

Medical Malpractice and Sarcoma Care—Sarcoma Malpractice: Who is at Risk? A Thirty-Three Year Review of Case Resolutions, Inciting Factors, and At Risk Physician Specialties Surrounding a Rare Diagnosis

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Background: We reviewed medico-legal cases related to extremity sarcoma malpractice in order to recognize those factors most commonly instigating sarcoma litigation.

Methods: Over one million legal cases available in a national legal database were searched for malpractice verdicts and settlements involving extremity sarcoma spanning 1980–2012. We categorized verdict/settlement resolutions by state, year, award amount, nature of the complaint/injury, specialty of the physician defendant, and academic affiliation of defendant—amongst other variables.

Results: Of the 216 cases identified, 57% of case resolutions favored the plaintiff, with a mean indemnity payment of \$2.30 million (range \$65,076–\$12.66 million). Delay in diagnosis (81%), unnecessary amputation (11%), and misdiagnosis (7%) accounted for the majority of complaints. The greatest numbers of claims were filed against primary care specialties (34%), orthopaedic surgeons (23%), and radiologists (12%). Individual state tort reform measures were not protective against case resolution outcome.

Conclusions: Reported medico-legal claims involving sarcoma care continue to rise, with mean indemnity payments approaching 10 times that for other reported medical/surgical specialties. Primary care and orthopaedic specialties are the most commonly named physician defendants, citing a delay in diagnosis. This suggests further education in the front line diagnosis and management of sarcomas is needed.

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KEY WORDS: sarcoma; medical malpractice; delay in diagnosis

INTRODUCTION

Burgeoning healthcare costs in the United States have quickly become a powerful impetus for legislation targeted at increasing efficiency, quality and access, while simultaneously reducing expenditures. It is projected that by 2018, Medicare/Medicaid spending will approach \$4.5 trillion, accounting for 20% of the national gross domestic product [1]. Increasing costs have been attributed to numerous factors, including a growing epidemic of medico-legal litigation [2–5]. One area of cancer medicine with persistent patterns of delay in diagnosis and unintended procedures leading to increased cost, decreased quality, or a rising incidence of adverse outcomes is bone and soft tissue sarcomas [6–9].

Sarcomas are a rare form of cancer, accounting for 1% of all adult malignancy and 20% of solid tumor pediatric malignancy [8,10–12]. One persistently troubling trend common to the diagnosis of sarcoma is the high proportion of inappropriate surgical techniques used to treat bone and soft tissue sarcomas. Examples of common errors include incomplete excision, faulty biopsy technique, or “blind” stabilization of an isolated bone lesion prior to an appropriate workup [6,8,11,13,14]. A second alarming trend is an overall delayed presentation of sarcoma malignancy to a multi-disciplinary sarcoma team [9,10,15,16]. Despite international attempts to address these shortcomings through the use of published guidelines targeted at early recognition of sarcoma triggering referral, deficient recognition patterns in both surgeon and primary care gatekeeper specialties remain prevalent [6,7,10,17,18]. As a result of this apparent disconnect, the failure of a physician to remain vigilant for recognizing a potential sarcoma can cause litigation to become a reality. Across medical and surgical literature, malpractice trends have been previously studied both with regards to cancer and common non-cancer diagnoses, with delay in diagnosis and misdiagnosis being the most frequently cited

complaints [9,19–26]. Specifically concerning sarcoma care, however, no such evaluation of malpractice trends has been attempted.

Given the paucity of literature addressing the medico-legal consequences specifically stemming from sarcoma care, we set out to enhance sarcoma awareness education by addressing two questions. First, we sought to describe the demographic context in which sarcoma claims were filed. Second, we sought to evaluate which physician sub-specialties are at risk for litigation. We hypothesized that a majority of cases would be filed secondary to morbidity associated with inappropriate surgical techniques/procedures, with surgeons being the most commonly sued physician type.

MATERIAL AND METHODS

LexisNexis[®] is a legal database containing one of the world’s largest collections of public legal records [27]. This American database draws from greater than 50 states and federal publications that collect jury verdict and settlement information, with over one million verdicts and settlements accessible online. Cases are added to the database on a

Conflicts of interest: There are no conflicts of interest pertinent to this study to report.

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voluntary basis, lending to a potential selection bias limitation linked to the court or legal practitioner's submission of information. To our knowledge, LexisNexis harbors the greatest number of case resolutions compared to any other national database, and has been utilized in multiple previous medical malpractice studies [19,21]. Alternative search methods have been proposed, such as review of data through a malpractice insurer's database or alternative regional legal databases [24,26,28,29]. As these collection methods are limited to a smaller geographic region, they were thought to be less pragmatic in the case of sarcoma malpractice given the rarity of the diagnosis.

Using the *Combined Verdicts, Settlements, and Expert Directories* section of LexisNexis, we inputted the search terms "sarcoma" and "medical malpractice," spanning the entirety of the database (1980–2012). Information obtained on each case included state/county, year of filing, defendant name, complaint, and a brief synopsis of the case record (including sarcoma type, age of plaintiff, and hospital affiliation).

For case records in LexisNexis found incomplete for purposes of this review, each individual verdict/settlement identified was queried through a secondary search, utilizing public search domain engines (Google[®], Bing[®], and Yahoo[®]). This alternative search method was done for two reasons – 1. To obtain specialty, subspecialty and hospital affiliation information for the defendant(s) party, 2. To search state/county public court records for further information related to case resolution or award details not delineated in LexisNexis. Physician identification was verified through the use of the first, middle, and last name of the defendant(s), as well as through verification of the practice location available in public search records (office website, resume, etc.) with those noted in the LexisNexis search. Hospital affiliation was defined as "academic" or "non-academic," with the former being defined as an institution with an actively practicing Musculoskeletal Tumor Society (MSTS) or Surgical Society of Oncology (SSO) member orthopaedic or surgical oncologist. This was verified on the MSTS and SSO websites, and felt to be the best attempt at capturing those institutions with (i) an actively practicing, fellowship-trained sarcoma surgeon and, by proxy, (ii) a high likelihood for a readily available multi-disciplinary sarcoma team [30,31]. All physician specialty types were verified through the secondary search methods. Incomplete case resolution details were supplemented through electronic court record queries, using the assigned case number as identified in LexisNexis. Settlement resolutions were thought to be in favor of the defendant only if the award amount was noted to be \$0 ($n = 2$), or if the resolution in the official court documents noted the "defendant" as the favored party ($n = 2$).

Exclusion criteria included retroperitoneal, uterine, intra-abdominal, or head/neck sarcoma locations. These were excluded due to the rarity of coordinated care involvement of the musculoskeletal oncologist. Axial locations of the chest wall, flank, and pelvis were included for study. All bone and soft tissue sarcoma diagnoses were considered for inclusion. All award amounts were adjusted to reflect a 2012 US Dollar amount, using the consumer price index.

No Institutional Review Board approval was sought, as no search of patient medical records was required.

We performed descriptive statistics for each of the variables studied.

RESULTS

Overall, 242 verdicts and settlements involving sarcoma-centered care were identified between 1980 and 2012. Twenty-six were excluded based on the sarcoma location, leaving 216 extremity sarcomas for study. Our search techniques included two attorneys (JLM, LMG) who individually searched each public record for further details not included in the initial search. Excluding age information, 65% of records were considered complete with the LexisNexis search, with an additional 19% of cases yielding further information with secondary search techniques. Despite a more thorough search method as compared to previous

literature utilizing public legal databases [19,21], 35% (33/91) of resolved cases in favor of the plaintiff were found to have confidential award details or were not found in public record due to the lack of electronic public court records in specific locations, and are not recognized in our final indemnity payments calculations.

Demographic and plaintiff/defendant characteristics are shown in Table I. The total reported indemnity payment was \$143,625,664 ($n = 61$), with an average indemnity payment of \$2,302,483. Thirty-three percent of cases with indemnity payments awarded (33/99) remained confidential concerning the specifics of payments rendered. Since 1980, the absolute number of reported sarcoma-related malpractice claims per decade remains in a steady climb, rising 12-fold between the decades 1980–1989 and 2000–2009. The percentage of verdicts/settlements in favor of the plaintiff has remained steady, with an overall rate of 57% (91/161) (Fig. 1 and Table II). We found that the average indemnity payment has fluctuated with each decade, perhaps holding foundation in two limitations – first, a general trend in improved case reporting over the past three decades may account for the early pattern of low case numbers, and likely skewed indemnity payments noted between 1980 and 1989 (Fig. 1) and second, larger awards may be more often reported than smaller amounts.

Physical injury (125/216, 58%) and wrongful death (84/216, 39%) were the most common injury allegations. Delay in diagnosis (175/216, 81%), unnecessary amputation (23/216, 11%), and misdiagnosis (14/216, 7%) accounted for the majority of filed complaints leading to injury. Claims related to soft tissue sarcoma (105/176, 60%) were more common than bone sarcomas, accounting for both a larger plaintiff resolution outcome (61% vs. 56%) and indemnity payment (\$2,953,965 vs. \$1,585,735). Two-thirds (154/205) of claims were filed solely against the treating physician, while 78% (157/201) of claims named physicians or hospitals who were defined as being part of a non-academic sarcoma practice. The most common location of sarcoma named in the case filings was in the lower extremity (66%, 82/125) (Table I).

Primary care specialties accounted for one-third of all named defendants (89/259, 34%), with an average indemnity amount in a "plaintiff" verdict/settlement of \$1,518,319. Non-oncology trained orthopaedic surgeons (59/259, 23%; \$4,125,285) and radiologists (32/259, 12%; \$1,394,366) were the second and third most common physician types named. Figure 2 depicts average indemnity payments according to physician specialty, within the context of sarcoma-related practice and general specialty practice. Jury verdict resolution indemnity payments were 2.7 \times (\$3,955,560 vs. \$1,442,560) greater than settlement award payments, with a 45% (27/60) plaintiff verdict. New York, Pennsylvania, Massachusetts, and Florida accounted for 48% of total claims. States with enacted tort reform had similar plaintiff verdict rates (55% [40/73] vs. 56% [53/94]) and higher mean indemnity payments (\$2,613,498 vs. \$2,186,533) (Table II).

A summary of current state tort reform liability caps is available in the Appendix A.

DISCUSSION

The findings of this study highlight both a rising incidence of reported malpractice claims following perceived substandard care surrounding sarcoma diagnosis and treatment, as well as the comparatively large financial cost to the physician defendant from litigation rooted in sarcoma treatment. The vast majority (88%) of sarcoma malpractice claims were secondary to a delay in diagnosis or misdiagnosis, and not specifically linked to morbidity stemming from an inappropriate surgical technique or outcome. This was in direct contrast to our hypothesis. Primary care physicians were the most likely physician-type to be named as a defendant in sarcoma-related litigation, with 62% of outcome resolutions in favor of the plaintiff – decidedly higher than has been previously shown amongst primary care physicians [25,26]. Additionally, national trends for primary care physicians (so-called low-risk specialties) and

TABLE I. Sarcoma Malpractice Statistics

Basic Demographics of Sarcoma Plaintiffs							
Status†,¶		Gender†,¶		Age†,¶			
Dead	86 (40.4)	Male	88 (53.3)	Adult	43 (68.1)		
Alive	127 (59.6)	Female	77 (46.7)	Kid (<18y)	32 (31.9)		
Unknown	3	Unknown	51	Unknown	141		
Extremity Sarcoma Characteristics							
Subtype†¶	Decision (D/P)*	Location†¶		Decade	Total Cases¶	Avg. Award‡	
Bone Sarcoma	71 (40.3)	24/30	Upper Extremity	14 (11)	1980-1989	10	\$5,127,317
Avg Award	\$1,585,735		Axial/Pelvis	31 (24.4)	1990-1999	58	\$1,096,392
Soft Tissue Sarcoma	105 (59.7)	33/51	Lower Extremity	82 (64.6)	2000-2009	123	\$2,637,680
Avg Award	\$2,953,965		Unknown	89	2010-2012	27	\$1,686,241
Unknown	40		Excluded	26			
Complaint/Injury							
Complaint‡§			Injury‡§				
Chemo/XRT Complication	3 (1.2)		None	2 (1)			
Delay in Diagnosis	175 (81)		Lost Chance of Recovery	5 (2.3)			
Medical/Surgical Complication	2 (1)		Physical Injury	125 (57.9)			
Failure to Communicate	1 (0.5)		Wrongful Death	84 (38.9)			
Failure to Properly Treat	2 (1)		Average Awards For Top Claims†¶ (Decision D/P)*				
Misdiagnosis	14 (6.5)		Physical Injury	\$2,350,728	45/42		
Unnecessary Amputation	23 (10.6)		Wrongful Death	\$2,107,522	23/46		
Unnecessary Treatment	2 (1)		Delay in Diagnosis	\$2,277,718	57/73		
Incomplete Excision	1 (0.5)		Misdiagnosis	\$4,195,606	3/7		
Lack of Informed Consent	3 (1.2)		Unnecessary Amp	\$1,936,814	5/15		
Pathologic Fracture	1 (0.5)						
None Reported	6 (2.8)						
Plaintiff/Defendant Characteristics							
Physician Subtypes†¶		Decision (D/P)*	Avg. Sarcoma Award‡	Avg. General Award‡			
Orthopaedic Surgery	59 (22.8)	17/28	\$4,125,285	\$238,814			
General Surgery	10 (3.7)	6/3	\$464,910	\$290,091			
Oncology Fellowship Trained††	18 (6.9)	7/8	\$3,815,055				
Surgical (other)	13 (5.0)	None reported					
Radiology	32 (12.4)	10/16	\$1,394,366	\$248,810			
Pathology	14 (5.4)	1/6	all cases undisclosed				
Primary Care	89 (34.4)	24/40	\$1,518,319	\$308,659			
OB-GYN	5 (1.9)	3/2	\$770,402	\$371,211			
Other‡‡	13 (5.0)	None reported					
Non-designated**	11 (4.3)	None reported					
Unknown	14						
Institutional Affiliation†¶‡				Case Outcome			
Non-Academic	157 (78.1)	58/67	\$1,385,724	Jury Verdict	Decision (D/P)*		
Academic	44 (21.9)	16/23	\$2,872,537	Avg Award‡	33/27		
Unknown	15			Avg Award‡	\$3,955,560		
Target of Lawsuit†¶‡				Settlement	4/71		
Physician Only	135 (65.9)	42/52	\$2,870,095	Avg Award‡	\$1,442,560		
Hospital Only	24 (11.7)	4/13	\$1,784,507				
Both	46 (22.4)	21/20	\$1,830,654				
Unknown	11						
Overall Indemnity Payment Summary							
Award Records		Award Amount‡					
Awards Reported	61	Average Overall Payment		\$2,302,483			
Awards Pending	5	Range		\$65,076 to \$12,661,611			
Undisclosed/Confidential	33						

† Percentage in parentheses; ‡ Delineates data compiled from available records, missing data (denominator less than 216) due to incomplete/confidential records

* (D/P) → ratio of Defense/Plaintiff verdicts and settlements; ‡ All indemnity award payments reported in 2012 US Dollars

§ Multiple complaints or injuries may have been filed for each case studied

†† Includes Surgical Oncology, Orthopaedic Oncology, Radiation Oncology, and Medical Oncology

‡‡ Includes homeopathic, DPM, Chiropractor, Anesthesia, and PM&R; * Plaintiff identified only as US Gov't or HMO/Hospital

surgeons (high-risk specialties) with regards to general reported medico-legal claims between 1991 and 2003 have shown stable overall claim and indemnity payout numbers over time – distinctly different from the apparent upward rise in reported sarcoma claims from the 1980s to current [32]. Furthermore, this study found that four in five lawsuit resolutions occurred following care at a defined non-academic sarcoma institution, supporting prior suggestions that sarcoma care should primarily occur at an institution with a multi-disciplinary sarcoma team [6,8,10,33]. These findings can hold context within the reported

trends by Canter et al., who showed that nearly 50% of deep and malignant extremity soft tissue tumor excisions are performed by non-oncology trained physicians, with 17% of excisions performed by physicians performing <3 per year [34]. One suggestion may be that in an academic sarcoma center housing a functioning multi-disciplinary sarcoma team, non-specialized hospital-affiliated physicians may be more likely to refer bone and soft tissue lesions early, rather than attempt to diagnose and treat suspicious lesions. Our definition of an “academic” sarcoma center was one in which a fellowship-trained orthopaedic or

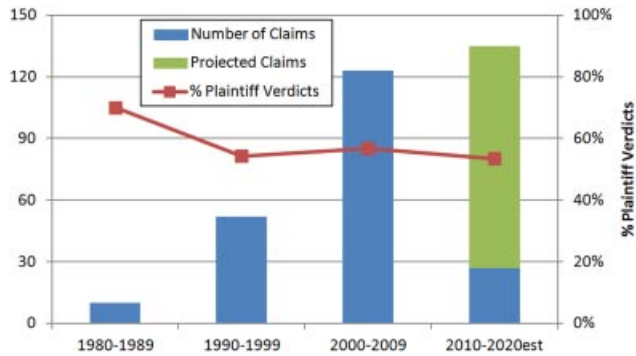


Fig. 1. Extremity sarcoma malpractice claims, verdicts, and award amounts by decade. The blue represents current claims through February 2012. The green represents the projected claims between 2010 and 2020, as calculated based off the average number of claims per month over a 26-month period (January 2010 to February 2012). All but one case from 2012 was pending resolution. The percentage of plaintiff verdicts (line plot) is based only on actual case resolutions known.

general surgery oncologist practiced within the hospital system at the time of diagnosis, and was not tied to known university affiliation or the status of a residency/fellowship program. Our assumption, that the presence of a fellowship-trained surgeon-specialty oncologist would indicate the greater likelihood of an affiliated multi-disciplinary sarcoma team, does have inherent weaknesses, but was felt to be the best manner to infer multi-disciplinary sarcoma treatment capabilities at an institution.

The average indemnity payment for a claim following sarcoma care was \$2,302,482. In some instances, this approached 10 times that of all claims averages (adjusted to 2012 US Dollars using the consumer price index) recently reported against specialists in Urology (\$299,378), Orthopaedic Surgery (\$238,814), Radiology (\$241,810), General Surgery (\$290,091), Internal Medicine (\$323,306), and Family Practice (\$258,991), as well as previously reported mean indemnity payments standardized across all physician specialties (\$280,576) and all primary care specialties (\$308,659) [32] (Fig. 2). When compared to the well-accepted “high-risk” specialties of obstetrics/gynecology and pediatrics, the overall sarcoma claim mean payment was 6.2× greater (\$371,211) and 4.3× greater (\$531,704), respectively [32]. Furthermore, when comparing sarcoma versus general indemnity payments within individual specialties, sarcoma payments ranged between 1.6× (general surgery) and 17.3× (orthopaedic surgery) greater than reported same specialty general mean indemnity award amounts (Fig. 2). With comparison to past surgical oncology literature, a 1992 review comprising of 20 years of breast cancer related claims in the United States highlighted an average payout of \$675,532 (2012 equivalent \$1,105,474) [35], – markedly less than average sarcoma indemnity payments. Notably, the presence of tort reform instigated caps (38/50 states, Table II) did not diminish the mean award amount or frequency of claims. Further discussion on tort reform and loss of chance is found in the Appendix A. (*Summary of Tort Reform and Loss of Chance Doctrine since 1977, in the United States of America*)

Delay in diagnosis accounted for 81% of malpractice complaints (56% plaintiff outcome; mean plaintiff award \$2,277,718), with 40% (70/175) of delayed diagnosis complaints alleging a wrongful death link and 9% (16/175) claiming the delay to have led to an “unnecessary amputation.” Interestingly, mean indemnity payments for a delayed diagnosis complaint were higher than those claims contending unnecessary amputation or wrongful death as a consequence (Table I). To further substantiate the link between delay in diagnosis and cancer claims, delay in diagnosis continues to be the lead cause for litigation in breast cancer (46%) and colorectal cancer claims (62%), as

well [23,36]. These findings, highlighting the primary impetus for cancer-related litigation as being a perceived delay in diagnosis, are also mirrored by a recent multi-national systematic review of primary care physician practices [25]. Globally, family practitioners rank amongst the top five specialties for highest prevalence of reported claims, with reported delay in diagnosis claims most commonly related to cancer (breast, colon, lung, melanoma, and female genital tract) and myocardial infarction diagnoses, accounting for 26–63% of all claims. Death was an attributed consequence in 15–48% of suits. In the United States, 32% of general claims against primary care physicians resulted in payment over a 24 year period – as compared to 63% (40/64) of sarcoma-related claims. The strong contribution of a delay in diagnosis leading to litigation against general practitioners is in contrast to described inciting litigation complaints in general orthopaedic surgery literature, where it has been shown that morbidity caused by surgical treatment (89% total payments, 81% total claims), rather than a delay in diagnosis (16% total payments, 7% total claims), accounts for the majority of filed litigation [29]. This contrasting trend is also echoed in recent head and neck surgical literature, highlighting a multifactorial impetus of medico-legal action, varying between specialties [37].

The overall high frequency of sarcoma-related diagnostic delays leading to successful plaintiff payment may suggest a couple of things. First, it may be inferred that sarcoma patients are more concerned with the careful attention of a workup that is given to a new “abnormal” finding than they are with an incomplete/incorrect procedure being performed. Even after an inappropriately performed surgical procedure, the patient may feel that their physician is summoning all available resources to diagnose their clinical abnormality, and thus left feeling less ostracized and less likely to become litigious. A delay in diagnosis explained as medical “observation” can be subjectively perceived by the patient as a lack of attentive care. This can leave the patient feeling ignored and unimportant. If the end pathway of “observation” culminates in a malignancy diagnosis, patients may assume that their future care and ultimate outcome will be affected by “lost time.” With regards to soft tissue sarcomas, prognosis is known to be associated with patient age, histologic tumor type, grade, size, and depth. A delay in diagnosis can lead to a larger tumor size at the time of diagnosis, with larger tumor size having been shown to effect both survival and the incidence of detectable metastases at the time of diagnosis [10,38,39]. By this merit, “lost time” certainly may play a role in the patient’s ultimate outcome. A second suggestion to arise from these results is the potential “false sense of security” that can surround a sarcoma presentation – especially with new soft tissue “lumps.” Many sarcomas may be subtle or unassuming, and they can be commonly mistaken for benign lesions, such as fatty lipomas. Advanced imaging of suspicious masses can give heightened suspicion for sarcoma based on aggressive imaging features. Commonly, however, practitioners presented with a superficial soft tissue will forego an MRI in favor of a high degree of subjective clinical diagnostic certainty – a confidence that may be falsely inflated by a lack of experience in dealing with soft tissue masses. This hypothesis is supported by the fact that over the past decade, despite rigorous attempts at education in the United Kingdom, the size of soft tissue sarcomas at the time of presentation to a multi-disciplinary sarcoma referral center has not changed [10]. Moreover, a 1982 attempt by Mankin et al. at educating non-sarcoma surgeons on sarcoma recognition and biopsy techniques revealed no change in community practice patterns in a 1996 follow-up study, highlighting the ever-present need for continuing sarcoma education [6,7]. Recent literature has shown that 37% of patients with non-specific lower back pain, and 80% of radiculopathy-related pain, received an MRI within 30 days of symptom onset, despite strong discipline-specific academy recommendations against such practice by both Internal Medicine and Orthopaedic Surgery governing boards [40–42]. The question then becomes why the same frequency of advanced imaging evaluation is not performed at initial presentation of suspicious soft tissue or bony lesions

TABLE II. Case Resolutions Details, by State, 1980–2012

State	Total Verdict/Settlements	Decisions (D/P) ^a	Avg award ^b (# awards)	Tort reform? ^c (years implemented)	
AK	1	(1/0)	\$2,000,000 (1)	1986–present	
AL	2	(1/1)	\$4,000,000 (1)	1987–1991	
AZ ^d	3	(1/1)	Undisclosed, Pending	None ^e	
CA	10	(3/7)	\$1,887,532.86 (7)	1985–present	
CO	1	(0/1)	Prison ^f , Undisclosed	1986–present ^e	
CT ^d	3	(1/0)	N/A	None ^e	
DC	3	(2/1)	\$1,727,119 (1)	None ^e	
FL ^d	18	(8/3)	\$847,589.87 (3)	1986, 1988–1991	
GA ^d	5	(3/0)	N/A	2005 ^e	
IL ^d	8	(1/2)	\$1,557,000 (1)	1995–1997 ^e	
KS	1	(1/0)	N/A	1988–present ^e	
KY ^d	1		N/A	None	
LA ^d	1		N/A	1984–present ^e	
MA ^d	22	(8/10)	\$1,621,247 (8)	1986–present ^e	
MD	2	(2/0)	N/A	1986–present ^e	
MI	5	(3/2)	Undisclosed	1986–present ^e	
MN ^d	3	(1/1)	Undisclosed	1986–present	
MO ^d	4	(0/1)	Undisclosed, Pending	1986–present ^e	
MT ^d	1		N/A	1995–present ^e	
NC ^d	1		N/A	2011–present	
NH ^d	4	(2/1)	Undisclosed	1979–1980, 1986–1991	
NJ ^d	6	(1/4)	\$1,613,570 (4)	None ^e	
NY ^d	34	(10/19)	\$1,617,420.21 (15)	None ^e	
OH ^d	12	(4/6) ^g	\$3,553,137 (4)	1975–1991, 1997–1999, 2003–present ^e	
OK ^d	2	(0/1)	Undisclosed, pending	2004, 2009–present ^e	
PA ^d	26	(7/12)	\$3,937,540.57 (7)	None ^e	
RI ^d	2	(1/0)	N/A	None	
SC ^d	2	(1/0)	N/A	2005–present	
TN ^d	1		N/A	2011–present	
TX ^d	17	(4/9)	\$5,481,381 (3)	1977–1988, 2003–current	
VA ^d	8	(1/5)	\$997,925 (4)	1987–present, 1999–present ^e	
WA	2	(0/2)	\$2,214,641 (2)	1986–1989 ^e	
WI ^d	2	(1/0)	N/A	1995–present ^e	
WV ^d	5	(3/0)	N/A	1986–present ^e	
Case resolution details	Verdict/Settlement outcome		Tort reform?	Decisions (D/P) ^a	
Settlement	83	Defendant	70	Never/No	41/53
Jury verdict	60	Plaintiff	91	Avg. award: \$2,186,533 (37 awards)	
Federal court	5	Pending	1	Yes	33/40
Appeals court	9	Split	1	Avg. award: \$2,613,498 (24 awards)	
Jury + settlement	12	Unknown/Confidential	54		
Unknown/Confidential	71				

^a(D/P) → ratio of Defense/Plaintiff verdicts and settlements.

^bAll indemnity award payments reported in 2012 US Dollars.

^cRefer to Appendix A for further details regarding caps limits and tort reform protections.

^dUndisclosed or confidential case resolution details for a portion of the verdicts.

^e“Loss of Chance” doctrine adopted.

^fUnlicensed homeopathic physician sentenced to 13yrs in prison for practicing medicine without a license and negligent homicide.

^g1 additional “split” verdict was noted, with an undisclosed amount.

if the alternative to a being wrong in one’s clinical judgment is a potential gross alteration of a cancer care pathway?

The need for purposeful interaction between sarcoma-trained specialists, the primary care community, and non-sarcoma trained surgical specialists continues to remain highly relevant, as troubling practice patterns continue to persist. While the primary goal of the authors was to describe both the impetus and the prevailing consequences of sarcoma-related malpractice suits, we also hope that this paper will serve toward sparking an interest in sarcoma recognition education. We would suggest that basic sarcoma recognition education should ultimately begin with a standardized curriculum within each medical school, so as to reach the largest population of future physicians. Furthermore, interaction between sarcoma specialist society liaisons (Musculoskeletal Tumor Society, Society of Surgical Oncology) and

primary care or surgical specialty societies must also become a higher priority, allowing for continuing, repetitive, and evolving education. Making simple recognition and treatment algorithms electronically available in an easy-to-access location on general practitioner and surgical subspecialty websites becomes vital toward allowing physicians to have a “second opinion” in real-time. Recent attempts at creating such simple algorithms for bone and soft tissue tumors have been previously described by Grimer and Briggs [18]. Additionally, working to utilize available resources in a more pragmatic fashion can also help to sharpen practice patterns. One such example pertains to the general practitioner, in which a large number of practices have available an ultrasound machine. If presented with an evidence-based description of worrisome ultrasound-defined tumor characteristics, a physician may more reliably and confidently be able to ascertain “alarming” features of a soft tissue

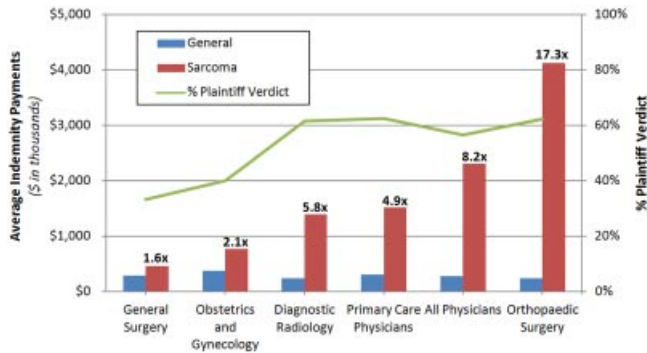


Fig. 2. Average indemnity payments for reported general specialty practice awards versus those specified toward sarcoma care. The blue bars represent the 2012 mean general indemnity payment within a delineated specialty. The red bars represent the mean sarcoma indemnity payment within that same specialty. The numeric values over each bar pairing represent a specialty-specific ratio of sarcoma indemnity payment to reported same-specialty general indemnity payment.

mass using resources that are familiar to their practice. Finally utilizing a well-known point of reference can also lend to an easy decision process for the physician. For example, education attempts have emphasized early 3D imaging obtainment (MRI preferred) and early referral to an institution with a multi-disciplinary sarcoma team for any soft tissue mass larger than an established common object (e.g., golf ball, 43 mm) – prior to biopsy/excision.[10]

CONCLUSIONS

Sarcomas are a rare form of malignancy that most physicians will encounter only once or twice in their career. Because of this, it can be difficult to maintain a high degree of suspicion for a diagnosis so rarely encountered. The literature is clear that sarcoma treatment in institutions with a specialized multi-disciplinary sarcoma team leads to less complications, lower mortality rates, and better functional outcome [6,7,33]. We suggest that a consistent practice of characterizing new lesions could minimize delays in diagnosis and surgical mishaps related to sarcoma care, and thus minimize adverse outcomes related to deviation from an appropriate sarcoma care pathway. Improved efforts aimed at education and communication is needed between the sarcoma surgeon, the primary care community, and the non-oncology trained surgical community to better facilitate the proper testing and diagnostic decision-making needed to ensure the most optimal patient outcome.

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APPENDIX A

Summary of Tort Reform and Loss of Chance Doctrine since 1977, in the United States of America

State	Cap years	Cap amount	Loss of chance
Alabama ^a	1987–1991	\$400,000	
	1987–1991	Wrongful death actions limits to \$1 million	
Alaska ^a	1986–1997	Noneconomic damages \$500,000 for cases not involving physical impairment or disfigurement	
	1997–2005	Noneconomic damages \$400,000 or injured person's life expectancy in years multiplied by \$8,000	
	2005–current	In disfigurement, severe permanent physical impairment, and wrongful death, limit on noneconomic damages \$1,000,000 or injured person's life expectancy multiplied by \$25,000 Noneconomic damages \$250,000 In disfigurement, severe permanent physical impairment, and wrongful death, limit on noneconomic damages \$400,000	
Arizona	N/A		Yes
Arkansas	N/A		
California	1985–current	Noneconomic damages limited to \$250,000	Yes
Colorado	1986–current	Noneconomic damages limited to \$250,000, unless the court finds justification by clear and convincing evidence for a larger award not to exceed \$500,000 Limits the total award of damages to \$1,000,000, of which no more than \$250,000 can be for noneconomic damages.	
Connecticut	N/A		<i>Boone v. William W. Backus Hosp.</i> , 272 Conn. 551, 864 A.2d 1 (2005) (adopting loss of chance doctrine, but also retaining requirement that decedent "had at least a 51 percent chance of survival" prior to negligence).
Delaware	N/A		Yes
District of Columbia	N/A		Yes
Florida ^a	1986	Limits noneconomic damages to \$250,000 in arbitration; limits noneconomic damages to \$350,000 if the plaintiff refuses to arbitrate. Sets no limit on noneconomic damages in medical liability cases, where neither party demands binding arbitration, or where the defendant refuses to arbitrate	No
	1988–1991	Limits noneconomic damages to \$450,000	
	2003–current	Limits noneconomic damages to \$500,000 per claimant, regardless of the number of practitioner defendants. Cap increases to \$1 million for certain exceptions (including cases of death or amputation of an arm, hand, foot or a leg). Limits noneconomic damages to \$750,000 per claimant for non-providers. Cap increases to \$1.5 million for certain exceptions (including cases of death or amputation of an arm, hand, foot or a leg)	
Georgia	2005	Limits noneconomic damages to \$350,000 per healthcare provider, with an overall aggregate limit of \$1.05 million	Yes
Hawaii	1986–current	Limits noneconomic damages to \$375,000	Yes
Idaho	1997–2003	Limits noneconomic damages to \$400,000	No
	2003–current	Limits noneconomic damages to \$250,000	
Illinois	1995–1997	Limited noneconomic damages to \$500,000	Yes
Indiana	1984–Jan. 1, 1990	Limit for each qualified provider not to exceed \$100,000, total recoverable not to exceed \$500,000	Yes
	After Jan. 1, 1990	Limit for each qualified provider not to exceed \$750,000	
	After July 1, 1999	Limit for each qualified provider is \$250,000; total cap \$1,250,000 for acts	
Iowa	N/A		Yes

Appendix A. (Continued)

State	Cap years	Cap amount	Loss of chance
Kansas	1988–current	Limits noneconomic damages to \$250,000	Yes
Kentucky	N/A		
Louisiana	1984–current	Limits total damages to \$500,000, excluding future medical care	Yes
Maine ^a	1989– 1996–2000 2000–2007 2007–current	\$75,000 cap on noneconomic damages in wrongful death cases \$150,000 cap on noneconomic damages in wrongful death cases \$400,000 cap on noneconomic damages in wrongful death cases \$500,000 cap on noneconomic damages in wrongful death cases	
Maryland ^a	1986–current 1994–current	Limits the award of noneconomic damages to \$500,000. Limits noneconomic damages to \$500,000 for wrongful death cases. In cases where there are two or more beneficiaries, the limit is \$700,000.	No
Massachusetts ^a	1986–current	Limits noneconomic damages to \$500,000 (exception is when the claimant can show “a substantial or permanent loss or impairment of a bodily function or substantial disfigurement.”)	Yes (May 2013)
Michigan	1986–current	Limits noneconomic damages to \$280,000 for ordinary occurrences, and \$500,000 if the claimant has suffered brain damages, spinal cord damages, damage to the reproductive system which prevents procreation, or injury to cognitive ability that leaves the plaintiff unable to live alone	State’s high court recognized loss of chance, <i>Falcon v. Memorial Hosp.</i> , 436 Mich. 443, 462 N.W.2d 44 (1990), but the Legislature subsequently amended its medical malpractice statute to state that a “plaintiff cannot recover for loss of an opportunity to survive or an opportunity to achieve a better result unless the opportunity was greater than 50%.” Mich. Comp. Laws Ann. § 600.2912a(2) (West), as amended by 1993 Mich. Pub. Acts 78, § 1, (effective April 1, 1994).
Minnesota	1986–current	Limits noneconomic damages to \$400,000	No
Mississippi	2002–current	Limits noneconomic damages to \$500,000 until July 1, 2011 Limits noneconomic damages to \$750,000 from July 1, 2011 until July 1, 2017 Limits noneconomic damages to \$1,000,000 after July 1, 2017	No
Missouri	1986–current	Limits noneconomic damages to \$350,000	Yes
Montana	1995–current	Limits noneconomic damages to \$250,000	Yes
Nebraska	N/A	\$1.75 million in total damages	
Nevada	2002–current	Limits noneconomic damages to \$350,000, except upon a showing of “gross malpractice” or a judicial determination that there is “clear and convincing evidence” that the noneconomic award should exceed the cap.	Yes
New Hampshire	1979–1980 1986–1991	Limits noneconomic damages to \$250,000 Limits noneconomic damages to \$875,000	No
New Jersey	N/A		Yes
New Mexico	1984–current	Limits total damages to \$600,000, except for punitive damages and medical care and related benefits	Yes

(Continued)

Appendix A. (Continued)

State	Cap years	Cap amount	Loss of chance
New York	N/A		Yes
North Carolina ^a	2011–current	Limits noneconomic damages to \$500,000 against all defendants. The limit does not apply if (1) the plaintiff suffered disfigurement, loss of use of part of the body, permanent injury or death; and (2) the defendant's acts or failures, which are the proximate cause of the plaintiff's injuries, were committed in reckless disregard of the rights of others, grossly negligent, fraudulent, intentional or with malice.	
North Dakota	1995–current	Limits noneconomic damages to \$500,000	
Ohio	1975–1991 1997–1999 2003–current	Limits general damages to \$200,000 Limits noneconomic damages to the greater of \$250,000 or 3x economic damages to the maximum of \$500,000 in most cases Limits noneconomic damages to \$350,000, with a provision to allow the cap to rise to \$1 million, depending on the severity of the injuries and the number of plaintiffs involved in the suit	Yes
Oklahoma ^a	2004 2009–2011 2011–current	Limit does not apply to wrongful death actions Limits noneconomic damages to \$300,000 (provided the defendant made an offer of judgment and the amount of the verdict is less than 1.5× the amount of the final offer of judgment) Limits noneconomic damages to \$400,000 Limits noneconomic damages to \$350,000 Limits do not apply to wrongful death actions	Yes
Oregon	1987–1999	Limits the award of noneconomic damages to \$500,000	Held that loss of chance claims are incompatible with wrongful death statute, but has not decided whether loss of chance claims are otherwise actionable. See <i>Joshi v. Providence Health Sys. of Or. Corp.</i> , 342 Or. 152, 149 P.3d 1164 (2006).
Pennsylvania	N/A		Yes
Rhode Island	N/A		
South Carolina	2005–current	Limits noneconomic damages to \$350,000 per provider, with an overall aggregate limit of \$1.05 million	No
South Dakota	1986–current	Limits noneconomic damages to \$500,000	Yes
Tennessee ^a	2011–current	Limits noneconomic damages to \$750,000 per occurrence, and a limit of \$1 million if the injury or loss is catastrophic	No
Texas ^a	1977–1988 2003–current	Limits damages to \$500,000 Limits noneconomic damages to \$250,000 against all doctors and health care practitioners and a \$250,000 per-facility cap against health care facilities	No
Utah	1977–current	Limits damages in wrongful death actions to \$500,000	
Vermont	1986–current	Limit noneconomic damages to \$250,000	No
Virginia	N/A 1987–current 1999–current	Limits punitive damages to \$350,000 Limits total damages to \$1.5 million for acts occurring on or after August 1, 1999, with additional annual increases	Yes
Washington	1986–1989	Limits noneconomic damages for bodily injury to 43% times the average annual wage times the plaintiff's life expectancy	Yes
West Virginia	1986–2003 2003–current	Limits noneconomic damages to \$1 million Limits noneconomic damages to \$250,000–\$500,000 depending on the severity of the injuries	Yes

Appendix A. (Continued)

State	Cap years	Cap amount	Loss of chance
Wisconsin ^a	1995–2005	Limits noneconomic damages to \$350,000; damages in wrongful death cases limited to \$500,000 for a minor and \$350,000 for an adult	Yes
Wyoming	2006–current N/A	\$750,000 cap on noneconomic damages	Yes

Information on tort reform taken from References[43–45].

Information on loss of chance taken from References[46,47].

^aDelineates those states that specify wrongful death or catastrophic injury (i.e., unnecessary amputation) under separate cap limits.