases have you testified in as an expert	witness for	DI AINITIEE	DEEE	NCE
	. How many cases have you testified in as an expert . What % of your gross income is derived from testi				NSE





13. Have you ever been named as a defendant in a medical malpractice lawsuit? (ALL information is			
ANONYMOUS): YES*□ NO**□ PREFER NOT TO DISCLOSE□ *If you answered YES, proceed with questions #14-16.			
	E", please skip questions 14-16, and go to question #17.		
	been named in have involved (check all that apply):		
Limb length discrepancy	Infection after total joint		
Vascular injury	Nerve injury after total joint		
Dislocation or instability of implants□	Fracture related to total joint procedure		
Premature revision surgery□	Fall after total joint		
Compartment syndrome	Chronic pain after total joint		
Implant malpositioning	Other (please describe)		
	rofessional(s) in an adverse outcome contributed to		
a malpractice suit against you? YES 🗖 No			
	hat you identified in question #13?(enter # of cases):		
	LOST BY JURY TRIAL SETTLED OUT OF COURT*		
	urt on your behalf, please proceed with questions #17-22;		
	of court on your behalf, please proceed to question #23		
	erceptions of ONE specific lawsuit settled on your behalf;		
	out court, these questions apply to the case you best recall:		
17. How satisfied were you with the settlement p	rocess in the malpractice case that you best recall?		
	AL DISSATISFIED VERY DISSATISFIED		
	or? Prefer not to disclose□		
19. How <u>fair</u> was judicial process was in terms o			
FAIR Neither fair nor unfair Un			
20. How did the expert witness(es) testimony inf			
	NT'S EXPERT WITNESS(ES)		
,	settlement less likely		
	ot influence settlement		
	settlement more likely cert witness(es) hired in this case? (check all that apply):		
YOUR EXPERT WITNESS(ES)	PATIENT'S EXPERT WITNESS(ES)		
In academic practice	In academic practice		
In private practice	In private practice		
Total joint specialist	Total joint specialist		
No longer practicing orthopaedic surgery □	No longer practicing orthopaedic surgery □		
Never practiced orthopaedic surgery□	No longer practicing orthopaedic surgery □		
Don't know	Don't know		
	vitnesses in this case, in each of these categories:		
Your Expert	WITNESS(ES) PATIENT'S EXPERT WITNESS(ES)		
HonestYES NO	DON'T KNOW ☐ YES ☐ NO ☐ DON'T KNOW ☐		
Familiar with current standardsYES ☐ No ☐	DON'T KNOW ☐ YES ☐ NO ☐ DON'T KNOW ☐		
Had expertise in specialtyYES □ No □	DON'T KNOW □ YES □ NO □ DON'T KNOW □ YES □ NO □ DON'T KNOW □ YES □ NO □ DON'T KNOW □		
23. What % of your gross practice revenue is sp			
24. What % in (23) above would make you chang	e your practice (relocate, retire, etc.)?		
25. Which best describes your practice setting?	(check one):		
PRIVATE PRACTICE ☐ ACADEMIC PRACTICE	HMO MULTI-SPECIALTY CLINIC		
GOV'T/MILITARY□ HOSPITAL EMPLOYEE	OTHER (PLEASE DESCRIBE)		
26. Who is involved in the direct care of you	r patients in your clinic/office? (check all that apply):		
FELLOW(S) ☐ RESIDENT(S) ☐ PHYSICIAN	ASSISTANT(S) □ NURSE PRACTITIONER(S)□ RN(S)□		
LPN(s)□ MEDICAL ASSISTANT(S)□ OTHE	R		
27. In which state do you practice? (Please write	n two letter abbreviation):		
28. How many orthopaedists are in your practice	? (Please write in number):		
29. How many years have you been in orthopaed	lic practice? (Please write in number):		
30. Did you complete an orthopaedic adult recor	structive surgery fellowship? YES□ No□		
31. What was your total THA/TKA surgery volum			
32. Please estimate the percentage of types of c			
% Primary THA: % Revision THA:	% Primary TKA: % Revision TKA:		
	OTH PAGES of questionnaire in the enclosed envelope or via		
Fax 847-698-0704 no later than May 8, 2006. Question			



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