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Incidence and Costs of Defensive Medicine Among Orthopedic Surgeons in the United States: A National Survey Study

Manish K. Sethi, MD, William T. Obremskey, MD, MPH, Hazel Natividad, MA, Hassan R. Mir, MD, and A. Alex Jahangir, MD

Abstract

Defensive medicine is defined as medical practices that may exonerate physicians from liability without significant benefit to patients. No study has evaluated the United States national incidence of defensive medicine in the field of orthopedic surgery. In the study reported here, we investigated the practice of defensive medicine and the resultant financial implications of such behavior by orthopedic surgeons in the US.

A Web-based survey was sent to 2000 orthopedic surgeons in the US. Of the 1214 respondents, 1168 (96%) reported having practiced defensive medicine by ordering imaging, laboratory tests, specialist referrals, or hospital admissions mainly to avoid possible malpractice liability. On average, 24% of all ordered tests were for defensive reasons. Mean national Medicare payment information was used to calculate the cost of defensive medicine per respondent: approximately $100,000 per year. With there being 20,400 practicing orthopedic surgeons in the US, we estimated that the national cost of defensive medicine for the specialty of orthopedic surgery is $2 billion annually.

Orthopedic surgeons' defensive medicine is a significant factor in health care costs and is of marginal benefit to patients. Policies aimed at managing liability risk may be useful in containing such practices.

Dr. Sethi is Co-Director, Center for Health Policy, Vanderbilt Orthopaedic Institute, and Assistant Professor, Department of Orthopaedic Surgery and Rehabilitation, Vanderbilt University Medical Center, Nashville, Tennessee.
Dr. Obremskey is Chief, Division of Orthopaedic Trauma, and Associate Professor, Department of Orthopaedic Surgery and Rehabilitation, Vanderbilt University Medical Center.
Ms. Natividad is Manager, Healthcare Statistics and Surveys, American Academy of Orthopaedic Surgeons, Rosemont, Illinois.
Dr. Mir is Assistant Professor, Department of Orthopaedic Surgery and Rehabilitation, Vanderbilt University Medical Center.
Dr. Jahangir is Co-Director, Center for Health Policy, Vanderbilt Orthopaedic Institute, and Assistant Professor, Department of Orthopaedic Surgery and Rehabilitation, Vanderbilt University Medical Center.

Address correspondence to: Manish K. Sethi, MD, Center for Health Policy, Vanderbilt Orthopaedic Institute, Vanderbilt University Medical Center, Suite 4200, Medical Center East, 1215 21st Ave, Nashville, TN 37232-8774 (tel, 615-936-0112; fax, 615-936-1566; e-mail, manish.k.sethi@vanderbilt.edu).

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In 2008, total United States national health care spending was $2.3 trillion, continuing to rise by approximately twice the consumer price index and representing 16.2% of gross domestic product (GDP).[1] US health care spending is expected to continue to increase at similar levels, reaching 20% of GDP by 2016.[1] Public sector and academic research efforts have been increased in the hope of elucidating the drivers behind these increased costs of care. One component of the growing health care expense may be the cost of unnecessary medical tests spurred by physicians' fears of malpractice litigation.

Defensive medicine, defined as medical practices that may exonerate physicians from liability without significant benefit to patients, can be categorized as either positive or negative.[2,3] Positive defensive medicine occurs when physicians provide excessive and unnecessary diagnostic testing, treatment, hospitalization, or consultation and is the focus of this report. Negative defensive medicine occurs when physicians curtail services to avoid high-risk patients or procedures.

The incidence and associated costs of defensive medicine have been debated and academic studies have shown wide variability.[4-9] For example, a 1994 comprehensive study from the US Congressional Office of Technology Assessment identified 8% of all diagnostic tests as purely defensive,[2] while a more recent survey of Pennsylvania physicians indicated that more than 93% (766/824) of surveyed physicians reported defensive

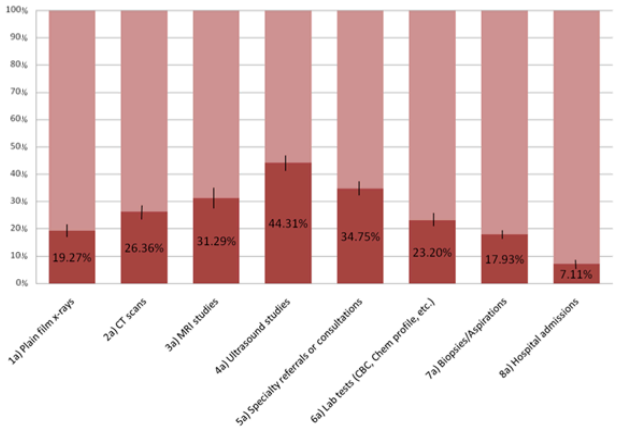

Figure 1. Percentage of procedures ordered per month due to liability concerns.

Table I. Respondents' Demographic Information

	n	%
Mean age, 52 y	—	—
Sex		
[Did not indicate]	26	2.14
Female	57	4.7
Male	1131	93.16
Total	1214	100
Practice setting		
Private practice orthopedics group	587	48.6
Academic practice	183	15.1
Private practice solo	165	13.7
Private practice multispecialty group	117	9.7
Clinical hospital	76	6.3
Other group	30	2.5
Preferred provider organization/ health maintenance organization	23	1.9
Nonmilitary or government practice	14	1.2
Military practice	13	1.1
Total	1208	100
Subspecialty		
Adult knee	460	38.8
Sports medicine	421	35.5
Arthroscopy	411	34.7
Total joint	395	33.3
Adult hip	390	32.9
Shoulder and elbow	309	26.1
Trauma	224	18.9
Hand	218	18.4
Foot and ankle	150	12.7
Adult spine	119	10
Pediatric orthopedics	93	7.8
Other [respondent is asked to specify]	60	5.1
Disability-legal-orthopedics	58	4.9
Pediatric spine	53	4.5
Nonoperative practice	52	4.4
Ortho-oncology	27	2.3
Rehabilitation-prosthetics-orthotics	13	1.1

practices.[10] In 1993, the Lewin group[11] demonstrated that, over a 5-year span, there was 10-fold variability in the cost of defensive medicine, from $11.8 billion to $119.5 billion in 2007 dollars ($7.5-$76.2 billion in 1991 dollars). In 2010, Mello and colleagues[12] argued that the costs of medical liability, including defensive medicine, could be as high as $55.6 billion, or 2.4% of total health care spending. Others, however, have made the argument that defensive medicine is not a major contributor to rising health care costs.[13]

Researchers have investigated the incidence and related costs of defensive medicine at the state level among multiple specialties, including orthopedic surgery. However, no one has specifically examined the national incidence and costs of defensive medicine among orthopedic surgeons.[10] Such an investigation on the practice of defensive medicine and its impact on costs among the national orthopedic community could potentially elucidate a specific area to explore in controlling rising health care costs.

In this article, we report results of our study of a survey of orthopedic surgeons in the US. We identify the incidence of defensive practices and estimate the associated financial burden using 2011 Medicare cost data.

Table II. Question: "In the past 5 years, did you do any of the following because of concerns about professional liability?"

	n	%
Reduce the number of high-risk patients I saw	635	70.4
Reduce or eliminate the number of high-risk services/procedures I performed	761	84.4
Other [respondent is asked to specify]	184	20.4

Materials and Methods

Patients

On September 22, 2010, after obtaining approval from our institutional review board, we e-mailed invitations to 2,000 randomly selected orthopedic surgeons from the American Academy of Orthopaedic Surgeons (AAOS) database to answer an anonymous, Web-based survey. The invitation noted that the AAOS, through the survey, sought to develop a better understanding of the role of defensive medicine in physician practice patterns. Data collection closed on December 15, 2010. By that date, 1214 of the 2000 (61%) surgeons had responded. We felt that the 3-month response period was appropriate for this study, given that the response rate was high compared with that in other physician surveys. No incentives were offered for participation in the study. Every 2 weeks, we sent an e-mail to nonrespondents to ask for their participation and included a copy of the initial invitation.

Data Instrument

Previously developed and validated surveys assessing defensive medicine were used as a reference to develop a 7-item, Web-based survey administered through the AAOS Healthcare Statistics and Research Surveys Unit.[10,14] The design of the survey was based on the principles of effective survey design as outlined by Dillman and colleagues.[15] The format was such that respondents

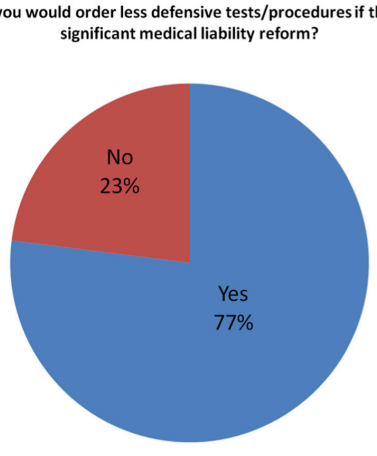

Figure 2. Impact of medical liability concerns and defensive behaviors.

Table III. Mean Cost per Month for Each Respondent—Procedures per Month Versus Cost Due to Liability

	Plain Radio-graphs	CT	MRI	Ultrasound	Specialty Referrals/ Consultations	Laboratory Tests[a]	Biopsies/ Aspirations	Hospital Admissions	Total/mo
Mean no. of									
A Procedures ordered in typical month	192.99	6.98	28.31	4.96	12.73	54.48	9.81	17.87	—
B Procedures ordered per month due to liability	37.18	1.84	8.86	2.20	4.42	12.64	1.76	1.27	—
Mean cost									
C Per procedure	$39.05	$335.13	$528.98	$138.26	$109.13	$17.78	$133.99	$381.00	—
D In typical month (D = A×C)	$7536	$2340	$14,975	$686	$1389	$969	$1314	$6808	$36,016
E Due to liability (E = B×C)	$1452	$617	$4685	$304	$483	$225	$236	$484	$8485
F % of cost & procedures due to liability concerns (F = E/D)	19.27	26.36	31.29	44.31	34.75	23.20	17.93	7.11	23.56

Abbreviations: CT, computed tomography; MRI, magnetic resonance imaging.
[a]Complete blood cell count, chemistry profile, etc.

would be more likely to follow the flow of the survey, and measurement error would be reduced. Simple, direct, complete sentences were used to reduce redundancy and minimize respondent burden.[15] Survey items queried monthly test-ordering, consultation, and hospital admission behavior. Respondents were then asked how many of the specific practices they would categorize as defensive, along with questions involving impact of professional liability insurance premiums, risk of malpractice lawsuits, personal history of malpractice claims, and basic demographic information (age, sex, subspecialty, practice setting, state).

Analysis Model

The frequency distribution (frequency, valid percentage) was analyzed for each survey question. Mean, median, standard deviation, minimum value, and maximum value were provided for analysis involving number of procedures and costs. Confidence interval values also were provided to illustrate where answers would likely lie if the experiment were repeated.

Estimates of the costs associated with self-reported imaging, laboratory tests, consultations, hospitalizations, and biopsies were determined at the *Current Procedural Terminology* (CPT) code level using the American Medical Association "relative value search" database.[16] CPT codes relevant to orthopedic practice in each of 8 domains—radiographs, magnetic resonance imaging (MRI), computed tomography (CT), ultrasound, consultations, hospitalizations, biopsies/aspirations, and laboratory tests—were included on the basis of independent review by Drs. Sethi, Mir, and Jahangir, all practicing orthopedic surgeons. A single code for hospitalization was included, representing admission for observation between 8 hours and 24 hours. Any CPT code not included in the independent review by each of the 3 authors was eliminated. Mean cost (Centers for Medicare and Medicaid Services relative value) for a single CPT code, or average unit cost, within each of the 8 domains was then calculated using the mean of the individual costs of all CPTs within each of the 8 domains of self-reported behavior. This calculated unit cost for each of the domains was then directly applied to the self-reported physician behavior with respect to each of the 8 categories.

Results

Demographic Characteristics

Of the 2000 physicians invited, 1214 completed the Web-based survey (Table I), resulting in an overall response rate of 61%. Respondents were from all 50 states (with California represented most, 10.8%) and the District of Columbia. Respondents were mostly male (93.2%), and mean age was 52 years. Almost half (48.6%) of the respondents were in private practice orthopedic groups. The most popular subspecialties were adult knee (38.8%), sports medicine (35.5%), arthroscopy (34.7%), total joint (33.3%), and adult hip (32.9%). Respondents marked a mean of 2 subspecialty interests each.

Quantitated Defensive Medical Practices

Of the 1214 respondents, 1168 (96.2%) indicated they ordered procedures out of liability concerns. Mean percentage of defensive procedures ranged from 44% for ultrasound to 7% for hospital admissions (Figure 1).

Impact of Medical Liability Concerns and Defensive Behaviors

Nine hundred thirty-five of the 1214 (77%) respondents reported they would reduce or discontinue practicing defensive medicine if significant medical liability reform were enacted, while 635 (52.3%) reported reducing the number of high-risk patients they saw because of professional liability concerns, and 761 (62.7%) reduced or

Table IV. Mean Cost of Defensive Medicine Among Orthopedic Surgeons Across United States Based on Self-Reported Defensive Behavior for Each Respondent

A	Mean cost due to liability per respondent	$101,820/y
B	No. of orthopedic surgeons in United States	20,400
C	Mean cost per year for procedures due to liability concerns in orthopedics (C = A×B)	$2,077,128,000

eliminated the number of high-risk procedures they performed (Figure 2, Table II).

Estimating Cost of Defensive Medicine

Total estimated cost of defensive medicine per respondent was approximately $8485 per month, or $101,820 per year, based on self-reported defensive medical practices (Table III). The largest cost drivers included MRI and plain radiographs. Respondents reported a mean of 31% of MRIs being defensive, at a total monthly cost of $4685 per respondent, as were 19% of radiographs, at a cost of $1452 per respondent.

Our 1,214 respondents represent 6% of all 20,400 orthopedic surgeons in the US. We extrapolated respondents' self-reported defensive medical practices to that larger group on the basis of information provided by the US Department of Labor.[17] If practice patterns are similar for the larger group, the estimated cost of defensive medicine in the United States rises to approximately $2 billion annually (Table IV).

Discussion

Our results are clear evidence of self-reported defensive medical practices among orthopedic surgeons across the United States. A staggering overall 96% of surveyed orthopedic surgeons reported practicing defensive medicine, accounting for 24% of all imaging, laboratory tests, consultations, and hospital admissions, at an estimated cost of approximately $100,000 per year for each survey respondent, and in turn, more than $2 billion a year when applied to the national orthopedic community.

Incidence of Defensive Medicine: Survey Versus Case Scenarios

Published studies have consistently shown that defensive medicine is a real component of most medical practices.[10,14,18] Other direct physician surveys have estimated an incidence of 43% to 92%, compared with the 96% among orthopedic surgeons responding to our survey.[5,10] Different methods of empirically estimating defensive medicine include assessing physicians' clinical decisions and implicitly extrapolating defensive medical practice and epidemiologic, population-based use studies. In a recent survey of 1231 physicians across the US, Bishop and colleagues[18] found that 91% of respondents believed that most physicians order extra tests out of fear of medical liability. Clinical scenarios have estimated defensive medicine to a lesser extent than self-reported surveys have. Klingman and colleagues[19] estimated that between 5% and 29% of physicians choose at least 1 clinical action primarily because of liability concerns.

It can be argued that the defensive medical practices reported in physician surveys may not capture the true extent of defensive medicine, which can have both conscious and unconscious components. With unconscious defensive medicine, or an implicit, community-imposed standard of defensive medicine, the repercussions on patients and the health care system are nevertheless very real. Glassman and colleagues[20] found that a culture or professional norm of defensive-minded behavior had a significant effect on physician ordering behavior.

Malpractice Concerns and Relationship to Defensive Medicine

Other investigators have also found a relationship between concerns about malpractice risk and overall malpractice environment and defensive behavior.[9,21-23] Seventy-seven percent of our respondents reported they would reduce or discontinue practicing defensive medicine if significant medical liability reform were enacted. Many respondents reported practicing negative defensive medicine out of medical liability concerns: 84% reported reducing the number of high-risk procedures they performed, and 70% reported reducing the number of high-risk patients they saw. Our survey results conflict with the argument made by Sloan and Shadle[24]—that tort reforms would not significantly influence medical decision-making.

Cost of Defensive Medicine

Our results show that liability concerns account for a large percentage of diagnostic testing, consultations, and hospital admissions ordered by orthopedic surgeons across the US. Our respondents spent a mean of approximately $100,000 each on defensive medicine annually. Extrapolated nationally, approximately $2 billion is spent on defensive medicine by orthopedic surgeons. Combining our data with data from the US Department of Labor, we see that orthopedic surgeons make up 5% of the entire "medical" population (20,000/400,000) and that, if each physician spends an amount commensurate with that reported here ($100,000), the total amount spent on defensive medicine in the US would be roughly $30 billion annually.

As with arguments surrounding the incidence of defensive medicine, the costs of these practices have been widely debated. As early as 1987, Reynolds and colleagues[5] argued that defensive medicine is responsible for 10% to 15% of health care costs. Similar findings were reported by the Lewin group[11] in 1993 and the Massachusetts Medical Society in 2008.[14] Although other investigators have recently argued that defensive medicine is not a major factor in rising health care costs,[12,13,24] our data show that the costs of defensive medicine clearly are a major problem for orthopedic surgeons and play a role in the rising costs of US health care.

Study Limitations

Our study was based on self-report measures, the validity and reliability of which have not been fully established. Physician reports of the incidence of defensive practices may include errors because of recall bias. In addition, social desirability may lead respondents to report an increased number of defensive practices in an effort to call attention to what they perceive as a wasteful and potentially harmful situation. Conversely, concerns about admitting that some tests and procedures were not motivated by medical necessity may lead to suppression of reports of defensive practices.

Our cost data are derived solely from Medicare data at the CPT level. Using these public cost data to approximate costs likely resulted in a conservative estimate, given the higher reimbursement rates of private health payers.

In addition, though this survey study maintained a high response rate (61%) for a physician cohort, the number of respondents (1214) represents only 6% of practicing orthopedists nationally. Furthermore, the distribution of respondents was equally weighted toward both private settings and other practice settings—which does not represent national trends within the field. As such, application of survey respondent defensive practices to the practice habits of orthopedic surgeons across the US must be conducted with caution.

A final limitation of the present investigation is its lack of a sensitivity analysis. Sensitivity analysis is used to study how the variation or uncertainty in the output of a statistical model can be attributed to variations in inputs to the model. Such an analysis could have strengthened our results but would have required sampling-based methods that would have effectively required a redesign of our survey study model. Furthermore, other defensive medicine studies with survey methods similar to ours did not use sensitivity analysis.[10,14] Future studies evaluating the impact of defensive medicine should be designed to allow for use of sensitivity analysis.

Conclusion

This study is the first of its kind to demonstrate that defensive medical practices are common among orthopedic surgeons across the US and come at great cost ($2 billion/year) to the US health care system. In the setting of continually rising health care costs, liability reforms may be an effective part of a comprehensive legislative reform package that can help contain medical costs for services that are of marginal to no medical benefit to the patient and the health care system.

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