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Clinical Investigation

Medical Malpractice Claims in Radiation Oncology: A Population-Based Study 1985-2012

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Summary

The rationale for the medical malpractice liability system is to compensate patients injured due to negligent care and to deter providers from practicing negligently. Limited evidence is available regarding experience with medical malpractice in radiation oncology. We review characteristics and national trends in radiation oncology malpractice claims and their associated costs and compare radiation oncology claims to those of other specialties. This study provides evidence that can be used to improve patient safety, minimize risk,

Purpose: The purpose of this study was to determine trends in radiation oncology malpractice claims and expenses during the last 28 years and to compare radiation oncology malpractice claims to those of other specialties.

Methods and Materials: We performed a retrospective analysis of closed malpractice claims filed from 1985 to 2012, collected by a nationwide medical liability insurance trade association. We analyzed characteristics and trends among closed claims, indemnity payments (payments to plaintiff), and litigation expenses. We also compared radiation oncology malpractice claims to those of 21 other medical specialties. Time series dollar amounts were adjusted for inflation (2012 was the index year).

Results: There were 1517 closed claims involving radiation oncology, of which 342 (22.5%) were paid. Average and median indemnity payments were $276,792 and $122,500, respectively, ranking fifth and eighth, respectively, among the 22 specialty groups. Linear regression modeling of time trends showed decreasing total numbers of claims ($\beta = -1.96$ annually, $P = .003$), increasing average litigation expenses paid ($\beta = +\$1472$ annually, $P \leq .001$), and no significant changes in average indemnity payments ($\beta = -\$681$, $P = .89$).

Conclusions: Medical professional liability claims filed against radiation oncologists are not common and have declined in recent years. However, indemnity payments in radiation oncology are large relative to those of many other specialties. In recent

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and influence policymaking relevant to radiation oncology.

years, the average indemnity payment has been stable, whereas litigation expenses have increased.

Introduction

The rationale for the medical malpractice liability system is to compensate patients injured due to negligent care and deter providers from practicing negligently (1). It is unclear whether this system improves patient safety and quality of care (2, 3). Certainly, being sued for medical malpractice is a great concern to practicing physicians (4). One study from a large liability insurer covering more than 40,000 physicians found that 7.4% of all physicians face a malpractice claim in any given year, with 1.6% facing a claim resulting in payment (5).

Despite media attention to catastrophic medical errors in radiation oncology (6-9), there are very few systematic studies of malpractice claims in this specialty. Elliot et al (10) evaluated 13 cases involving prostate brachytherapy, where claims typically involved an alleged breach of standard of care. Another study reviewing 20 malpractice suits involving a single expert reviewer identified the most common allegation as delays in diagnosis, breach of standard of care, or failure to obtain a second opinion (11). None of these studies reported the severity of claims or litigation expenses. Studies of malpractice claims filed against oncologists in lung cancer, head and neck cancers, skin cancer, and sarcoma (12-17) have neglected implications for radiation oncology. Furthermore, these studies (12-17) describe only cases that were formally adjudicated in court, representing only 8% of all filed malpractice claims (18).

This study sought to determine trends in radiation oncology malpractice claims and expenses during the last 28 years. We also compared malpractice claims in radiation oncology to those in other specialties.

Methods and Materials

We performed a retrospective analysis of medical liability claims data from the Physician Insurers Association of America (PIAA) that identified a radiation oncologist as the primary defendant between January 1, 1985, and December 31, 2012. The PIAA is a nonprofit trade association representing medical professional liability insurance companies that insure more than two-thirds of private practice physicians in the United States (19). The PIAA Data Sharing Project (DSP) is a database containing information for more than 278,000 closed medical liability claims from 25 participating companies, representing the largest independent database of medical liability claims with specialty-specific data (19).

Primary outcome variables were closed claims, paid claims, percentage of closed claims resulting in indemnity payment to the plaintiff, average indemnity payments, and average litigation expenses for each year of the study period and for the most recent 10-year period. A "claim" was defined as any written demand for monetary compensation by a patient or a patient's family stemming from an alleged injury during the patient's medical care by the insured clinician. A claim was "closed" when there was a resolution by settlement, by court verdict or arbitration, or when a claim was withdrawn, dropped, or dismissed without payment. Indemnity was defined as compensation "for loss or damage that has already occurred, or to guarantee through contractual agreement to repay another party for loss or damage that occurs in the future" (20). Adjudicatory outcomes included whether the claim resulted in indemnity payment to the plaintiff ("paid claims") or ended without payment ("no indemnity") and the amount of indemnity payment ("severity"). Litigation expenses ("expenses"), also known as loss adjustment expenses, were also analyzed. These expenses are related to the defense of a liability claim, including expenses paid in the process of administering or adjudicating a claim (such as investigative costs, attorney fees, expert witness fees, court costs, and others) (19, 21).

First, we compared demographics of the physicians who were sued to those of the national radiation oncology workforce. Demographic information about the involved radiation oncologist was obtained by PIAA when available and released by the insurer. Because PIAA does not report the number of insured physicians, we used annual workforce data as reported in the American Medical Association (AMA) physician master file (22) to estimate the number of active physicians in each specialty per year in the United States. National workforce data from calendar years 1987, 1990, 1994, and 2002 were not available in the AMA Physician Characteristics and Distribution publication; therefore, linear interpolation to impute data for the missing years was performed because demographic data were provided in aggregate and variability in physician workforce data for each specialty was expected to be constant (stationary) with time (23, 24). Comparisons between demographics of sued radiation oncologists and those of the national radiation oncology workforce were performed using Pearson χ^2 test for the entire study period as well as for 2003 to 2012 in order to evaluate recent demographic characteristics.

We then performed a cross-sectional comparison of closed claims during the study period for radiation oncology to those of 21 other medical specialties. Closed claims, paid claims, and average and median indemnity,

and total indemnity were described for each specialty. Median indemnity payments were included when comparing specialties to represent the most common experience in each specialty due to outliers in the data (23). We calculated an estimated proportion of active physicians represented in the PIAA DSP by specialty, as the number of active physicians varied considerably by medical specialty. This was done by dividing the number of claims by the cumulative number of active physicians per "physician-year" during the period from AMA workforce data described above, representing the maximum proportion of physicians in each specialty that had a claim in the PIAA DSP. This exploratory analysis was a simple proportion and was not intended as a direct normalization or risk calculation, because inherent population differences between the PIAA and AMA datasets preclude the latter.

Table 1 Radiation oncology physician demographics: PIAA sued physicians and AMA physician workforce, 1985 to 2012 and 2003 to 2012

	Radiation oncologists 1985-2012					Radiation oncologists 2003-2012				
	PIAA*		AMA†			PIAA*		AMA†		
Demographic	n	%	n	%	*P* value‡	n	%	n	%	*P* value‡
Age groups										
<35	121	8.0%	17,659	16.8%	<.001	16	4.4%	6418	14.1%	<.001
35-44	508	33.5%	31,740	30.2%		90	24.9%	11,320	24.9%	
45-54	557	36.7%	29,261	27.8%		179	49.4%	13,688	30.1%	
55-64	221	14.6%	18,118	17.2%		68	18.8%	9387	20.6%	
≥65	110	7.3%	8454	8.0%		9	2.5%	4669	10.3%	
Total	1517		105,226			362		45,482		
Employment status										
Full time	1284	98.3%	NA	NA	NA	346	97.7%	NA	NA	NA
Part time	22	1.7%	NA	NA	NA	8	2.3%	NA	NA	NA
Total	1306		NA			354		NA		
Sex										
Male	1212	92.8%	81,845	77.8%	<.001	315	89.0%	34,218	75.2%	<.001
Full time	1196	98.7%	NA	NA		309	98.1%	NA	NA	
Part time	16	1.3%	NA	NA		6	1.9%	NA	NA	
Female	94	7.2%	23,381	22.2%		39	11.0%	11,264	24.8%	
Full time	88	93.6%	NA	NA		37	94.9%	NA	NA	
Part time	6	6.4%	NA	NA		2	5.1%	NA	NA	
Total	1306		105,226			354		45,482		
Board certification										
Board certified	774	91.9%	82,022	77.9%	<.001	225	86.9%	37,032	81.4%	.02
Not board certified	68	8.1%	23,204	22.1%		34	13.1%	8450	18.6%	
Total	842		105,226			259		45,482		
Previous claims experience										
Previous claims experience	631	71.9%	NA	NA	NA	52	67.5%	NA	NA	NA
No previous claims experience	246	28.1%	NA	NA	NA	25	32.5%	NA	NA	NA
Total	877		NA			77		NA		
Medical school										
US medical graduate	1155	76.4%	83,754	79.6%	.002	292	81.6%	37,835	83.2%	.41
International medical graduate	357	23.6%	21,472	20.4%		66	18.4%	7647	16.8%	
Total	1512		105,226			358		45,482		
Practice type										
Group practice	302	19.9%	NA	NA	NA	86	23.9%	NA	NA	NA
Solo practice	1094	72.2%	NA	NA	NA	188	52.2%	NA	NA	NA
Institution	119	7.9%	NA	NA	NA	86	23.9%	NA	NA	NA
Total	1515		NA			360		NA		

Abbreviations: AMA = American Medical Association; NA = not available; PIAA = Physician Insurers Association of America.

* Insured as reported on a per-claim basis that released demographic information.

† Cumulative active radiation oncology physicians for all years (physician-years) calculated using the annual number of active physicians reported in the AMA master file (22).

‡ *P* value for Pearson χ^2 test ($\alpha = .05$, 95% confidence interval).

Finally, we analyzed time trends of closed claims, paid claims, percentage of closed claims that were paid, average indemnity payments, and average litigation expenses for radiation oncology by using simple linear regression and log-linear regression. These values were reported as trends or annual changes (β) and average annual percent changes ($\exp(\beta) - 1$) (25). We also evaluated claims by associated personnel, defined as any associated professional that was named in the claim.

All tests were performed using an α value of .05 and 95% confidence intervals. Time series dollar amounts were adjusted for inflation by using the Consumer Price Index for all urban consumers for all items, with 2012 as the index year (26). Statistical analyses were conducted using SPSS software, version 22.0 (IBM Corp., Armonk, NY).

Results

From 1985 to 2012, 1517 closed claims reported to the PIAA DSP involved radiation oncologists, of which 342 (22.5%) were paid. Table 1 compares demographics of sued radiation oncologists in the PIAA with those of active physicians in the AMA. Sued radiation oncologists were primarily in solo practice (72.2%) and were more likely to be middle aged (35-54 years of age; $P<.001$), compared with national workforce demographic data. The proportion of physicians sued previously was 71.9%, and 91.9% of sued physicians were board certified. However, these physicians represented only 41.5% and 51.0%, respectively, of sued physicians because only approximately 50% of claims reported these data. Sued radiation oncologists were more likely to be male ($P<.001$), and international medical graduates (IMGs; $P=.002$). In the last 10 years, there were no differences between the proportion of IMGs sued and those in the national workforce ($P=.41$), and a smaller proportion of sued physicians were in solo practice (52% vs 72%, respectively, for 1985-2012).

Radiation oncology had the fewest number of closed claims (<1%) among all reported specialties during the 28-year period (Table 2). Only 22.5% of closed claims resulted in indemnity payment, ranking radiation oncology 18th

Table 2 Characteristics of closed claims and indemnity payments by medical specialty, 1985 to 2012

	Cumulative closed claims						
Medical specialty	Closed claims*	Paid claims†	% Of closed claims paid‡	Total indemnity payment§	Average indemnity payment‖	Median indemnity payment	Largest indemnity payment
Anesthesiology	11,030	3470	31.5%	$856,516,675	$246,835	$96,774	$5,048,678
Cardiology	5371	1032	19.2%	$271,207,784	$262,798	$156,250	$2,000,000
Cardiothoracic surgery	7948	1900	23.9%	$457,058,679	$240,557	$125,000	$5,005,000
Dermatology	3198	906	28.3%	$130,900,558	$144,482	$35,000	$3,000,000
Emergency medicine	6887	1864	27.1%	$461,440,009	$247,554	$120,000	$2,000,000
Gastroenterology	3521	661	18.8%	$170,353,285	$257,721	$119,559	$4,000,000
General and family practice	30,453	9639	31.7%	$1,703,213,764	$176,700	$82,246	$7,239,248
General surgery	29,400	9822	33.4%	$1,978,471,304	$201,433	$99,999	$3,116,180
Internal medicine	37,216	9271	24.9%	$2,106,112,462	$227,172	$101,400	$12,000,000
Neurology	4474	979	21.9%	$326,529,544	$333,534	$175,000	$5,000,000
Neurosurgery	6443	1814	28.2%	$599,483,751	$330,476	$183,735	$5,600,000
Obstetrics and gynecology	40,266	13,761	34.2%	$3,959,561,785	$286,324	$149,250	$13,000,000
Ophthalmology	7893	2232	28.3%	$429,207,088	$192,297	$100,000	$3,550,000
Orthopedic surgery	25,707	7404	28.8%	$1,329,643,166	$179,584	$90,000	$3,000,000
Otorhinolaryngology	4627	1529	33.1%	$336,006,438	$219,756	$100,000	$4,199,329
Pathology	1991	594	29.8%	$158,426,561	$266,711	$137,500	$2,700,000
Pediatrics	7825	2180	27.9%	$618,020,900	$283,496	$126,251	$5,250,000
Plastic surgery	10,174	2697	26.5%	$333,545,019	$123,673	$50,000	$2,000,000
Psychiatry	2666	526	19.7%	$84,278,265	$160,225	$55,000	$2,375,000
Radiation oncology	**1517**	**342**	**22.5%**	**$94,662,971**	**$276,792**	**$122,500**	**$2,700,000**
Radiology	16,411	4740	28.9%	$1,088,473,008	$229,636	$100,000	$3,364,156
Urologic surgery	7099	2009	28.3%	$402,586,508	$200,391	$100,000	$3,200,000
All specialties	272,117	79,372	29.2%	$17,895,699,524	$225,221	$100,000	$13,000,000

Values for radiation oncology are displayed in boldface.

* Closed claims are medical liability claims that were resolved through settlement or verdict or were withdrawn, dropped, or dismissed without payment.

† Paid claims are medical liability claims that resulted in indemnity payment to the plaintiff as a result of settlement or court adjudication.

‡ Percentage of closed claims paid refers to the percentage of all closed claims that were paid to the plaintiff as a result of settlement or court adjudication.

§ Total indemnity is the sum of all indemnity payments during the period.

‖ Average indemnity is the mean amount of award for paid claims during the period.

among 22 specialties in percentage of closed claims paid. The specialties with the highest percentage of closed claims paid were obstetrics and gynecology, general surgery, and otorhinolaryngology (34.2%, 33.4%, and 33.1%, respectively); gastroenterology ranked last (18.8%).

The average indemnity payment per claim for radiation oncology was $276,972, ranking radiation oncology fifth of 22 specialties. The median indemnity payment was lower than the average indemnity payment for all specialties (Fig. 1). Total payments for radiation oncology claims ($94,661,971) represented fewer than 1% of total payments ($17,895,699,524) for all specialties during the study period. The median indemnity payment for radiation oncology was $122,500, ranking radiation oncology eighth among 22 specialties. The specialties with the highest median indemnity were neurosurgery ($183,735) and neurology ($175,000); dermatology had the lowest median payment of only $35,000.

Estimates of the proportion of physicians in each specialty that had closed and paid claims in the PIAA DSP are presented in Table 3. These estimates show that the maximum proportion of the radiation oncology workforce represented in the DSP was 2.4% for closed claims and 0.68% for paid claims. Table 4 shows the trends of radiation oncology closed claims, payments, and expenses from 1985 to 2012 and 2003 to 2012. The number of radiation oncology closed claims decreased over time ($\beta = -1.96$ claims annually, $P = .003$; -3.5% annually, respectively; $P = .003$), the percent paid of closed claims increased ($\beta = 0.73\%$ annually, $P = .006$; $+2.8\%$ annually, $P = .046$), and average expenses paid increased ($\beta = \$1472$ annually, $P \leq .001$; $+5.0\%$ annually, $P < .001$). No significant trend was observed for the average indemnity paid ($P = .89$) (Fig. 2a and 2b). No significant trend was observed for total indemnity or expenses or total expenses for paid claims. Over the last 10 years (2003–2012), no significant trends were observed (Table 4).

During the last 10 years, the 2 personnel most commonly named in closed claims included physicians (including radiologists, emergency medicine physicians, pathologists, and unspecificed "other" physicians; named 140 times) and therapists (named 7 times). Up to 3 associated personnel were reported for each record, so it is unclear how many individual claims reported associated personnel.

Discussion

The current study is the first comprehensive analysis of nationwide medical liability claims data for radiation oncology, spanning 28 years. When we compared sued radiation oncologists in the PIAA DSP to the national radiation oncology workforce, we found that a greater proportion of sued physicians were male and that only 5% to 6% of sued female physicians reported working part time, which is less than that in national estimates (17.5%) (27).

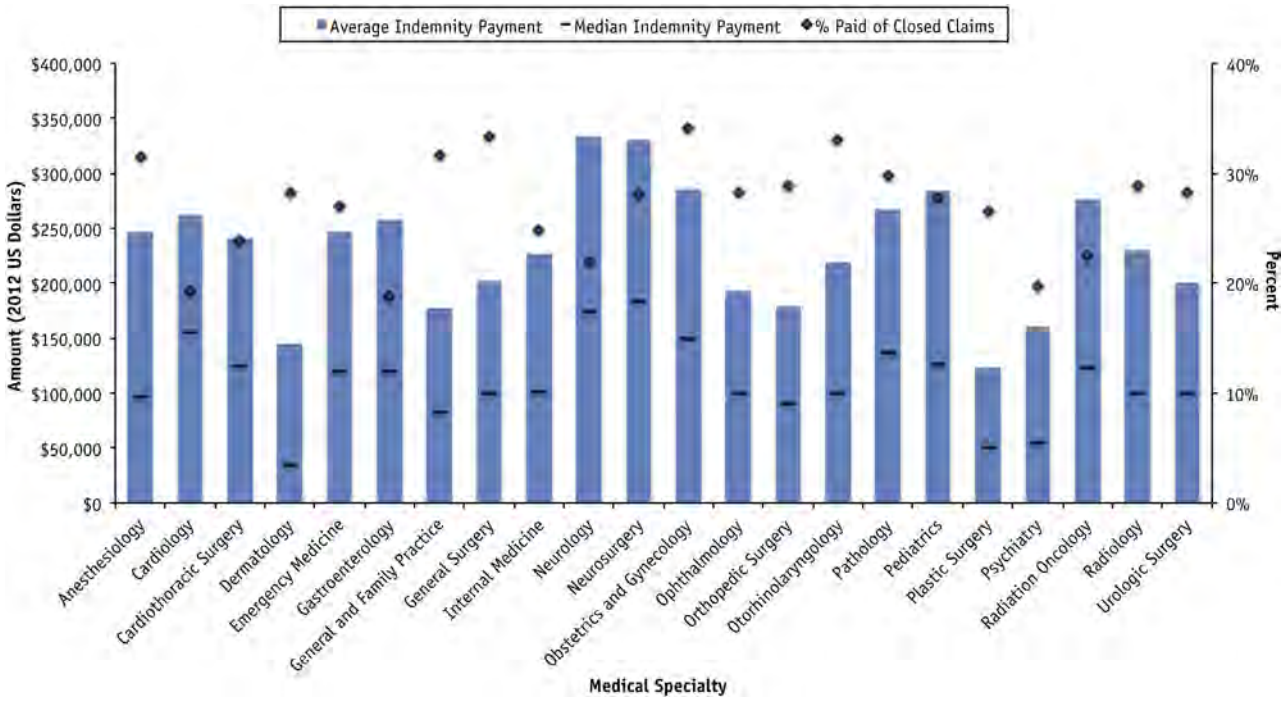

Fig. 1. Characteristics of closed claims and indemnity payments by medical specialty, 1985 to 2012. Vertical bars (blue) represent average indemnity payments; horizontal lines (black) indicate median indemnity for each specialty group during the period. Diamonds (dark blue) illustrate the percentage of paid closed claims, that is, the percentage of all closed claims that were paid to the plaintiff as a result of settlement or court adjudication. A color version of this figure is available at www.redjournal.org.

Table 3 Comparison of representation of the national physician workforce in the PIAA DSP by medical specialty, 1985 to 2012

Medical specialty	Total physicians per year in the United States (physician-years)‡	Closed claims*	Closed claims*: Proportion of physicians with a closed claim in the PIAA DSP§	Paid claims†	Paid claims†: Proportion of physicians with a paid claim in the PIAA DSP§
Plastic surgery	166,911	9312	5.58	2456	1.47
Cardiothoracic surgery	89,818	4962	5.52	917	1.02
Neurosurgery	139,304	5954	4.27	1698	1.22
Orthopedic surgery	622,728	23,786	3.82	6949	1.12
Obstetrics and gynecology	1,083,903	37,682	3.48	13,034	1.20
Radiology	579,689	14,770	2.55	4299	0.74
General surgery	1,065,608	26,549	2.49	9088	0.85
Radiation oncology	**105,226**	**2531**	**2.41**	**715**	**0.68**
Urologic surgery	280,809	6166	2.20	1806	0.64
Otorhinolaryngology	257,287	4360	1.69	1417	0.55
Ophthalmology	489,935	7378	1.51	2097	0.43
Cardiology	548,966	7724	1.41	1826	0.33
General and family practice	2,326,387	29,031	1.25	9215	0.40
Neurology	341,804	4118	1.20	906	0.27
Dermatology	260,432	2919	1.12	847	0.33
Anesthesiology	965,932	9906	1.03	3149	0.33
Gastroenterology	285,075	2874	1.01	548	0.19
Internal medicine	3,649,954	34,993	0.96	8754	0.24
Emergency medicine	635,639	4926	0.77	1268	0.20
Pediatrics	1,637,971	7409	0.45	2063	0.13
Pathology	500,270	1795	0.36	519	0.10
Psychiatry	1,072,973	2457	0.23	496	0.05

Abbreviations: AMA = American Medical Association; PIAA DSP = Physician Insurers Association of America Data Sharing Project.
Values for radiation oncology are displayed in boldface.
* Closed claims are medical liability claims that were resolved through settlement or verdict or were withdrawn, dropped or dismissed without payment.
† Paid claims are medical liability claims that resulted in indemnity payment to the plaintiff as a result of settlement or court adjudication.
‡ Calculated using the number of active physicians for each specialty in 2012 obtained from AMA master file data (22).
§ Proportion of physicians with a closed or paid claim in the PIAA DSP is the number of closed or paid claims over the period divided by the number of physicians over the period in that specialty (physician-years), representing the maximum proportion of physicians in that specialty that have a claim in the DSP during the period.

The larger proportion of males working full time might have influenced the sex of sued physicians; however, the changing sex demographics of the radiation oncology workforce likely played a larger role: a greater number of claims were closed early in the study period when men represented a greater proportion of the workforce (22). Our data show that the proportion of claims attributable to IMGs has decreased, consistent with the proportion of IMGs in the radiation oncology workforce, which also decreased from 31% in 1985 to 14% in 2012. We also found that the proportion of solo practitioners was high among sued physicians compared with that of other practice types. Data from the American College of Radiology (ACR) survey between 1995 and 2003 show relatively stable numbers of solo practitioners (8%-11%) (27, 28), and recent National Plan and Provider Enumeration System data (29) showed that 12.5% of 4503 individual radiation oncologists were sole proprietors. Our study found that the proportion of claims attributed to solo practitioners dropped from 72% overall to 52% for the last 10 years. Radiation oncology practice accreditation, obtained though ACR-American Society for Radiation Oncology (30), requiring peer review documentation, is one possible reason for reduction in claims by introducing increased quality assurance and peer review.

Radiation oncology–related liability claims represent fewer than 1% of all reported closed claims. We expected that this number would be <1% because radiation oncology physician-years during the study period also represent <1% of all physician-years for all specialties. Despite a growing physician workforce and patient population (31) over the study period, the number of closed claims has recently declined by approximately 2% per year, and the number of paid claims has also decreased, although this trend was not significant. Our findings are similar to, although to a lesser extent, recent reports from the National Practitioner Data Bank showing that the number of closed and paid claims dropped 34% and 38%, respectively, in the last 10 years (32). Previous authors have also found that payment amounts have not changed significantly in recent

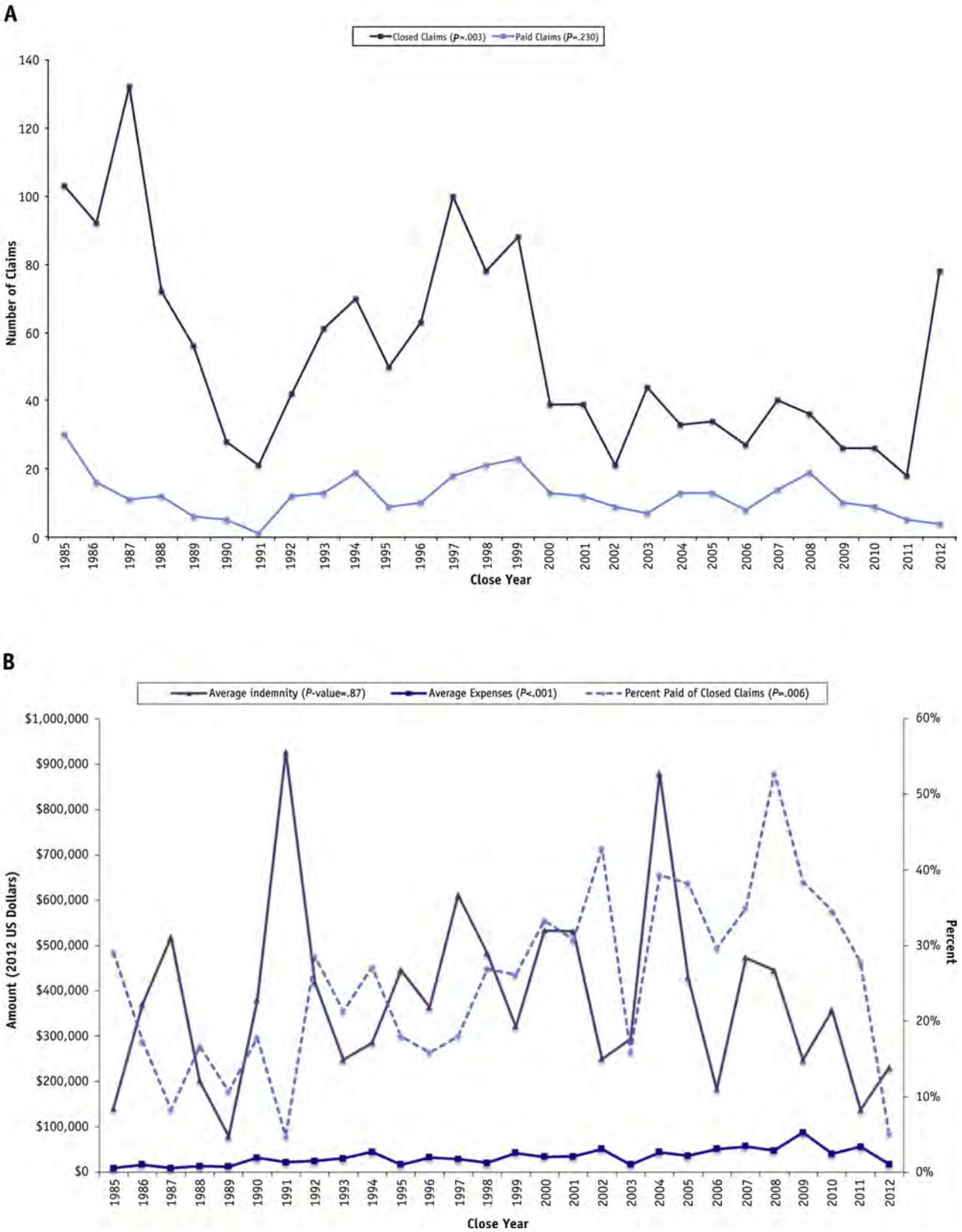

Fig. 2. (a) Radiation oncology closed claims, 1985 to 2012, showing both closed claims and paid claims. *P* values represent significance of change in the number of claims over the time period modeled with linear regression. (b) Radiation oncology closed claims and litigation expenses, 1985 to 2012, showing average indemnity,* average expenses,* and percentage of closed claims paid. *Adjusted for inflation; 2012 = index year (26). *P* values represent significance of change over time modeled with linear regression.

Table 4 Trends of radiation oncology closed claims and litigation expenses, 1985 to 2012 and 2003 to 2012

	1985-2012				2003-2012			
Series	Trend*	Trend in *P* value	% Of average annual change†	% Of average annual change *P* value	Trend*	Trend in *P* value	% Of average annual change†	% Of average annual change *P* value
Closed claims	−1.96	**.003**	−3.57%	**.003**	0.99	.64	−0.39%	.93
Paid claims	−0.18	.23	−0.80%	.62	−0.558	.30	−7.63%	.16
Percentage of closed claims paid	0.73%	**.006**	2.77%	**.046**	−0.01%	.56	−7.23%	.36
Total indemnity for all claims‡	$4941	.95	0.58%	.78	−$559,626	.17	−16.86%	.11
Average indemnity for all claims‡	−$681	.89	0.22%	.87	−$36,080	.13	−9.23%	.12
Total expenses for all claims‡,§	$13,439	.47	1.28%	.26	$22,872	.71	2.02%	.63
Average expenses for all claims‡,§	$1472	**<.001**	4.85%	**0.001**	$1291	.60	2.41%	.69
Total expenses for paid claims‡,§	$16,421	.18	3.08%	0.11	−$12,446	.82	−4.29%	.61
Average expenses for paid claims‡,§	$1742	**.008**	3.88%	**.001**	$2308	.50	3.34%	.48
Total expenses for no indemnity paid‡,§	−$2982	.78	−0.18%	.88	$35,319	.16	4.29%	.24
Average expenses for no indemnity paid‡,§	$1105	**.044**	4.43%	**<.001**	$1559	.44	3.54%	.57

Significant *P* values are shown in boldface.
* Trend over time was modeled with linear regression.
† Trend over time was modeled with log-linear regression (25).
‡ Adjusted for inflation, using 2012 as the index year (26).
§ Expenses are litigation expenses related to the defense of a liability claim, including expenses paid in the process of administering or adjudicating a claim.

years (32, 33). Indemnity payments in radiation oncology are large relative to many other specialties, although we also found that these payments have been stable over time.

A recent decrease in the volatility of insurance premiums has also been observed (34). In addition to other market factors, increased expenses have historically been associated with rising premiums and decreased availability of malpractice insurance (35). Although we do not report on insurance premiums, we found that litigation expenses for all radiation oncology closed claims continued to rise on average from 1985 to 2012 for both paid claims and claims with no indemnity, although they have stabilized in the last 10 years. The 2010 final report by the Centers for Medicare and Medicaid Services (CMS) (36) on malpractice relative value units by specialty reflects the relative costs to practitioners of professional liability insurance. This report ranked radiation oncology as having a greater nonsurgical risk than 32 of 37 nonsurgical specialties. For surgical risk, radiation oncology ranked 15th among 46 specialties. Our data are consistent with CMS estimates that radiation oncology has higher nonsurgical risk, which may lead to higher payments but less overall risk due to a lower risk factor associated with surgical procedures, thereby resulting in fewer claims (36).

Recent PIAA DSP data for all physician specialties (18) showed physicians faced an 8% increase in expenses from 2003 to 2012 and that expenses increased at a rate of 2.5 times that of total indemnity payments. For our more recent data regarding total indemnity (2003-2012), data by year were unavailable, so we were limited in our ability to comment on trends in indemnity payments without the possible influence of outliers. We also found that other physicians and technicians were the associated personnel most commonly named in claims. The involvement of associated personnel seems appropriate given the team-based environment in which radiation oncology is practiced, although we cannot comment on what types of claims involved other personnel due to the aggregate nature of the data.

Our study adds to the current research by providing a large systematic analysis of closed (paid and unpaid) malpractice claims in the United States. Most previous studies of oncology claims have evaluated jury verdicts (10, 12-15), which are limited to approximately 8% of closed claims (18). A previous study of claims in lung cancer patients, also using PIAA data, does not provide specific information for radiation oncology (16). National Practitioner Data Bank analyses do not include physician

specialty, sufficient data regarding the nature of claims, or information on claims that were not paid (21) and represent approximately 30% of all claims filed (21, 33). Furthermore, PIAA DSP data, although not generalizable given the lack of exposure data, do represent a greater proportion of the physician workforce than studies based on single or small numbers of insurance firms.

Our study has several limitations, many of which are inherent to the source data from the PIAA DSP. The most significant limitation is absence of exposure data. All information in the PIAA DSP database is reported on a per claim basis. They do not report the number of insured physicians in a given year, so it is not possible to directly calculate claims frequency per physician. We used AMA Masterfile data for active physicians by specialty to understand what percentage of the national workforce was represented as having a closed claim in the PIAA DSP, but these data do not generalize beyond the DSP. Similarly, we compared differences in demographic information among sued radiation oncologists to the national radiation oncology workforce, but again these comparisons are limited in their generalizability beyond the DSP, given the selection bias of the data that we are unable to evaluate. A second major limitation is that PIAA member companies have guidelines to ensure that there is consistency and uniformity in data collection and reporting, but there may certainly be errors in such a registry. However, McLean et al (16) analyzed PIAA coding used to aggregate data in the DSP and found only minor differences between the dataset and available case abstracts for malpractice litigation in the setting of lung cancer, suggesting the data for radiation therapy in the present study are likely to be representative of liability claims. Additionally, PIAA DSP aggregation of data without claim-specific or variance measures limits our ability to analyze and draw conclusions from the data presented. Still, the PIAA DSP database is the only national database that provides specialty-specific information on malpractice claims as well as information on closed claims that were not paid.

Conclusions

Our study demonstrates the need for additional, detailed analyses of the underlying causes of claims in radiation oncology to guide translation of these findings to risk reduction, preventing malpractice claims, and improving patient safety (37). Malpractice continues to be a significant concern for physicians, policy makers, and patients alike, as the rapidly evolving health care environment and ongoing legal battles surrounding malpractice reform add uncertainty to the future. Although medical professional liability claims filed against radiation oncologists are not common and the annual number of closed claims has declined, litigation expenses have increased, and indemnity payments in radiation oncology are high relative to those of many other specialties. This evidence can inform efforts by physicians and national organizations interested in improving patient safety, decreasing costs of care, and minimizing risk.

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