

Physician Specialty, Not Presence of State-Based Medical Malpractice Caps, Guides Physician Malpractice Insurance Rates

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Utilizing national databases, medical malpractice rates were compared, using physician specialization, and presence or absence of medical malpractice caps as independent factors contributing to malpractice rates. Multivariate analyses of variance showed that physician malpractice rates do significantly differ by specializations. Obstetricians/Gynecologists were demonstrated to have the greatest malpractice insurance rates, followed by physicians in General Surgery, and finally, by those in Internal Medicine. Additional analyses indicated that medical malpractice rates did not differ between states with and without medical malpractice caps. This suggests a proposal that presence of medical malpractice caps directly impact physician-directed insurance costs to be incorrect, or faulty, based on demonstrated results in the present study. Multiple regression analysis was also conducted to evaluate if individual specializations correlated with medical malpractice caps. Results indicated that none of the identified specializations correlated significantly with state-based imposed medical malpractice caps. Results are debated in the contexts of physician specialization decisions, risk theory, and whether caps are independent or dependent on actual malpractice insurance rates.

There is an extensive literature that purports to identify an increasing need for an understanding of factors contributing to variable insurance liability rates, with a dual goal to reduce insurance costs, but also meet prospective liability needs. This need, combined with the reality that insurance rates vary according to both industry-specific and industry-independent factors (Localio et al., 1993; Madigan, 2003; Thorpe, 2004; Zuckerman, Bovbjerg, & Sloan, 1990), calls for an investigation into factors that contribute to insurance rates. Related specifically to medical malpractice insurance (American Medical Association, 2007; Dale & Wojtiwycz, 1997; Dubay, Kaestner, & Waidmann, 2001; Wholey, Feldmen, & Christianson, 1995), it is not clear whether efforts to reduce or maintain rates would be best devoted towards expanding physician education, limiting practice activities, or reducing the range of patients served. One approach may be to examine whether rates are determined by medical malpractice caps. In the present article, models were examined to

identify and specify not only presently-expected insurance rates for treating physicians, but also applicable state-based medical malpractice caps. Specification of both of these factors by individual states allows examination of not only whether medical malpractice rates vary by physician specialization (Internist, General Surgery, Obstetrics/Gynecology), but also whether rates correlate with respective state-based malpractice caps. The presented models use both analysis of variance (ANOVA) to enable inference of whether insurance rates vary by physician specialization and presence-absence of caps, and also multiple regression to examine the actual relationships between the medical malpractice rates themselves, and applicable caps. Lastly, results are discussed in the context of risk theory and recommended legislative review of present state-based medical malpractice caps.

Rural nature of practice, expected compensation, continuing specialization requirements, and additional factors have been posited to cause physicians to

re-evaluate both patient care and long term practice options (Danzon, Epstein, & Johnson, 2004; Kessler & McClellan, 1996; Kessler & McClellan, 1997; Thurston, 2001; Lister Hill Center for Health Policy, 2007; Nelson, Kilgore, & Morrissey, 2007). Furthermore, there is a body of literature that suggests medical malpractice rates most often determine identification of specialization for medical students and continued practice for established physicians (Feldman, Dowd, & Gifford, 1993; Kilgore, Morrissey, & Nelson, 2006; Morrissey, Jenson & Gabel, 2003; Viscusi & Born, 1995; Viscusi, Zeckhauser, Born, & Blackmon, 1993). Unfortunately, a paucity exist in the present literature that examines the simple perception that liability insurance varies according to state-specific caps or an alternative proposal that medical liability insurance rates are determined not by caps, but by additional factors, perhaps not identified either in the existing literature, or via other sources.

There is a concern in the medical community that medical students may not choose specialized areas, or that advanced-practice physicians may veer away from their established practices due to expected medical malpractice insurance rates (Danzon, 2000; Young, 2007). Physicians believe that certain specialties warrant higher malpractice insurance rates, affecting career decisions (Mello, 2006; Nelson, Kilgore, & Morrissey, 2007; Sloan, Bovbjerg, & Githerns, 1991; Brennan, 2005). Attempts to remedy physician recruitment and placement could take place at many levels. Physicians may be advised differences in malpractice insurance rates exist between specialization areas, enabling physicians-in-training to make career decisions based on this factor. Moreover, physicians may make short-term and long-term geographic career decisions by determining if medical malpractice rates are directed or dependent on state-specific caps. Local, state, or federal government agencies could examine present caps to not only protect physicians from exorbitant malpractice rates, but, moreover, assure public safety by enabling proper compensation for individuals harmed through medical malpractice. Regardless of specific individuals making decisions about the pros and cons of medical malpractice caps, a key factor towards making those decisions is examination of actual trends and differences based on data, as opposed to making decisions based on current political zeitgeist. In the case of a single physician, it is possible that an area of specialization or geographic location may be determined by insurance rates, state-based caps, both, or neither. Similarly, in the case of a member of the general public, medical services may be provided, or compensation may be limited based upon these same factors. In such cases, decisions about whether to maintain or modify medical malpractice caps must be critically examined.

Thus, to the extent that medical malpractice rates vary across specialties and according to presence or absence of caps, one would hypothesize the following:

Hypothesis 1: Specific skills or requirements and subsequent opportunity for patient-based health complications may be explained by differences in medical malpractice rates across specialties. It is further hypothesized that medical malpractice insurance rates will be greatest for those specializing in Obstetrics/Gynecology, followed by General Surgery, and, then, by Internal Medicine.

This would suggest a physician's specialization does, ultimately, affect their medical malpractice insurance rates. From a personal physician's perspective, decisions may be made to enter, exit, or avoid a specialization not only based upon education and training requirements, but also both liability exposure and insurance rates, both as factors contributing towards loss-profit and compensation. From an actuarial or insurance professional standpoint, observed differences would be based on not only state-based differences (i.e., "rates for Obstetrics/Gynecology physicians are higher than General Surgery physicians in Wisconsin"), but also national trends (i.e., "rates for Obstetrics/Gynecology physicians are traditionally higher not only in Wisconsin, but also across the Nation").

Additionally, the proposal that medical malpractice rates vary across states, wherein, some states have medical malpractice caps and other states fail to have an identified cap, one would hypothesize the following:

Hypothesis 2: States that offer a medical malpractice cap will have lower medical malpractice rates than states that fail to offer a specified cap.

This would suggest states that fail to have a cap have substantially greater medical malpractice rates than states that do not have a cap. That is, for states that fail to have a cap, physicians would not only have greater exposure due to unlimited liability, but also this greater liability would be reflected by greater insurance rates for individual physicians. Moreover, for states that have a cap, it could be assumed that insurance rates would be lower for physicians residing in these states, as a result of lower liability, as imposed by their respective caps. Finally, this would suggest or infer that caps themselves affect insurance rates.

Additionally, the extent that medical malpractice caps relate to actual expected insurance rates, one would hypothesize the following:

Hypothesis 3: Medical malpractice rates in individual specializations will positively correlate with medical malpractice caps in respective states. That is, as medical malpractice caps rise, probable insurance rates will also increase.

This would suggest that either collectively, or individually, medical malpractice rates correlate with indi-

visualized state rate caps. Through correlational analyses one could also assess not only the relationship of specialization with state-based caps, but also the relationship between specializations. While it is recognized that correlation does not dictate causation, correlation, more specifically, multiple regression, does allow examination of the variance of state-based caps which could be attributed to insurance rates for physician specializations. Moreover, it is important to note that it is interminable whether state-based caps dictate insurance rates, or insurance rates dictate state-based caps. However, as most often caps were established greater than 10 years ago via state legislatures without changes, making them stagnant. Albeit, as insurance rates vary annually, it is proposed that insurance rates would vary according to state-based caps.

Table 1
State-Based Caps (Less than \$1 million)

State	Cap
Alaska	\$ 250,000
California	\$ 250,000
Colorado	\$ 300,000
Florida	\$ 500,000
Georgia	\$ 350,000
Hawaii	\$ 375,000
Idaho	\$ 250,000
Illinois	\$ 500,000
Kansas	\$ 250,000
Louisiana	\$ 500,000
Maine	\$ 500,000
Maryland	\$ 695,000
Massachusetts	\$ 500,000
Michigan	\$ 733,500
Mississippi	\$ 500,000
Missouri	\$ 350,000
Montana	\$ 250,000
Nevada	\$ 350,000
New Mexico	\$ 600,000
North Dakota	\$ 500,000
Ohio	\$ 500,000
Oklahoma	\$ 400,000
Oregon	\$ 500,000
South Carolina	\$ 350,000
South Dakota	\$ 500,000
Texas	\$ 250,000
Utah	\$ 450,000
West Virginia	\$ 250,000
Wisconsin	\$ 750,000

To test these competing hypotheses, models were compared that examined the relationships between medical specializations and their respective malpractice insurance rates, variances in insurance rates between states that have and do not have malpractice caps, and then relationships between malpractice caps and actual insurance rates. It is important to note that in the present study the aforementioned-hypotheses were prepared *a priori*, or at the beginning of the present study, and, moreover, prior to completion of statistical analyses, which will occur later in the present report. Furthermore, *post-hoc* analyses will also be reported, which, as will be reported later, varies significantly from projected *a priori* projections.

Table 2
States Without Caps

Alabama
Arizona
Arkansas
Connecticut
Delaware
DC
Iowa
Kentucky
Minnesota
New Hampshire
New Jersey
New York
North Carolina
Pennsylvania
Rhode Island
Tennessee
Vermont
Washington
Wyoming

Table 3
Wrongful Death Caps in Respective States

Alabama	\$ 1,000,000
Alaska	\$ 400,000
Illinois	\$ 1,000,000
Indiana	\$ 1,250,000
Maine	\$ 500,000
Maryland	\$ 812,000
Nebraska	\$ 500,000

Method

Operational Definitions of Constructs

The following offers descriptors of constructs utilized in the present study. Most constructs represent general knowledge; however, to promote clarity definitions have been offered to direct and lead the reader.

A *state* represents a distinct and systematic political entity, operating under a unified government, wherein, a state may also be politically divided and governed by county governments, in addition to regional or local commissions, either elected or appointed. States are considered sovereign, in that, each state has the authority to self-govern, separate from the National political system, or federal government. States may enact their own laws, which can greatly vary throughout each constituent state, as long as they do not contradict the laws of the national government. Federal laws and regulations of the national government always override state law. However, states may not only publically disagree with Federal mandates, but also chose to fight and present legal suits to veer from these mandates.

State-based malpractice caps are imposed restrictions that limit the maximum amount of compensation that can be awarded in medical malpractice suits. Each state independently decides the details of their respective malpractice cap, including whether or not to have a cap, the maximum amount of damage the cap will cover, and the type and extent of damage of the cap. Illinois, Georgia, and Missouri have declared malpractice caps as being unconstitutional. This is due, in large part, to the caps being imposed by state legislators, who make laws, rather than allowing for the judiciary, who interpret laws, to apply them to the facts of each specific case (Stafford, 2012).

Medical malpractice insurance is a type of professional liability insurance used by medical professionals to help offset the high costs of medical malpractice lawsuits. Medical malpractice insurance typically covers negligence, unprofessional medical conduct or substandard care, inaccurate advice, and additional medical errors.

Caps represent restricted or limited payments to plaintiffs, based on legislatively-prescribed determinations. A state may impose a cap, based on projected need, lobbying-based influence, or other factors. When a cap is imposed, a physician has limited exposure, and as a result, a plaintiff has restricted reimbursement or remedy as a consequence of a legal suit. For example, a jury may award \$1,000,000 for a negligent death claim of a child. In a state without a cap, the parents, or other guardians, would receive the allocated jury award, minus appropriate legal fees. However, in states with a cap (i.e., \$250,000), the parents would only be warranted the maximum amount al-

lowed by the cap, or \$250,000, as opposed to the complete award deemed appropriate by the jury. It is posited that caps protect physicians from lawsuits with poor foundation for claims, with such claims limited by the imposed caps. However, it is also proposed that caps may not satisfactorily offer sufficient remedy in circumstances, in which either death occurred, or costs (medical, lost wages, among others) are greater than the prescribed caps.

Utilization of Extant Data

The present study is not a true experimental study, rather extant and available data were utilized. Data was gathered from existing samples, made available by insurance providers (providers of medical malpractice liability insurance) and professional associations (American Medical Association). The variables in this study were *malpractice insurance rates* and *state-based malpractice caps*.

Medical malpractice insurance rates by state were derived from Medical Liability Monitor (2009), a reputable website listing national rates. In this document, medical malpractice insurance rates from different companies, in each state, were surveyed and reported each year, starting in 2000. The insurance rates are broken down into three specialties, including Internal Medicine, General Surgery, and Obstetrics/Gynecology. In circumstances, wherein, more than one provider offered a quote, the average among all quotes was utilized as a representative figure. It is the most comprehensive database based on present resources that allows an analysis of both the change in insurance rates over years and across states.

State-based caps identified by the American Medical Association (American Medical Association, 2011) were used in the present study. This organization offers narrative summaries of imposed caps, documenting the different types and amounts of state-based malpractice caps, along with the accompanying state laws, furthermore, guiding the caps. Medical malpractice laws, specifically related to caps, greatly vary between the 33 states with caps. Differentiations include the amount of the caps, the types of damages covered via the caps, and the types of circumstances wherein caps would be applicable. In many states the amount of the cap changes every year due to inflation, while many states fail to account for inflationary factors. Nineteen states did not have a malpractice cap, with caps either overruled as unconstitutional, or specifically prohibited by the respective state constitution.

ANOVA and Multiple Regression

The authors of the present article acknowledge that ANOVA and multiple regression were both used to analyze the same set of data. While ANOVA and mul-

Table 4
Medical Malpractice Rates by States (State-Based Cap Implemented)

State	Cap	Internal	General Surgery	OB/GYN
Alaska	Yes	\$ 9,654	\$ 32,663	\$ 55,133
California	Yes	\$ 13,037	\$ 42,668	\$ 60,479
Colorado	Yes	\$ 11,434	\$ 47,350	\$ 55,209
Connecticut	Yes	\$ 22,908	\$ 80,321	\$ 129,809
DC	Yes	\$ 24,010	\$ 73,018	\$ 147,595
Delaware	Yes	\$ 14,526	\$ 43,486	\$ 76,470
Florida	Yes	\$ 34,792	\$ 138,773	\$ 142,143
Georgia	Yes	\$ 14,064	\$ 47,935	\$ 65,871
Hawaii	Yes	\$ 9,768	\$ 35,160	\$ 58,600
Idaho	Yes	\$ 6,471	\$ 25,656	\$ 40,566
Illinois	Yes	\$ 29,496	\$ 84,593	\$ 110,364
Indiana	Yes	\$ 10,200	\$ 39,899	\$ 62,731
Kansas	Yes	\$ 9,330	\$ 34,059	\$ 48,712
Louisiana	Yes	\$ 18,591	\$ 61,325	\$ 82,910
Maine	Yes	\$ 9,390	\$ 29,110	\$ 46,774
Maryland	Yes	\$ 15,579	\$ 61,048	\$ 113,400
Massachusetts	Yes	\$ 13,239	\$ 39,986	\$ 99,114
Michigan	Yes	\$ 21,589	\$ 75,672	\$ 71,209
Mississippi	Yes	\$ 17,046	\$ 57,710	\$ 82,108
Missouri	Yes	\$ 17,222	\$ 66,856	\$ 91,526
Montana	Yes	\$ 14,784	\$ 62,025	\$ 85,485
Nebraska	Yes	\$ 5,055	\$ 17,818	\$ 23,570
Nevada	Yes	\$ 23,625	\$ 82,688	\$ 118,125
North Dakota	Yes	\$ 7,015	\$ 23,529	\$ 28,295
Ohio	Yes	\$ 19,385	\$ 61,653	\$ 81,861
Oklahoma	Yes	\$ 12,809	\$ 45,443	\$ 58,180
Oregon	Yes	\$ 8,740	\$ 35,121	\$ 53,573
Pennsylvania	Yes	\$ 20,978	\$ 80,328	\$ 101,452
South Carolina	Yes	\$ 11,221	\$ 37,847	\$ 44,919
South Dakota	Yes	\$ 4,373	\$ 13,118	\$ 21,073
Texas	Yes	\$ 17,724	\$ 53,270	\$ 69,389
Utah	Yes	\$ 10,759	\$ 55,883	\$ 78,749
Virginia	Yes	\$ 12,788	\$ 49,258	\$ 57,077
West Virginia	Yes	\$ 20,842	\$ 65,339	\$ 92,038
Wisconsin	Yes	\$ 6,058	\$ 19,962	\$ 24,867

multiple regression share similarities in calculations, they differ by interpretation.

ANOVA is a type of statistical hypothesis test, which is largely used in experimental research. ANOVA uses inference, a process in which data is examined from a given sample to draw conclusions and make decisions about a proposed, real or theoretical, population. Multiple regression analysis examines the relationship between the dependent and independent variables to predict how changes in the independent

variables will influence changes in the dependent variable. Multiple regression analysis does not use inference. ANOVA and multiple regression analysis are similar in that they are both assess which factors account for the variance observed in the dependent variable(s). In ANOVA, variables are manipulated to measure the change in the dependent variable, while multiple regression analysis does not manipulate any data. It analyzes the existing relationship between a number of variables in order to help predict a set of

variables which best predict the dependent variable. Related to comparable strengths, ANOVA can analyze a larger sample size and more samples than compared to individualized *t*-tests. Interaction effects can also be measured using ANOVA. ANOVA can be used to analyze much larger data sets and more complex problems with multiple variables or it can be used to analyze very simple data sets. Related to multiple regression analysis, this type of analysis represents a flexible model, which can use numeric or categorical independent variables. The interactions between variables can be analyzed as possible predictors.

Results

Hypotheses 1 and 2

A 2 (cap, no cap) X 3 (Internal Medicine, General Surgery, Obstetrics/Gynecology) ANOVA was conducted to compare the effect of physician specialization on medical malpractice insurance rates, specifically across Internal Medicine, General Surgery, and Obstetrics/Gynecology; compare medical malpractice caps across states with and without caps; and then examine the interaction between these variables. There was a significant effect of physician specialization on medical malpractice insurance rates at the $p < .05$ level for the three specialization [$F(2, 152) = 83.8, p < .001$]. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the Internal Medicine specialization ($M = \$14,021, SD = \$6,563$) was significantly different than the General Surgery specialization ($M = \$49,711, SD = \$22,786$). Moreover, the Obstetrics/Gynecology specialization ($M = \$71,649, SD = \$31,327$) did significantly differ from Internal Medicine specialization. Similarly, the Obstetrics/Gynecology specialization significant differs from the Internal Medicine specialization. The main effect of whether states had a cap or did not have a cap yielded an *F* ratio of $F(1, 151) = .914, p = .340$, indicating that the mean cap status insurance rate was no different in states with or without a cap. The interaction effect was non-significant, $F(2, 152) = .14, p = .89$.

Hypothesis 3

Multiple regression analysis was used to test if insurance rates paid by physician specialties significantly predicted medical malpractice caps. The results of the regression indicated the three predictors explained less than 5% of the variance [$R^2 = .05, F(3, 31) = .339, p = .797$]. None of the observed insurance rates correlated with present caps, with all p 's $> .35$.

Discussion

The aim of this study was to examine the inter-relationships between medical malpractice caps and med-

ical malpractice rates. In two models, medical malpractice rates were compared by state-based cap status and medical specialization (Hypotheses 1 and 2), and then correlations were compared across medical malpractice rates and state-based caps (Hypothesis 3). In the first model, medical malpractice rates were compared against legislatively-imposed cap status and physician specialization. Results showed malpractice rates to be significantly different by type of physician specialization, but not by presence or absence of medical malpractice caps. These results support the idea that medical specialization influences medical malpractice rates. However, these results refute the hypothesis that medical malpractice rates differ by whether or not a state has legislatively-imposed caps. Rather, insurance rates, as suggested by the present study, are independent of state-based caps.

In the second model, as opposed to seeking inference, relationships were compared using multiple regression analyses. These additional analyses allowed examination of not only relationships across individual specializations, but also enabled an analysis across specializations and state-based caps. Results showed that statistically significant relationships are present across specializations. That is, as medical malpractice rates increase for one specialization, similar occurrences occur across other specializations, with positive correlations occurring across all specializations. This suggests that trends are similar within states. For example, the second model demonstrates most probable that if General Surgery malpractice rates are higher in Tennessee, than Mississippi, then malpractice rates for Internal Medicine will most likely be higher in Tennessee. These results suggest that rates are relatively consistent across states, with some specialization areas having higher malpractice rates (i.e., General Surgery) than other areas (i.e., Internal Medicine). However, not only do caps statuses not affect malpractice rates (Hypothesis 2), but also none of the malpractice specializations correlate with state-based caps (Hypothesis 3).

Physician Specialization

These results can be framed in terms of physician specialization decision and risk theory. Risk theory is an emerging topic in psychology, economics, philosophy, and commerce utilized mainly by actuaries and insurance companies to predict the most optimal outcome associated with each choice. Moreover, decisions must be made in situations, wherein, not only where risks are involved, but also potential choices or decisions may lead to probable loss. Among possible choices, a combination of selection and evaluation of most probable losses directs decision making. Risk theory predicts that decisions will produce a number of different outcomes. This theory assists people to make knowl-

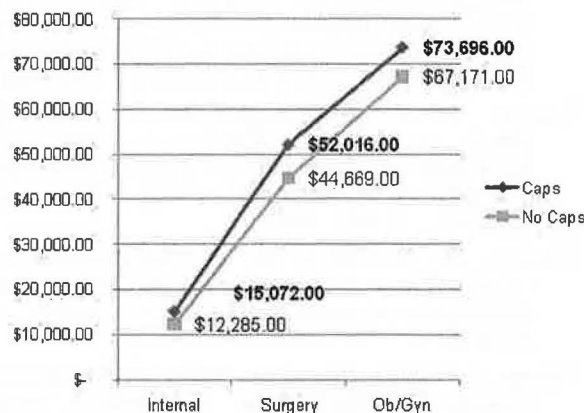


Figure 1. Comparison of Physician Malpractice Rates by Specialization and State-Based Medical Malpractice Caps

edgeable judgments by accounting for possible indecisions and hesitations.

Risk theory further attempts to quantify potential outcomes not only based on a particular decision, but also potentially, with a numerical value or resultant. Outcomes associated with each uncertainty or decision may not only be mapped mathematically on a graph, but also costs and benefits can be compared, based on identified decisions. Related to physicians and their choice of specialization, physicians may make career decisions based on three factors, including malpractice insurance costs, projected income from medical practice, and a profit ratio based on both of the former factors. The weighted outcome for making a career decision may be based on medical malpractice costs. Based on the present study, certain physician specialties do statistically differ related to expected malpractice insurance rates, as discussed previously. Furthermore, physician income may be based on a multitude of factors, with possibilities including healthcare reform status, economics, and general health (and sickness) of the general population. While malpractice rates may be identified, and expected income predicted, physicians may make career decisions using risk theory by evaluating the expected income against probable risks and concurrently malpractice rates. However, the present research suggests that decisions to enter a practice in a specific state, based on presence or absence of caps, is less speculative—medical malpractice rates do not differ among states that have caps in comparison to states that do not have caps. Similarly, physicians may assess, based on results in the present study that malpractice rates will positively correlate across states, suggesting that high General Surgery malpractice rates in one state will predictably be higher another state. While risk theory offers fodder for discussion of

the present results, theory offers explanation of the results, not resolution to the problem.

Conclusion

Medical malpractice represents a modern issue that at present lacks an up-to-date resolution. Two sectors of the population must be protected through medical malpractice caps: Victims of medical malpractice and physicians. If a medical malpractice suit results in appropriate remedy for the plaintiff, then modern-day caps are effective. However, if a particular suit fails to meet remedy for the harmed party, then medical malpractice caps must be revisited for the benefit of the victim. Concurrently, medical malpractice caps must protect the physician. Physicians take risks on a daily basis, enabling them to make decisions for the benefit of the patient. However, when decisions or actions harm a patient, medical malpractice insurance addresses the needed remedy to provide benefits, perhaps compensation, to the plaintiff. The concurrent research presented in the present study offers insight into whether medical malpractice rates differ across physician specialization—rates do vary by physician specialization. Also, the present study demonstrated that malpractice rates do not statistically vary across states with and without caps. Nonetheless, in circumstances wherein properly remedy is not available for plaintiffs with special needs, legislators and government officials must further explore options for these plaintiffs. It is proposed that additional research should be generated to explore not only needed remedy for selected plaintiffs, but also assist physicians, when making career decisions, based on proposed exposure through medical malpractice.

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