



# The Impact of State Laws Limiting Malpractice Damage Awards on Health Care Expenditures

| Fred J. Hellinger, PhD, and William E. Encinosa, PhD

Twenty-eight states have laws that limit payments in malpractice cases, and several studies indicate that these laws reduce the frequency and severity of malpractice claims and lower premiums. Moreover, proponents believe that such laws reduce health care expenditures by reducing the practice of defensive medicine. However, there is a dearth of empirical evidence about the impact of these laws on the cost of health care.

We used multivariate models and relatively recent data to estimate the impact of state

tort reform laws that directly limit malpractice damage payments on health care expenditures. Estimates from these models suggest that laws limiting malpractice payments lower state health care expenditures by between 3% and 4%. (*Am J Public Health*. 2006;96:1375–1381. doi:10.2105/AJPH.2005.077883)

**THE 2 KEY FUNCTIONS OF** our medical malpractice system are to compensate victims of negligent care and to provide

appropriate incentives for health care professionals to supply safe and efficient care.<sup>1,2</sup> Yet our medical malpractice system rarely compensates individuals who suffer injuries through medical negligence, and it often compensates those who suffer injuries unrelated to medical negligence. A landmark Harvard University study of malpractice claims in New York State found that only 2% of negligent injuries resulted in a claim and that only 17% of claims involved a negligent injury.<sup>3,4</sup>

Moreover, there is concern that the most damaging attribute of our medical malpractice system is not that it fails to compensate victims or to deter poor performance but that it promotes the practice of “defensive medicine.” In its 1994 report on medical malpractice and the practice of defensive medicine, the Office of Technology Assessment wrote, “For more than two decades many physicians, researchers, and government officials have claimed that the most damaging and costly result of the medical



malpractice system as it has evolved in the United States is the practice of defensive medicine: the ordering of tests, procedures, and visits, or avoidance of certain procedures for patients because of concern about malpractice liability risk.<sup>5</sup>

In order to reduce the cost of defensive medicine and to make malpractice insurance more affordable, many physicians, legislators, and others support laws that limit damage payments in medical malpractice cases.<sup>6,7</sup> Supporters maintain that escalating, multimillion-dollar awards are driving premium increases and that restricting malpractice payments will lower health care expenditures by reducing the practice of defensive medicine.<sup>8</sup> Opponents maintain that rapidly increasing malpractice premiums are in large part a consequence of insurance companies trying to offset the costs of ill-advised business decisions and declining investment income.

Opponents also note that in most geographic areas there are only a few malpractice insurers, and they argue that insurers are able to maintain artificially high prices as a result of the limited competition. They also maintain that underwriting cycles for malpractice insurance have been too severe especially because claims payments have significantly exceeded claims costs for most recent time periods.<sup>9</sup>

Others offer different reasons for rapidly escalating malpractice premiums and for the volatility in the market for malpractice insurance.<sup>10,11</sup> Some maintain that high premiums results from the

risk distribution of malpractice claims (i.e., they argue that there is more uncertainty about the number and size of malpractice claims than there is in other lines of business) and the long average time period for claims settlement periods (i.e., the long time period between when a claim is filed until it is settled).<sup>12</sup> Thus, it is reasoned that insurers must continually increase premiums to maintain large reserves in an effort to support future claim payments.

At present, there are 28 states with laws that limit damage payments in malpractice cases (Table 1) (Alaska, California, Colorado, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, Missouri, Montana, Nevada, New Mexico, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, Texas, Utah, Virginia, and West Virginia).<sup>13–16</sup> In addition, there have been determined efforts to pass legislation limiting damage payments in malpractice cases in Pennsylvania, New Jersey, and Connecticut.<sup>17–19</sup>

We estimated the impact of state tort reform laws that directly limit malpractice damage payments on all health care expenditures in a state. This is the first empirical study of the impact of such laws on state health care expenditures. Our study combined 1984, 1988, 1994, and 1998 data on state health care expenditures with data on a variety of other state characteristics including information about state tort reform law. Multivariate regression analysis was used to estimate equations explaining

**TABLE 1—States With Caps on Malpractice Awards for Noneconomic Damages: United States, 1975–2005**

	Years With Any Cap
Alabama	1987–1991
Alaska	1986–
California	1975–
Colorado	1986–
Florida	1988–1991, 2003–
Georgia	2005–
Hawaii	1986–
Idaho	1990–
Illinois	1995–1997, 2005–
Indiana <sup>a</sup>	1975–
Kansas	1988–
Louisiana <sup>a</sup>	1975–
Maryland	1986–
Massachusetts	1986–
Michigan	1986–
Mississippi	2002–
Missouri	1986–
Montana	1995–
Nevada	2002–
New Hampshire	1977–1980
New Mexico <sup>a</sup>	1976–
North Dakota	1995–
Ohio	1975–1994, 1997–1999, 2003–
Oklahoma	2004–
Oregon	1987–1999
South Carolina	2005–
South Dakota	1986–
Texas	1977–1988, 2003–
Utah	1986–
Virginia <sup>a</sup>	1976–
Washington	1986–1988
West Virginia	1986–
Wisconsin	1985–2005

Note. Open ranges indicate the continued presence of caps. <sup>a</sup>Cap on total damages; current as of October, 2005.

health care expenditures per capita where the state was the unit of observation.

Several studies have shown that state tort reform laws directly limiting payments in medical malpractice cases reduce the frequency and severity of malpractice claims and lower premiums.<sup>8</sup> Moreover, proponents believe that the passage of such laws reduces health care expenditures because the laws reduce the practice of defensive medicine.

## BACKGROUND

### The Cost of Defensive Medicine

Most studies of the cost of defensive medicine are based on physicians' responses to questions about their underlying motivation for providing certain procedures and services.<sup>20,21</sup> There are a few studies, however, based on cost and utilization data.<sup>22–24</sup> Yet these are dated and they examine only a few procedures and conditions. By and large, both types of studies have found evidence supporting the existence of defensive medicine, and some have found that the scope and extent of defensive medicine is greater in areas with high malpractice claim rates and high premiums.

In the first widely cited study of the cost of medical malpractice, Reynolds and colleagues<sup>25(p2772)</sup> used data from the American Medical Association's 1984 Socioeconomic Monitoring System. This is a telephone survey of a nationally representative sample of nonfederal physicians, and physician respondents to the Socioeconomic Monitoring System in



1984 indicated that because of the threat of malpractice litigation, they prescribed 2.2% more pharmaceuticals, scheduled 2.6% more follow-up visits, spent 2.9% more time with patients, and spent 2.4% more than they would have without this threat. From these data, Reynolds and colleagues calculated that the cost of these practices designed to reduce the likelihood of being sued for malpractice was equal to 14.1% of physicians' revenue in 1984.

### The Impact of State Laws Limiting Malpractice Awards

Most studies indicate that state tort reform laws directly limiting payments in medical malpractice cases reduce the frequency and severity of malpractice claims, and most also indicate that they lower premiums. The General Accounting Office concluded that "limited available data indicate that rates of growth in malpractice premiums and claims payments have been slower on average in states that enacted certain caps on damages for pain and suffering—referred to as noneconomic damage caps—than in states with more limited reforms. . . . For example, from 2001 through 2002, average premium rates rose approximately 10% in states with noneconomic damage caps of \$250 000 compared with approximately 29% in states with more limited tort reforms."<sup>26(p6)</sup>

Confirmatory evidence of the impact of these laws on malpractice premiums is provided in a recent study by Thorpe,<sup>12</sup> who used data from the National Association of Insurance Commissioners

for the years 1995 through 2001. Thorpe found that malpractice premiums in states with laws capping malpractice payments were 17.1% lower than in states without such laws.

Although there are a number of studies of the impact of tort reform laws on the frequency and severity of claims and on malpractice premiums,<sup>27–29</sup> there is only 1 study of the impact of laws that directly limit payments in malpractice cases on health care expenditures.<sup>30</sup> In that study, Kessler and McClellan addressed the impact of these laws on the cost of hospital care for Medicare patients with acute myocardial infarction or ischemic heart disease in 1984, 1987, and 1990. They used data on hospitalizations related to these causes in the year after the heart event along with data on state tort reform legislation to estimate the impact of these laws on hospital costs, mortality rates, and serious cardiac complications. They found that health care expenditures for Medicare patients with acute myocardial infarction in states with a law directly limiting damage payments were 5.3% lower than those of similar patients in states without such laws. The corresponding figure for ischemic heart disease patients was 9.0%. Although the cost of hospital care for Medicare patients with an acute myocardial infarction or ischemic heart disease is considerable, it accounts for only 1% of national health expenditures.<sup>30</sup>

Kessler and McClellan<sup>30</sup> also found that these laws had no impact on mortality rates or serious cardiac complications.

They concluded that malpractice liability reforms that directly limit awards result in sizable cutbacks in the rate of growth of the cost of treating cardiac illness in the elderly with no noticeable diminution of health outcomes, including morbidity and mortality.<sup>30(p388)</sup>

### METHODS

The empirical analysis in this study was based on the premise that 1 of the factors affecting the cost of defensive medicine in a state is its legal environment. It was hypothesized that physicians are less likely to order tests, prescribe medications, and provide services in order to reduce the likelihood of being sued in states with a law limiting their exposure to damages.

The key independent variable in this study was whether or not a state had a cap on noneconomic damages in a given year (Table 1). In order to adjust for other types of liability reforms, we included variables for collateral source reform (which prevents payments for damages that have been compensated from other sources), for joint and several liability reform (which places a party at risk only for the share of the total settlement that corresponds to that party's level of responsibility), and for punitive damage caps (which limit payment to punish a defendant for intentional or malicious misconduct).

A variety of factors were included in our model. Physicians' availability was measured by the number of active, nonfederal physicians practicing in each

state per 100 000 civilian residents, and it was assumed that states with more physicians would have higher health care expenditures. States with higher personal incomes were assumed to have a greater demand for health care services and higher health care expenditures. For this reason, we included personal income in our model. Similarly, it was assumed that states with higher unemployment rates were likely to have lower demand for health services and that this would result in lower health care expenditures. For this reason, we included a state's unemployment rate in our model.

We assumed that health care expenditures in states that were sparsely populated were less than those in states that were densely populated because physicians and patients had to travel longer distances to provide or seek care.<sup>31</sup> For this reason, we included a variable that measured the number of citizens (measured in thousands) per square mile for each state.

The proportion of persons working on farms was assumed to be negatively related to the demand for health services.<sup>32,33</sup> Farm workers are more likely to lack insurance and receive low wages and thus, were expected to have little disposable income to spend on health care services.<sup>31</sup> Consequently, a variable measuring the percentage of the state domestic product (i.e., a measure of the value of goods and services produced within a state) attributable to farm activities was included in the model. We also included the proportion of residents without health insurance



and the proportion of residents enrolled in a health maintenance organization. We anticipated that each of these variables would be inversely related to health care expenditures per capita.<sup>34,35</sup> In addition, we included a variable measuring the number of deaths per 1000 residents to adjust for the health and age of the state's population.

At one time, each state was required to have a certificate of need (CON) program to curtail the construction of unnecessary health care facilities and the acquisition of costly equipment that provided minimal improvements in patients' health. However, the mandated federal CON program was repealed effective January 1, 1987, and today 36 states have CON laws.<sup>36</sup> We included a variable indicating the existence of a state CON law in our model because CON laws may affect health care expenditures as well as the composition of health care facilities and services available in a state.<sup>37</sup>

## Data

Information about state medical liability laws was obtained from the National Conference of State Legislatures,<sup>38</sup> the American Tort Reform Association,<sup>39</sup> and publications of a large law firm.<sup>40</sup> The National Conference of State Legislatures provides a listing of all state medical liability laws by state that includes the type of reform implemented (e.g., limit on economic and noneconomic damage awards) and the specific legislation that enacted this reform. In 1994, the American Tort Reform Association created a publication that

displayed the status of each state law on medical liability. This publication has been updated several times since that time, and it is currently available on the association's Web site<sup>40</sup> (<http://www.mcandl.com/states.html>). McCullough, Campbell & Lane is a large general practice law firm located in Chicago with a specialty in insurance law, and this firm publishes a compendium of all legislation relating to medical malpractice for each state.<sup>40</sup>

These data sources were used to ascertain the date of the legislation enacting state laws that limit damage awards in medical malpractice cases (Table 1). The variables "any cap" and "years since cap was adopted" were derived from this information. In addition, these data resources were used to construct the 4 variables: indicating the existence of a collateral source rule, prejudgment interest reform, joint and several liability, and caps on punitive damages.

Data on personal health care expenditures were acquired from the Centers for Medicare and Medicaid (US Department of Health and Human Services), and data on the population of each state and the number of square miles in each state were obtained from the US Census Bureau (US Department of Commerce). Data on state unemployment rates were obtained from the US Department of Labor's Current Population Survey. Data on mean state per capita income were obtained from the US Bureau of Economic Analysis (US Department of Commerce) as published in various issues of

the *Survey of Current Business*.<sup>42</sup> Data on the proportion of the state domestic product attributable to farm income were obtained from reports issued by the National Agricultural Statistics Service and the Economic Research Service of the US Department of Agriculture. The number of hospital beds in each state was obtained from the American Hospital Association in various issues of its publication *Hospital Statistics*.<sup>42-45</sup> The number of active, nonfederal physicians practicing in each state was obtained from various issues of the American Medical Association's publication *Physician Characteristics and Distribution in the U.S.*<sup>46-49</sup>

## Statistical Analyses

The chief independent variables in our analyses were whether or not a state had a cap on noneconomic damages in a given year and the number of years since enactment of this law. And, because we were concerned about the effect of state laws limiting damage awards on health care expenditures, the use of the state as a unit of observation was reasonable. In order to estimate the impact of state laws limiting damage awards on health care expenditures, we used data from a time series of cross-sectional units (i.e., panel data), and we collected data on each of the variables in our analyses for 4 points in time (1984, 1988, 1994, and 1998).

We tested our model for cross-sectional heteroscedasticity and autocorrelation.<sup>50</sup> We found no evidence of heteroscedasticity. However, we found that the

Durbin-Watson statistic was statistically significant in each equation. Consequently, we employed a first-order autoregressive error structure with simultaneous correlation between cross sections.<sup>51</sup> The covariance matrix was calculated by a 2-stage procedure that resulted in the estimation of model regression parameters by the generalized least squares method.<sup>50</sup>

We estimated our model with the absolute value of a state's per capita health expenditures as the dependent variable and then used the natural logarithm of a state's per capita health expenditures as the dependent variable. We estimated both specifications using a dichotomous cap variable reflecting the existence of a cap law in a state, and then we estimated the model using a variable that measured the number of years that a cap law had been in place in the state. We used both forms of the independent variable because it was possible that the impact of cap laws might reflect both the existence of the law and the number of years since its enactment. We included a time variable because there might be time-specific factors affecting the growth in health care expenditures.

## RESULTS

The means of the variables in our analyses are reported in Table 2. The coefficients of the estimated equations and their standard errors are reported in Tables 3 and 4. We found that the coefficients of the economic caps variable were statistically significant in each of the equations



**TABLE 2—State Data: Variable Means (1984, 1988, 1994, and 1998 data; n = 196 [Alaska excluded])**

	Mean
Annual health care expenditures per capita, \$	2863
Number of physicians per 100 000 residents	218
Deaths per 1000 residents	8.66
Hospital beds per 100 000 residents	402
Percentage of population unemployed	5.53
Population per square mile of land area	716.33
Personal income per capita, \$	13 158
Farm income as percentage of state domestic product	2.90
Percentage of population without health insurance coverage	15.15
Percentage of population enrolled in a health maintenance organization	13.57
State law capping damage awards in malpractice cases (1 = yes, 0 = no)	0.29
Years since state law capping awards for states with a cap	6.77

reported in Tables 3 and 4. Coefficients of the other reform variables were not statistically significant except for the coefficients of the joint and several liability reform variables in Table 3.

The coefficient of the economic caps variable was  $-96$  in equation (1), where the dependent variable was health expenditures per capita and the policy variable was dichotomous and

equal to 1 for states with a cap law. This implies that states with such laws experienced average per capita health expenditure levels that were 3.4% ( $\$96/\$2863$ ) lower than those in states without such laws. The coefficient in equation (2) (the equation that measures the impact of the number of years since a state passed a law capping awards in malpractice cases on health care expenditures per resident in the state) for the variable measuring the number of years since the adoption of a state law that directly limits the level of payment in a malpractice case was  $-13.6$ , and the mean number of years since adoption was 6.77 years (Table 2), so the mean reduction in health expenditures due to caps was equal to  $\$92$  per capita.

The dependent variable for equations in Table 4 was the natural logarithm of state health expenditures per capita. The coefficient for the variable indicating the existence of a state law that directly limited the level of payment in a malpractice case was  $-0.032$  in equation (3), where the policy variable was dichotomous. This implies that states with such laws experienced average per capita health expenditure levels that were 3.25% ( $e^{0.032} - 1$ ) lower than those in states without such laws. The coefficient in equation (4) for the variable measuring the number of years since the adoption of a state law that directly limits the level of payment in a malpractice case was  $-0.048$ , and the mean number of years since adoption was 6.77 years, so the mean reduction in health expenditures due to caps was equal to 3.31% ( $[e^{0.048} - 1] \times 6.77 = 0.49 \times 6.77$ ).

Coefficients for the following variables were statistically significant in at least 1 equation: joint and several liability reform law, hospital beds per 100 000 residents, population density, income (personal income per capita in thousands of dollars), physicians per 100 000 residents, health maintenance organizations (percentage of the population enrolled in a health maintenance organization), and the dummy variables for the time periods. The signs of the coefficients for statistically significant nonregulatory variables in Tables 3 and 4 were consistent with expectations, with a single exception. The coefficients for the proportion of

**TABLE 3—Impact of Malpractice Award Caps on Health Care Expenditures per State Resident (State Data From 1984, 1988, 1994, and 1998 data; n = 196)**

Explanatory Variable	Equation (1) AR(1) Coefficient (SE)	Equation (2) AR(1) Coefficient (SE)
Caps on punitive damage law	3.99 (48.64)	-12.64 (50.09)
Collateral source reform law	-22.81 (41.65)	-23.07 (42.52)
Joint and several liability reform law	-67.93 (45.02)	-77.89 (44.92)
Certificate of need law	32.36 (44.18)	38.83 (45.77)
Deaths per 1000 residents	16.57 (10.29)	8.17 (20.28)
Hospital beds per 100 000 residents	1.57* (0.20)	1.60* (0.20)
Unemployment rate (percentage of civilian noninstitutionalized population)	16.19 (10.29)	12.24 (10.33)
Population density (population in thousands of residents per square mile)	0.062* (0.020)	0.063* (0.020)
Income (personal income per capita in thousands of dollars)	0.020* (0.002)	0.021* (0.002)
Farm income as percentage of state domestic product	-13.87 (7.42)	-13.63 (7.85)
Physicians per 100 000 residents	2.79* (0.46)	2.71* (0.51)
Health insurance (percentage of population without health insurance)	-0.28 (4.38)	2.36 (4.75)
Percentage of population enrolled in a health maintenance organization	7.62* (1.95)	7.97* (2.00)
Existence of state law capping damage awards in malpractice cases	-95.65* (40.48)	...
Years since state law capping awards in malpractice cases	...	-13.60* (5.24)
Total R <sup>2</sup>	0.95	0.95

Note. AR(1) = first-order autoregressive error structure. Estimates were generated with SAS software, version 8 (SAS Institute, Cary, NC).  
\*Statistically different from zero at the .05 level. Coefficients and standard errors for intercept and time variables excluded.



**TABLE 4—Impact of Malpractice Award Caps on Log of Health Care Expenditures Per State Resident (State Data from 1984, 1988, 1994, and 1998 data; n = 196)**

Explanatory Variable	Equation (3) AR(1) Coefficient (SE)	Equation (4) AR(1) Coefficient (SE)
Caps on punitive damage law	-0.026 (0.021)	-0.032 (0.20)
Collateral source reform law	0.0002 (0.0156)	0.0025 (0.0154)
Joint and several liability reform law	-0.043* (-0.021)	-0.044* (0.020)
Certificate of need law	0.027 (0.019)	0.024 (0.018)
Deaths per 1000 residents	0.006 (0.009)	0.0035 (0.008)
Hospital beds per 100 000 residents	0.0005* (0.0001)	0.0005 0.0001)
Unemployment rate (percentage of civilian noninstitutionalized population)	0.013 (0.007)	0.010 (0.005)
Population density (population in thousands of residents per square mile)	0.0001* (0.00003)	0.00007* (.00002)
Income (personal income per capita in thousands of dollars)	0.00005* (0.00002)	0.00007* (.00001)
Farm income as percentage of state domestic product	-0.0018 (0.0034)	-0.0013 (0.0036)
Physicians per 100 000 residents	0.0012* (0.0003)	0.0011* (0.0002)
Health insurance (percentage of population without health insurance coverage)	0.0018 (0.0024)	0.0025 (0.0026)
Percentage of population enrolled in a health maintenance organization	0.001 (0.001)	0.0014 (0.0008)
Existence of state law capping damage awards in malpractice cases	-0.032* (0.016)	...
Years since state law capping awards in malpractice cases	...	-0.0048* (0.0021)
Total R <sup>2</sup>	0.94	0.94

Note. AR(1) = first-order autoregressive error structure. Estimates generated with SAS/STAT software, version 8 (SAS Institute, Cary, NC).  
\*Statistically different from zero at the .05 level. Coefficients and standard errors for intercept and time variables excluded.

residents enrolled in a health maintenance organization in Table 3 are positive and statistically significant.

**DISCUSSION**

Our study used information about state attributes at 4 points in time to estimate the relation between state tort reform laws that cap noneconomic damage payments in malpractice cases and health care expenditures per capita. In each of these models, the coefficient for the variable reflecting laws that cap noneconomic damage payments in malpractice cases was negative and statistically significant, and in each of these models the coefficient for the variable reflecting cap laws was between 3% and 4%.

Our model includes data from both before and after the enactment of cap laws in 15 states, and our model includes variables adjusting for other types of liability reforms as well as CON legislation. Our findings are consistent with those of Kessler and McClellan,<sup>30</sup> and the robustness of our findings across a variety of specifications provides reasonably strong support for the argument that laws capping noneconomic damage payment reduce health care costs.

Nevertheless, our analyses have limitations. First, there are other types of state laws that may affect health care expenditures (e.g., some states have passed laws that permit awards in malpractice cases to be made over a period of time). Second,

there are factors other than those included in our model that affect health care expenditures (e.g., there is evidence that people’s attitudes toward health care affect their use of care, and there is no variable in our analyses measuring attitudes toward health care).<sup>52</sup> And third, this study employed state data, and thus, there may be problems with aggregation bias (i.e., the relations that exist at the individual level may be obscured when measured for a large group).<sup>51</sup>

Future studies should include more variables and use data from other sources and from different time periods. Furthermore, future studies should focus on important questions such as whether or not the level at which damages are

capped is related to health care expenditures and whether or not reductions in health care spending attributable to these laws are related to poorer health outcomes. It is also important to examine variations in the effectiveness of these laws across states because such knowledge would assist policy-makers in determining the optimal levels for damage caps for their state. ■

**About the Authors**

The authors are with the Center for Delivery, Organization, and Markets, Agency for Healthcare Research and Quality, Rockville, Md.

Requests for reprints should be sent to Fred J. Hellinger, PhD, Center for Delivery, Organization, and Markets, Agency for Healthcare Research and Quality, Room 5319, 540 Gaither Rd, Rockville, MD 20850 (e-mail: fhelling@ahrq.gov).

This article was accepted October 25, 2005.

**Contributors**

Both authors contributed to the formulation of ideas and to the creation and assessment of each draft of this article.

**Acknowledgments**

The views herein do not necessarily reflect the views or policies of the US Department of Health and Human Services.

**References**

1. Anderson RE. Billions for defense: the pervasive nature of defensive medicine. *Arch Intern Med.* 1999;159: 2399–2402.
2. Mello MM, Studdert DM, Brennan TA. The new medical malpractice crisis. *N Engl J Med.* 2003;348:2281–2284.
3. Localio AR, Lawthers AG, Brennan TA, Laird NM, Hebert LE, Peterson LM, et al. Relation between malpractice claims and adverse events due to negligence. *N Engl J Med.* 1991; 325: 245–251.
4. Brennan TL, Leape L, Laird N, et al. Incidence of adverse events and negligence in hospitalized patients: results from the Harvard Medical Practice



- study I. *N Engl J Med.* 1991;321:480–484.
5. *Defensive Medicine and Medical Malpractice.* Washington DC: US Congress, Office of Technology Assessment; 1994. OTA-H-602.
  6. Ballard MA. Rush to beat tort law deadlines. *Natl Law J.* 2003;26(6):1–3.
  7. Treaster JB. Malpractice insurance: no clear or easy answers. *New York Times.* March 4, 2003:C1.
  8. *Medical Malpractice Insurance: Multiple Factors Have Contributed to Increased Premium Rates.* Washington, DC: US General Accounting Office; 2003. Report GAO-03–702.
  9. Baker T. Medical malpractice and the insurance underwriting cycle. *DePaul Law Rev.* 2005;54:393–438.
  10. Viscusi WK, Born PH. Damages caps, insurability, and the performance of medical malpractice insurance. *J Risk Insurance.* 2005;72:23–43.
  11. *Addressing the New Health Care Crisis: Reforming the Medical Litigation System to Improve the Quality of Health Care.* Washington DC: Office of the Assistant Secretary for Planning and Evaluation, US Department of Health and Human Services; 2003.
  12. Thorpe KE. The medical malpractice ‘crisis’: recent trends and the impact of state tort reforms. *Health Affairs (Millwood).* January–June (suppl Web exclusives), 2004;W4-20–30. Available at: <http://content.healthaffairs.org/cgi/reprint/hlthaff.w4.20v1>. Accessed April 21, 2006.
  13. Haussman T, Brevic SM. State-level action *Natl Law J.* 2003;25:A17-A21.
  14. Ullmer K. Voinovich seeking malpractice legislation. *Dayton Daily News.* May 4, 2003:1.
  15. Jarvis J. Financial pressures are thinning doctors’ ranks. *Fort Worth (Texas) Star Telegram.* June 16, 2003:1.
  16. Haggman M. Medical malpractice lawsuit restrictions clear committee. *Broward Daily Business Rev.* 2004;45:1–2.
  17. Lilienthal C. Legislature is poised to act on medical malpractice reforms. *Pa Law Wkly.* 2003;26(37):37–40.
  18. Hirschorn J. The doctors’ strike in context. *N J Law J.* 2003;171(8):1–2.
  19. Scheffey TB. Med-Mal caps likely to hurt doctors’ patients. *Conn Law Tribune.* 2003;29:1–4.
  20. Klingman D, Localio AR, Sugarman J, et al. Measuring defensive medicine using clinical scenario surveys. *J Health Politics Policy Law.* 1996;21:185–217.
  21. Birbeck GL, Gifford DR, Song J, Belin TR, Mittman BS, Vickrey BG. Do malpractice concerns, payment mechanisms, and attitudes influence test-ordering decisions? *Neurology.* 2004;62:119–121.
  22. Baldwin LM, Hart LG, Lloyd M, et al. *Malpractice Claims Exposure and Resource Use in Low Risk Obstetrics.* Washington, DC: Office of Technology Assessment; 1993.
  23. Localio AR, Lawthers AG, Bengtson JM, et al. Relationship between malpractice claims and caesarean delivery. *JAMA.* 1993;269:366–373.
  24. Grumbach K, Peltzman-Rennie D, Luft HS. Charges for obstetric liability insurance and discontinuation of obstetric practice in New York. Washington, DC: Office of Technology Assessment; 1993.
  25. Reynolds RA, Rizzo JA, Gonzalez ML. The cost of medical professional liability. *JAMA.* 1987;257:2776–2781.
  26. *Medical Malpractice: Implications of Rising Premiums on Access to Health Care.* Washington, DC: US General Accounting Office; 2003. Report GAO-03–836.
  27. Danzon PM. New evidence on the frequency and severity of medical malpractice claims. Santa Monica, Calif: Rand Corp; 1986. Report R-3410–1CJ.
  28. Zuckerman S, Bovbjerg RR, Sloan F. Effects of tort reforms and other factors on medical malpractice insurance premiums. *Inquiry.* 1990;47:167–182.
  29. Intriligator MD, Kehrer BH. An econometric model of medical malpractice. In: Rottenberg S, ed. *The Economics of Medical Malpractice.* Washington, DC: American Enterprise Institute for Public Policy Research; 1978:110–136.
  30. Kessler DP, McClellan MB. Do doctors practice defensive medicine? *Q J Econ.* 1996;111:353–390.
  31. Dor A, Holahan J. Urban-rural differences in Medicare physician expenditures. *Inquiry.* 1990;27:307–328.
  32. McBride TD, Penrod D, Mueller K. Volatility in Medicare AAPCC rates: 1990–1997. *Health Aff (Millwood).* 1997;16:172–180.
  33. McAuley WL, Spector WD, Van Nostrand J, Shaffer T. The influence of rural location on utilization of formal home care: the role of Medicaid. *Gerontologist.* 2004;44:655–664.
  34. Batata A. The effect of HMOs on fee-for-service health care expenditures: evidence from Medicare revisited. *J Health Econ.* 2004;23:951–963.
  35. Kirby JB, Machlin SR, JW Cohen. Has the increase in HMO enrollment within the Medicaid population changed the pattern of health service use and expenditures? *Med Care.* 2003;7(suppl):III24-III34.
  36. Romano M. Pros and cons of certificates. *Mod Healthc.* 2003;33:4–5.
  37. Grabowski DC, Ohsfeldt RL, Morrisey MA. The effects of CON repeal on Medicaid nursing home and long-term care expenditures. *Inquiry.* 2003;40:146–157.
  38. *State Medical Liability Laws Table.* Washington DC: National Conference of State Legislatures; 2004.
  39. *State Laws on Medical Liability: Medical Liability Reform.* Washington DC: American Tort Reform Association; 2004.
  40. McCullough, Campbell, & Lane. Summary of Medical Malpractice Law. Available at: <http://www.mcandl.com/states.html>. Accessed April 15, 2006.
  41. US Department of Commerce, Bureau of Economic Analysis. Interactive Access to Annual State Personal Income Accounts Tables. Available at <http://www.bea.gov/bea/regional/spi/default/cfm?satable=summary>. Accessed June 1, 2006.
  42. Health Forum. *AHA Hospital Statistics.* 2001 ed. Chicago, Ill: American Hospital Association; 2001.
  43. Health Forum. *AHA Hospital Statistics.* 1997 ed. Chicago, Ill: American Hospital Association; 1997.
  44. Health Forum. *AHA Hospital Statistics.* 1991 ed. Chicago, Ill: American Hospital Association; 1991.
  45. Health Forum. *AHA Hospital Statistics.* 1987 ed. Chicago, Ill: American Hospital Association; 1987.
  46. *Physician Characteristics and Distribution in the U.S.* Chicago, Ill: American Medical Association; 2003.
  47. *Physician Characteristics and Distribution in the U.S.* Chicago, Ill: American Medical Association; 2001.
  48. *Physician Characteristics and Distribution in the U.S.* Chicago, Ill: American Medical Association; 1997.
  49. *Physician Characteristics and Distribution in the U.S.* Chicago, Ill: American Medical Association; 1991.
  50. *SAS/STAT User’s Guide, Version 8.* Cary, NC: SAS Institute, 1999.
  51. Green, HAJ. *Aggregation in Economic Analysis: An Introductory Survey.* Princeton, NJ: Princeton University Press, 1964.
  52. Riley GC, Tudor C, Ingber M. Health status and Medicare enrollees in HMOs and fee-for-service in 1994. *Health Care Financing Rev.* 1996;17:65–76.