
THE VALUE OF LIABILITY IN MEDICAL MALPRACTICE

by Michelle J. White

Prologue: *In the debate over reforming the U.S. health care system, there are relatively few areas of agreement among the various parties with a stake in the U.S. system. One area that enjoys near-universal agreement, however, is the need to reform the nation's medical malpractice system. Even the scaled-back versions of health care reform that survived the legislative wrangling of the summer of 1994 contain some measure or measures to address medical malpractice and the skyrocketing costs associated with it. In this paper Michelle White, an economist on the faculty of the University of Michigan, attempts to quantify the potency of the incentive providers have to avoid delivering negligent medical care. According to her calculations, negligent medical care costs \$135,000 per malpractice claim that involves negligence, in medical care-related costs alone (that is, excluding legal costs). She concludes that even in our imperfect system, the system of determining and punishing negligence provides a powerful financial incentive for providers to avoid substandard care. If medical liability were abolished, as some proposals suggest, the number and cost of medically caused injuries and deaths could rise sharply if liability were not replaced with other sanctions against negligent care. White received her doctorate in economics from Princeton University and has been a professor of economics at the University of Michigan since 1984. She has held academic appointments at New York University and the University of Pennsylvania and is on the editorial boards of a number of journals related to urban economics, real estate finance, and land economics. Her work has focused on urban issues, housing, and medical malpractice and negligence.*

Abstract: In this paper I estimate the strength of medical providers' incentive to avoid negligent medical care, taking account of the facts that many victims of medical malpractice do not file claims, many nonvictims do file claims, legal costs are high, and the legal system makes errors. Despite these problems, the negligence system creates a strong financial incentive for medical providers to avoid substandard care: The average cost of negligence is \$135,000 per malpractice claim involving negligence and \$3,500 per occurrence of negligent medical care. These substantial penalties suggest that if liability were abolished without adopting effective alternative sanctions for negligent medical care, the number and cost of medically caused injuries and deaths could rise sharply.

Nearly 1 percent of all hospital patients in the United States suffer harm because of substandard medical care; of these, about 25 percent die and 6 percent suffer permanent disability.¹ These figures suggest that substandard medical care in U.S. hospitals causes about 84,000 patient deaths and 20,000 permanent disabilities each year.² Despite the seriousness of the medical malpractice problem, however, the legal rule of negligence—which gives doctors and hospitals an incentive to provide high-quality medical care by requiring that they compensate patients for harm caused by substandard care—is under attack from many quarters. A number of states have adopted or are considering no-fault systems to replace liability for at least some types of medical malpractice cases; a well-publicized proposal by Paul Weiler calls for adoption of a no-fault system in the medical malpractice area generally.³ Successive administrations also have shown interest in reforming the medical malpractice system. During the 1992 presidential election campaign, former President George Bush suggested that abolishing medical malpractice liability could solve the problem of high health care costs. The Clinton administration offered limits on liability in fall 1993 in a bid to obtain the support of the medical profession for health care reform.⁴

A problem with the negligence system in medical malpractice is that until recently little evidence has been available to enable policymakers to judge how well it works. To make matters worse, to judge how well the negligence system works, the analyst must take into consideration two unusual features of medical malpractice—that many victims of malpractice do not file claims, while many nonvictims of malpractice do file claims—as well as more familiar problems—that the legal system makes mistakes and that legal costs are high. In this paper I first review the results of several recent studies of the negligence system in medical malpractice. I then use the results of these studies to calculate the strength of medical providers' incentive to avoid substandard medical care, taking account of all of the issues just mentioned. The results show that the negligence system creates a strong financial incentive for medical providers to avoid substandard care. The average cost of negligence (including legal costs) is found to be \$183,500 per malpractice claim involving negligence and \$4,800 per occur-

rence of negligent medical care. These are substantial penalties that send a very clear message to medical providers. They suggest that abolishing liability without adopting effective alternative sanctions for negligent medical care could lead to a sharp increase in the number and cost of negligent injuries.

The Negligence System

A number of recent studies have examined the negligence system in medical malpractice; here I summarize their results (Exhibit 1). There are two basic approaches. First, researchers have estimated how frequently hospital patients are injured in the course of medical treatment and how

Exhibit 1
Summary Of Results Of Research Into The Negligence System In Medical Malpractice

	California (Danzon)	Harvard Medical Practice Study	Taragin et al.	Cheney et al.	Farber/ White
Overall injury rate	.0465	.042	—	—	—
Negligent injury rate	.0079	.01	—	—	—
Claims rates					
Per negligent injury	—	.026	—	—	—
Per nonnegligent injury	—	.01	—	—	—
Per noninjury	—	.001	—	—	—
Distribution of care quality in claims					
Negligent	—	.17	.25	.47	.35
Unclear	—	—	.13	.13	.23
Nonnegligent	—	.83	.62	.40	.42
Probability of payment					
Negligent	—	—	.91	.89 ^a	.66
Unclear	—	—	.59	—	.45
Nonnegligent	—	—	.21	.47 ^a	.16
Damage payments					
Negligent	—	—	—	\$463,000 ^b	\$205,000 ^c
Unclear	—	—	—	—	73,900 ^c
Nonnegligent	—	—	—	93,000 ^b	41,800 ^c
Number of records	20,864	30,195	—	—	—
Number of claims	—	47	8,231	1,004	748

Sources: See text.

^a Calculated by omitting cases for which the payment outcome was unknown.

^b Median damage payment for all injuries decided at trial.

^c Mean damage payment for all injuries.

often this injury is due to negligent medical care. In this type of study, large samples of hospital records are examined, and each record is categorized according to whether patients were injured from medical care and, if so, whether the injury was the result of negligence. Second, researchers have examined how the resolution of patients' medical malpractice claims depends on negligence. Claims of medical malpractice from either insurance company or hospital records are examined, and records are again categorized by whether or not negligence occurred. One study, the Harvard Medical Practice Study (HMPS), combined the two approaches and examined both the frequency of medical malpractice incidents and the malpractice liability system using the same data set. However, a drawback to this procedure is that medical malpractice incidents are rare and medical malpractice claims are even rarer, so that very large samples of hospital records yield only very small samples of medical malpractice claims.

The earliest study, by the California Medical Association and the California Hospital Association, examined about 21,000 records of patient stays in twenty-three California hospitals in 1974. The study concluded that 4.65 percent of hospital patients were injured from medical care, and 0.79 percent of hospital patients were injured from negligence.⁵

The HMPS examined 30,195 records of patient stays in fifty-one New York hospitals in 1984.⁶ It found that 4.2 percent of patients were injured from medical care, and 1 percent were injured from negligence. Since the HMPS matched individual hospital records to claims, the study could estimate claims rates by whether negligence occurred. The HMPS categorized 306 hospital records as involving negligent injuries to patients, 972 as involving nonnegligent injuries, and 28,917 as involving no injury. Within each of these groups, patients filed eight, ten, and twenty-nine claims, respectively, so that the implied probabilities of patients filing claims are 2.6 percent for patients who suffer injuries from negligence, 1 percent for patients who suffer injuries not from negligence, and 0.1 percent for patients who do not suffer any injury. Thus, while claims rates generally are low, patients are much more likely to file claims if their injuries were due to negligence.

The other studies all examine samples of medical malpractice claims and follow these claims through the dispute resolution process. They therefore have larger samples of medical malpractice claims than the HMPS but no information about rates of injury or claims filing. The first, by Mark Taragin and colleagues, examines records of 8,231 medical malpractice claims against doctors in New Jersey who were insured by a physician-owned medical malpractice insurance company.⁷ Insurance company employees and/or outside medical experts categorized each claim as involving negligence, not involving negligence, or unclear. In the study, 25 percent of

claims were categorized as involving negligence, 62 percent were classified as not involving negligence, and the remaining 13 percent were unclear. The study found that quality of care strongly influenced whether patients received compensation: Patients received compensation in 91 percent of cases categorized as negligent, compared with compensation received in only 21 percent of cases categorized as nonnegligent. When negligence was unclear, the compensation rate was intermediate at 59 percent. Based on the probability of receiving a payment, the study thus found that claims involving negligence are 4.3 times as likely to receive payments as are claims not involving negligence. Thus, the evidence from the Taragin study indicates that the negligence system sets up fairly strong incentives for doctors to provide medical care that is not negligent. Unfortunately, the study does not separate compensation paid to patients by whether negligence occurred, although it does indicate that damage awards at trial were higher in cases categorized as negligent.

The next study, by Frederick Cheney and colleagues, uses records from seventeen insurance companies to examine 1,004 medical malpractice claims involving anesthesia.⁸ In this study, 47 percent of claims were categorized as involving negligence, 40 percent were classified as not involving negligence, and the remaining 13 percent were unclear. Quality of care again strongly influenced whether patients received compensation: They received compensation in 89 percent of cases involving negligence, compared with compensation in only 47 percent of cases not involving negligence. Quality of care also influenced the level of damage payments. The median damage payment for a disabling injury was \$463,000 when care was negligent, compared with \$93,000 when care was not negligent (this difference was statistically significant). The study thus finds both that the probability that patients will receive compensation is higher when care was negligent and that, when compensation is paid, the amount is higher when care was negligent.

The last study, by Henry Farber and myself, examines all of the medical malpractice claims made against a single large hospital and doctors who provided treatment there.⁹ The study used internal hospital records to determine whether or not negligence occurred. In these records, medical experts evaluate whether the quality of care at the hospital met the negligence standard.¹⁰ In this study, 35 percent of claims were categorized as involving negligence, 42 percent were categorized as not involving negligence, and the remaining 23 percent were unclear.

Using data from the Farber/White study, Exhibit 2 shows the probability that patients who file malpractice claims receive compensation and the average level of compensation when a payment is made. Both are shown by quality of care and for four levels of injury severity.¹¹ When negligence

Exhibit 2

Resolution Of Medical Malpractice Claims

Probability that claims receive payment

	Negligent	Nonnegligent	Ratio of negligent to nonnegligent
Severity of injury			
Temporary	.58	.12	—
Permanent partial	.69	.25	—
Permanent total	1.00	.17	—
Death	.75	.16	—
Average	.66	.16	—

Average payment when payments are made

Severity of injury			
Temporary	\$ 27,600	\$ 16,400	—
Permanent partial	298,000	33,600	—
Permanent total	1,280,000	728,000 ^a	—
Death	195,000	38,000	—
Average	205,000	41,800	—

Expected cost per malpractice claim

Severity of injury			
Temporary	\$ 16,100	\$ 2,000	8
Permanent partial	206,000	8,400	25
Permanent total	1,280,000	121,000	11
Death	147,000	6,000	25
Average	135,000	6,600	21

Source: H.S. Farber and M.J. White, "A Comparison of Formal versus Informal Dispute Resolution in Medical Malpractice," *Journal of Legal Studies* 23, no. 2 (1994).

^a Based on only one observation.

occurs, both the probability that patients receive compensation and the level of compensation are higher than when care is nonnegligent, for all severity levels. The lower panel of Exhibit 2 shows the hospital's expected or average cost per medical malpractice claim at the time that a claim is filed, which equals the probability of payment times the amount of the payment if one occurs. This panel also shows the ratio of expected cost for cases involving negligence versus cases not involving negligence, by severity of injury. It shows that the expected cost of a claim to the hospital is eight times higher when negligence occurs for claims involving temporary injuries, twenty-five times higher when negligence occurs for claims involving permanent partial disability, and twenty-five times higher when negligence occurs for claims involving death. Thus, the hospital faces a substantial financial penalty for negligence and a strong incentive to avoid negligence in medical care.

Finally, consider the results of the various studies concerning the probability that patients who file medical malpractice claims are victims of

negligent medical care. This figure is important from a public policy standpoint, because whether it is high or low influences both the level of legal costs and how much of the compensation paid by medical providers actually goes to victims of negligence. Here there is a disagreement between the results of the HMPS and those of the other studies. In the HMPS, the probability that patients who file claims are victims of negligence is only eight in forty-seven claims, or 17 percent. This low probability caused the authors of the Harvard study to criticize the negligence system sharply: "Medical-malpractice litigation infrequently compensates patients injured by medical negligence and rarely identifies, and holds providers accountable for, substandard care."¹² In contrast, in the Taragin, Cheney, and Farber/White studies (the Danzon study did not collect claims information), the probability that patients who file malpractice claims are victims of negligence is higher. Excluding claims in which the negligence categorization was unclear, the probabilities that patients who file claims are victims of negligence are 29 percent, 54 percent, and 46 percent in the Taragin, Cheney, and Farber/White studies, respectively—all higher than the figure found by the HMPS. Because the HMPS's result that patients who file malpractice claims are unlikely to be victims of negligence is based on a very small sample of claims, it seems a frail reed upon which to base major public policy recommendations.¹³

The Cost Of Negligence

What can these studies tell us about how the medical malpractice system actually works? Consider first how it works in theory. A hospital patient's treatment goes badly, and the patient files a medical malpractice claim. If the case goes to trial, a jury decides it based on the rule of negligence. Under the rule, the doctor and/or hospital is liable for damage only if the jury finds that treatment was negligent; that is, it did not meet the customary standard of care in the relevant medical specialty.¹⁴ In that case, the medical provider must compensate the patient for damage, including lost wages, the cost of additional medical treatment, and the monetary equivalent of pain and suffering. Actually, few medical malpractice claims are resolved by trials; in most either there is a settlement or patients drop their claims. But even when claims are resolved without trials, the outcome reflects what both sides predict would occur at trial.

Thus, the negligence system is intended to create a financial incentive for doctors and hospitals to provide nonnegligent medical care by penalizing them financially when care is negligent. The financial incentive to avoid negligence is measured by the cost to defendants per malpractice claim involving negligence, which equals the average amount that medical

providers must pay each time a patient who is a victim of negligence files a claim. Data from the Farber/White study indicate that the average cost of liability per malpractice claim involving negligence is \$135,000 at the time the claim is filed (Exhibit 3). This suggests that the negligence system gives hospitals a strong incentive to provide medical care that is not negligent.¹⁵

This brief discussion has not considered a number of problems with the liability system in medical malpractice. In particular, four real-world issues exist for which evidence from the research just discussed is illuminating. First, many malpractice victims never file claims. Second, patients who were not victims of negligence may file “false” malpractice claims. Third, the legal system is an expensive way to resolve medical malpractice disputes. Fourth, juries sometimes make mistakes in deciding liability.¹⁶

“Missing” medical malpractice claims. We previously calculated the average cost of negligence per malpractice claim involving negligence, but because of the large number of missing claims, it would also be useful to know the average cost of negligence each time a patient receives negligent medical care. To calculate this, I multiplied the average cost of negligence per malpractice claim involving negligence (\$135,000) by the probability that patients who receive negligent medical care file claims, which the HMPS found to be 2.6 percent. The result is that the average cost of negligence per occurrence of negligent medical care is \$3,500. While this figure may seem low, hospitals treat many patients, and many situations occur each day in which negligence might occur. Each time medical providers avoid negligence, such as by taking a bit more time and effort when caring for a hospital patient, on average they save \$3,500. Since avoiding negligence is likely to cost less than this, doing so is likely to be financially worthwhile.¹⁷ Thus, even accounting for the fact that many victims do not file claims, the liability system provides a strong incentive to avoid negligence.

“False” claims and high legal costs. Many claims are filed by patients

Exhibit 3		
Estimates Of The Cost Of Negligence In Malpractice Claims		
	Cost of negligence per claim involving negligence	Cost of negligence per occurrence
Actual		
Without legal costs	\$135,000	\$3,500
With legal costs	183,500	4,800
Theoretical		
Without legal costs	157,000	4,100
With legal costs	205,500	5,300

Source: Author’s calculations.

who were not victims of negligence. These patients are not necessarily greedy or vindictive. Rather, patients who file medical malpractice claims generally do not know in advance whether their medical care was negligent or not. Only by filing claims can they learn whether or not negligence occurred. The four studies discussed above found the probability of negligence conditional on patients filing claims to range from 17 percent to 54 percent. If we average these figures using as weights the number of claims in each study, we get a probability of 33 percent that patients filing claims were victims of negligence, or a probability of 67 percent that patients filing claims were not victims of negligence. This means that for each claim involving negligence, patients file roughly an additional two claims that do not involve negligence.

How do claims by patients who were not victims of negligence affect the cost of negligence? Suppose temporarily that the litigation process is error-free in determining negligence. Then patients who file claims but later learn that they were not victims of negligence either would drop their claims without compensation or would pursue their claims to a trial verdict but always lose. Thus, they would never receive compensation, and both the cost of negligence per claim and the cost of negligence per occurrence would be completely unaffected by their claims. The only distorting effect of claims by nonvictims would be that both sides incur legal costs in processing claims.

Of course, in reality legal costs are substantial. In the Farber/White study, the hospital's legal costs averaged \$9,800 per lawsuit if patients dropped their claims before trial, \$20,000 per lawsuit if the case was settled before trial started, and \$43,000 per lawsuit if trial started.¹⁸ Using the results of the Taragin study concerning how cases are resolved, we calculate that defendants' average legal costs per malpractice claim are about \$16,000.¹⁹

Because patients file 2.3 nonnegligent claims for every negligent claim, defendants on average incur legal costs for 3.03 cases for each malpractice claim involving negligence. Legal costs thus add \$48,500 to the cost of negligence per malpractice claim involving negligence, so that the latter figure rises from \$135,000 to \$183,500. Legal costs thus increase the incentive to avoid negligent medical care by about 36 percent. Legal costs also raise the cost of negligence per occurrence of negligent medical care by the same proportion, or from \$3,500 to \$4,800 (Exhibit 3).

Errors in deciding cases. The legal system makes two types of errors in deciding medical malpractice cases: (1) Juries may decide that medical providers are liable when care was not negligent (type I error); and (2) juries may decide that providers are not liable in cases where care was negligent (type II error). Both types of error attenuate the signal provided by the negligence system, since type I error creates a penalty for providing

nonnegligent care and type II error erases the penalty for providing negligent care. Even though few malpractice cases are decided at trial, errors in deciding cases at trial affect the outcomes in cases that are resolved without trials, because these outcomes reflect parties' predictions of what would happen in court.

The average amount paid when medical malpractice claims are settled out of court reflects defendants' evaluations of whether negligence occurred, as well as both sides' predictions of the probability that courts would make errors if cases were decided at trial. Therefore, information concerning average settlement amounts can be used to estimate the legal system's error rate for particular types of cases.²⁰

The middle panel of Exhibit 2 gives data on average settlements from the Farber/white study. Using these data, the estimated error rates are 9 percent for cases involving permanent partial disability and 16 percent for cases involving death of the patient. Doing the same calculations using payment amounts from the Cheney study in Exhibit 1, the implied error rate is 17 percent.²¹

Suppose the probability of both types of error occurring is 14 percent, the average of these three figures. How does error affect the cost of negligence? The cost-of-negligence figures calculated above already account for the effect of errors in the legal system. However, we can calculate an estimate of what the cost of negligence would be in theory if the legal system never made errors. From Exhibit 3, expected liability per claim involving negligence is \$135,000, given errors in the legal system. This figure would become \$157,000 if the legal system never made errors. Adding in legal costs of \$48,500 per claim involving negligence, we find that the theoretical cost of negligence in the absence of errors becomes \$205,500 per claim. Thus, the effect of legal errors is to reduce the cost of negligence per claim involving negligence from \$205,500 to \$183,500. Similarly, in the absence of errors, the cost of negligence per occurrence would be \$5,300, and errors cause it to fall to \$4,800 (Exhibit 3). Thus, errors in how the legal system decides cases cause the cost of negligence to fall but do not affect the figures previously calculated. Even with errors, the liability system creates a substantial incentive for hospitals to provide nonnegligent medical care.

We have investigated the incentives for high-quality medical care provided by the liability system, using the results of recent research to allow for the facts that many medical malpractice claims are missing, others are "false," legal costs are high, and the legal system makes mistakes. These estimates are obviously dependent on the quality of the studies used in constructing them, and they rely in part on data from the Farber/White study, which examines a single hospital. Nonetheless, the various studies, where they overlap, are generally in agreement.

Policy Implications

The studies and the data discussed here address only part of the question of how well the liability system works in medical malpractice. These studies suggest that liability sends a strong signal to doctors and hospitals to provide nonnegligent medical care. But does this signal actually deter negligence and reduce the frequency of negligent injuries? Medical providers could reduce negligence by such means as investing in further training or better equipment, taking more time with each patient, performing more diagnostic tests, or ceasing to perform risky procedures if past injury rates have been high. The authors of the HMPS addressed this question and estimated that if medical malpractice liability were abolished, the frequency of negligent injuries would rise by 40 percent, although their test is quite weak and the results were not statistically significant.²² Several ongoing studies will shed further light on the issue, but there is now little evidence concerning how and how much medical providers respond to liability.

Despite this, the research discussed here suggests that medical malpractice reform carries potentially high risks. Suppose that medical providers do respond strongly to liability. Also suppose that liability were abolished and a no-fault system were adopted instead. Then, with no penalty for negligence, occurrences of negligent medical care could increase substantially. The consequences to victims would be costly, as indicated by the high damage payments to victims of negligence shown in Exhibit 1. Those who favor a no-fault system might respond that systems of peer review would deter negligent medical care even without liability. But most studies of peer review organizations and state disciplinary boards conclude that they are infrequently used and rarely directed against negligent medical care.²³ Thus, the research reported here suggests that negligence is extremely costly and that liability provides a strong incentive (perhaps the only incentive) for medical providers to avoid negligence. The onus therefore ought to be on proponents of no-fault and other schemes to demonstrate that their reforms would not result in a sharp increase in negligent injuries.

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NOTES

1. See P.C. Weiler et al., *A Measure of Malpractice: Medical Injury, Malpractice Litigation, and Patient Compensation* (Cambridge, Mass.: Harvard University Press, 1993), 42, Table 3.2.
2. For data on the number of hospitalizations, see American Hospital Association, *Hospital Statistics, 1992-93* (Chicago: AHA, 1993), Table 1.
3. P.C. Weiler, *Medical Malpractice on Trial* (Cambridge, Mass.: Harvard University Press, 1991).
4. First Lady Offers Doctors a 'Bargain' on Health Plan," *The New York Times*, 14 June 1993, A9.
5. P. Danzon, *Medical Malpractice: Theory, Evidence, and Public Policy* (Cambridge, Mass.: Harvard University Press, 1985).
6. Results of the HMPS are reported in Weiler et al., *A Measure of Malpractice*.
7. M.I. Taragin et al., "The Influence of Standard of Care and Severity of Injury on the Resolution of Medical Malpractice Claims," *Annals of Internal Medicine* 117 (1992): 780-784.
8. F.W. Cheney et al., "Standard of Care and Anesthesia Liability," *Journal of the American Medical Association* 261, no. 11 (1989): 1599-1603.
9. H.S. Farber and M.J. White, "A Comparison of Formal versus Informal Dispute Resolution in Medical Malpractice," *Journal of Legal Studies* 23, no. 2 (1994): 777-806.
10. The evaluations are for the hospital's internal use and are not subject to discovery by patients' lawyers.
11. Figures include liability by both the hospital itself and doctors providing treatment at the hospital. All dollar figures are in 1992 dollars. Cases initiated by risk management reports are excluded if patients did not pursue them.
12. A.R. Localio et al., "Relation between Malpractice Claims and Adverse Events Due to Negligence: Results of the Harvard Medical Practice Study III," *The New England Journal of Medicine* 325, no. 4 (1991): 245-251.
13. Why is the HMPS figure so much lower than those found by the other studies? First, because the number of claims in the HMPS (forty-seven) is so low, the resulting estimate of the probability that malpractice claimants are victims of negligence is quite imprecise. If we calculate the 95 percent confidence interval around the HMPS estimate of 0.17, we find that it is ± 0.11 . Thus, the result of the HMPS cannot exclude a probability of malpractice claimants' being victims of negligence as high as 28 percent. In contrast, the 95 percent confidence intervals around the Taragin, Cheney, and Farber/White figures are ± 0.01 , ± 0.03 , and ± 0.04 , respectively. These confidence intervals are smaller since sample sizes are larger. Second, the HMPS made its categorizations of negligence based on written hospital records alone, while the other studies made their categorizations of negligence after claims were filed and therefore used more information. Additional information that becomes available after a claim is filed might include the results obtained by lawyers or insurance company agents interviewing the medical personnel involved in the incident or evidence from later medical care suggesting that misdiagnosis occurred. By ignoring this information, the HMPS is likely to underestimate the probability of negligence among patients filing claims.
14. The jury must also find that the provider's negligence caused the patient's injury.
15. Unfortunately, neither the Taragin study nor the Cheney study provides all of the data needed to calculate the cost of negligence. However, the partial data these studies provide suggest that the results would be similar.
16. An additional problem with the liability system is that doctors typically buy liability insurance for medical malpractice, and their insurance premiums are often not experience rated. Hospitals, however, often self-insure so that they face exactly the incentives

- discussed here. See Danzon, *Medical Malpractice*, for discussion of medical malpractice insurance, and W.B. Schwartz and D.N. Mendelson, "The Role of Physician-Owned Insurance Companies in the Detection and Deterrence of Negligence," *Journal of the American Medical Association* 262, no. 10 (1989): 1342-1346, for discussion of physician-owned insurance companies that engage in experience rating.
17. In fact, the cost of negligence per occurrence of negligent medical care is probably higher than \$3,500, since victims who suffer more severe damage and would receive higher damage payments have higher probabilities of filing claims. Using data in Danzon, *Medical Malpractice*, Table 2.4, we find that the severity-weighted cost of negligence per occurrence of negligent medical care would be nearly twice as high, or \$6,500.
 18. These figures include the cost of hiring outside experts, but not the value of time of the medical personnel being sued. Figures are in 1992 dollars.
 19. The distribution of claims is as follows: 18 percent are resolved without lawsuits being filed, 48 percent are filed as lawsuits and quickly resolved, 15 percent are settled shortly before trial, and trials commence in 19 percent. See Taragin et al., "The Influence of Standard of Care and Severity of Injury on the Resolution of Medical Malpractice Claims," Figure 1. In calculating average legal costs, claims that are never filed as lawsuits are assumed to generate no legal costs. Note that other studies, such as R.R. Bovbjerg et al., "Juries and Justice: Are Malpractice and Other Personal Injuries Created Equal?" *Law and Contemporary Problems* 54, no. 5 (1991): 542, have found similar results for legal costs in medical malpractice cases.
 20. Whenever a malpractice claim is made, the medical provider (or its insurer) evaluates for internal use whether negligence occurred. Suppose these evaluations were always accurate. Then if the legal system never made errors, juries would always find defendants liable in cases that the defendant categorized as involving negligence and not liable in cases that the defendant categorized as not involving negligence. Out-of-court settlements in cases categorized as negligent (denoted S) would equal the amount of damage suffered by patients (denoted D), or $S=D$. This is because if these cases went to trial, patients would always win and would always be awarded damages of D . Similarly, settlements in cases categorized as nonnegligent (denoted S') would equal zero, because if these cases went to trial patients would always lose. However, in bargaining over settlements, the parties anticipate that courts make errors. As a result, settlements in cases involving negligence are less than S because if these cases were decided at trial, type II error would sometimes cause defendants to be found not liable. Similarly, settlements in cases not involving negligence are greater than zero because if these cases were decided at trial, type I error would sometimes cause defendants to be found liable. Suppose the probabilities of type I and type II error occurring are equal and are both e . Then it can be shown that $S/S'=(1-e)/e$. This expression allows us to calculate e using data on average settlements in cases categorized as negligent versus nonnegligent.
 21. Error rate estimates for temporary injuries are not used because they are distorted by legal costs, which are high relative to liability. Note that the calculation using the Cheney data ignores the fact that the damage figures are medians rather than means.
 22. See Weiler et al., *A Measure of Malpractice*, 129-131.
 23. See U.S. Congress, Office of Technology Assessment, *The Quality of Medical Care: Information for Consumers*, OTA-H-386 (Washington: U.S. Government Printing Office, 1988); and F.A. Sloan et al., "Medical Malpractice Experience of Physicians: Predictable or Haphazard?" *Journal of the American Medical Association* 262, no. 23 (1989): 3291-3297.