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Chapter 7
PATIENT INJURIES AND LITIGATION

Summary

In this Chapter we present an overview of the malpractice claims data used in our analyses and set forth explicit definitions for counting claims. Using five different measures of the number of claims, we estimate that the frequency of malpractice claims filed by patients per year lies in the range of 2,967 to 3,888. Using these figures, together with the projected statewide number of injuries from medical negligence during the same period, we estimate that eight times as many patients suffer an injury from medical negligence as there are malpractice claims. Because only about half the claimants receive compensation, there are about sixteen times as many patients who suffer an injury from negligence as there are persons who receive compensation through the tort system.

These aggregate estimates do not consider whether those who file claims, and sometimes those who receive awards, might be judged as not having suffered adverse events from medical negligence. When we identified the 47 malpractice claims actually filed by patients in our sample and reviewed the judgments of our physicians, we found that even fewer than one in sixteen adverse events with negligence produced litigation. Our lack of access to litigation files prevented any determination whether malpractice claims in the sample are non-meritorious.

Confining our analysis to the adverse events that involved strong or certain evidence of negligence, we estimate that 12,859 injuries from medical negligence did not lead to malpractice claims. Of these injuries, 22% (2,833) occurred in patients under age 70 who suffered moderate incapacity or greater. Our projections suggest that if this group of patients had litigated, the malpractice claims frequency for accident year 1984 would have increased by 75%.

I. Introduction

Chapter 6 presents the incidence of adverse events and negligently caused adverse events in New York in 1984. Chapter 8 examines the financial consequences to patients of these adverse events. In this chapter we present data on malpractice litigation in New York State. From these data we estimate the incidence of malpractice claims and compare that figure with the rates of adverse events and negligence previously discussed. For the patients in our sample who have filed claims, we report the fraction whose care involved identified adverse events and the percentage of patients whose adverse events resulted from identified negligence. We also present figures on the number and characteristics of patients who suffered adverse events as a result of negligent medical care but who have not filed malpractice claims to date.

II. Overview of the Issue

The extent to which negligent medical care that injures patients also leads to civil litigation is not known. Danzon[1] estimated from the California Medical Association (CMA) study[2] that only one in 10 instances of malpractice produced malpractice litigation. From a less than 0.5 probability that a claimant would obtain a settlement or award from the defendant, she estimated that only one patient received compensation per 25 instances of injury from negligent care.[3] She later noted that the 10% figure was an upper bound for the year of the study (1974) and that even with an increase in the number of claims filed, injuries caused by negligence still vastly outnumbered malpractice claims. With the increase in the frequency of litigation from the mid 1970s to the mid 1980s, she suggested

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[1] P.M. Danzon, Medical Malpractice: Theory, Evidence, and Public Policy, Cambridge, MA, Harvard Univ. Press, (1985)

[2] Report on the Medical Insurance Feasibility Study, San Francisco, CA, California Medical Assn., (D.H. Mills ed. 1977).

[3] Danzon also estimated the number of cases of negligence per claim according to the severity of injury. Because both CMA and NAIC data used the comparable disability ratings, she could estimate a negligence/claim ratio for each level of disability. Her overall conclusion held even for the severely disabled: there were 7 cases of negligence for each claim. P.M. Danzon, note 1 supra, at 25.

that the negligence-to-claims ratio would fall from 10 to 5.[4] These estimates implied that the incentives of litigation for injury prevention are anything but excessive.

This pathbreaking work was based on the best data then available. In arriving at these estimates, Danzon used the CMA statewide projections of the number of potentially compensable events in California in 1974, the year of the survey. For her estimates of the number of malpractice claims arising out of care rendered during that same year, she resorted to closed claims frequencies from the National Association of Insurance Commissioners (NAIC) report of claims closed from 1974 to 1980.[5] By combining these figures she arrived at the 10:1 ratio of negligence to claims.

There were, however, several limitations in the data used to estimate both the underlying negligence and claims figures. First, as noted previously, the CMA study did not use a probability sample of hospitalizations in California. For that reason, inferences from the sample to the population are risky, and estimates of the statewide total of adverse events and of those due to negligence are open to attack. Chapter 6 reports our own estimate of the rate of adverse events caused by negligence. These figures, based on a probability sample of hospitalizations in New York State, are comparable to those of the California study.

Second, the estimated number of claims arising out of medical care in California in 1974 is possibly low because of incomplete coverage of the claims data bases. NAIC gathered its data from commercial insurers in California. There is no evidence on the number of claims filed in California but not reported to NAIC. Malpractice claims against the University of California hospitals and physicians and other public facilities probably were not counted in the NAIC figures. Thus, NAIC

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[4] Danzon, Medical Malpractice Liability, In Liability Perspectives and Policy 223-41 (R.E. Litan, R.W. Clifford eds. 1988)

[5] Malpractice Claims--Final Compilation--Medical Malpractice Closed Claims 1975-1978 71-75, Brookfield, WI, National Association of Insurance Commissioners, (M.P. Sowka ed. 1980)

estimates of claims frequency likely understate the incidence of malpractice claims.

Third, it is uncertain whether the rates for claims closed during those four years are representative of the rates of claims arising out of 1974 hospitalizations. Claims arising out of accidents in 1974 took an average of three and four years to close; many would still have been open when the NAIC study closed its books, and some might not yet have been filed. Yet the assumption underlying estimates based on NAIC data assume that frequency of claims closed during the year in question is an acceptable proxy of the frequency of claims opened as a result of medical care during that same year. As we explain below, delays in bringing and processing malpractice claims can produce anomalies in claims rates when the measure of that rate is not linked carefully to the year of analysis.

Finally, the CMA study was not designed to follow patients injured and determine whether they litigated, or to review the medical records of those who sued and then determine in a blind review how many suffered from medical negligence. As we outline in Section V of this chapter, a direct link between hospitalization and claim can lead to markedly different estimates of the frequency of litigation of medical negligence. Simply estimating the population frequency of injuries caused by negligence and the frequency of malpractice litigation by the entire population cannot help resolve a fundamental question concerning malpractice litigation: whether it compensates those patients who are actually harmed by negligent care.

In this Study we attempted to estimate the relative frequency of negligence and litigation during comparable periods of observation with the use of data bases that are as complete as possible. In addition, we propose to estimate the fraction of both adverse events and negligently caused adverse events that actually precipitate litigation. If negligence fails to lead to litigation in most cases, then (a) the deterrent effect of litigation might be suboptimal because so few instances of substandard performance lead to censure and civil penalty via

litigation[6,7]; and (b) the civil justice system would compensate too few patients for injuries they sustain from the health care system.[8] On the other hand, if sizable numbers of malpractice claims are filed for medical care that is not negligent, as some state,[9] this also will obstruct the deterrent effect of liability. In this chapter we describe litigation arising out of care that our reviewers found to be non-negligent. Further discussion of the relationship between litigation patterns and deterrence of substandard care is presented in Chapter 10.

III. Malpractice Claims Data: Terminology and Methods of Collection

In this section we offer a brief lexicon of the terminology of malpractice insurance. Both the scientific and popular literature on the issues of malpractice, professional liability, and insurance often leave the reader with confusing and conflicting impressions of the number of claims and the size of payments to patients. In the following section we document lower claims rates than reported elsewhere. For example, the U.S. General Accounting Office (GAO) reported 27 to 38 claims per 100

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6 Bovbjerg, Medical Malpractice on Trial: Quality of Care is the Important Standard, 49 Law & Contemp. Probs. 321-348 (1986 Spr)

7 Bell, Legislative Intrusions into the Common Law of Medical Malpractice: Thoughts about the Deterrent Effect of Tort Liability, 35 Syracuse L. Rev. 939-93 (1984)

8 Abel, The Real Tort Crisis: Too Few Claims, 48 Ohio St. L. J. 443-67 (1987)

9 Lewis, AMA Presses Plan to Change State Tort Law. 28 Am. Med. News 1,25 (Mar. 1,1985)

physicians per year in New York State during the early 1980s.[10] The New York State Insurance Department reported rates of paid claims per 100 physicians per year of 8.04 to 9.20 for 1980 to 1985.[11] Those projections imply rates of claims filed in the range of 16 to 18 per 100 physicians.[12] Prior to presenting our own analyses and discussing the implications of our contrasting results, we must state explicitly the terms and definitions that lie behind them. For clarity, we present this brief explanation and summary of malpractice claims data in New York State.

A. Terminology

A claim, as commonly understood, is a demand by a patient for compensation for injury and financial loss arising out of medical care. This claim will be entertained by the health care provider or his insurer for one of the following reasons:

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[10] The GAO found the following numbers of physician provider-claims per 100 insured physicians:

Year	Claims Against Physicians Per 100 Physicians
1980	27.1
1981	28.9
1982	31.4
1983	38.1
1984	35.7

U.S. General Accounting Office, Human Resources Division. Medical Malpractice: Six State Case Studies Show Claims and Insurance Costs Still Rise Despite Reforms. December 1986. We cannot reproduce these results for the Medical Liability Mutual Insurance Co. (MLMIC), the source of the GAO estimates, but in its latest informational rate filing, MLMIC's actuary also quotes lower figures.

[11] New York State Insurance Dept., A Balanced Prescription for Change, April 1, 1988, Table 4, p. 58 [hereinafter referred to as Balanced Prescription].

[12] We assume that roughly 50% of claims are paid. See the discussion in section IV.

- A suit for damages has been filed by the injured person (plaintiff).
- The injured person or family member has made either an oral or a written claim for damages, or a statement charging an insured with malpractice and demanding an investigation or explanation.
- An attorney has sent a letter of representation (other than a request only for medical records) to an insured or the insurer's claims department.
- As a result of a loss arising out of clear negligence, the insurer has decided to approach a patient or family for purposes of exploring the possibility of a settlement and avoiding a likely formal claim or suit.[13]

A claim is not confined to formal litigation. Although a suit (litigation in court) is by definition a claim, the converse does not hold. In fact, depending on local practices and customs in the trial bar, many claims can be filed and settled without resort to the courts or litigation. Our figures include all formal claims, whether in suit or not.

Insurers or self-insured organizations will often open a file for investigation even before a patient files a formal claim. They open these observation or potential claim files when a physician or hospital reports that a bad outcome has occurred and might become the subject of litigation. Insurers often encourage their policyholders to report these events in order to permit prompt investigation while the facts are fresh in the minds of witnesses. This practice has led to confusion when these potential claims are included in counts of formal claims. Early reporting as a method of risk management can artificially inflate estimates of the incidence of claims to the extent that the reports never mature into formal claims. This ambiguity in definition is especially likely to bias estimates when the number of potential claims approaches or exceeds the number of formal claims.

As in the GAO closed claims study, we excluded all potential claims from our analyses whenever possible. The Office of Professional Medical Conduct (OPMC) has stressed that all

[13] U.S. General Accounting Office, Human Resources Division. Medical Malpractice: Characteristics of Claims Closed in 1984. April 1987.

hospitals and insurers are regularly instructed to report only formal claims. Nevertheless, our reviewers found isolated instances of reports of so-called claims closed without a formal demand by a patient. Ideally, these reports would be excluded from analysis.

A related concept is the claim that is "incurred but not reported" (IBNR). These are the converse of potential claims in the sense that a patient has suffered an injury for which he will eventually file a claim, but the provider has not recognized and reported the incident. Often insurers and actuaries include in their reports an estimate of such IBNR claims in order to avoid undercounting projected losses. Owing to the customary delay between an event and its report, one aspect of the so-called long tail (see following discussion), the IBNR factor can play a significant role in actuarial projections of losses.

Another source of ambiguity arises when a single insurer covers an institution for both professional liability and general liability coverage. Professional liability insurance covers medical malpractice. General liability covers the accidents that occur in hospitals and clinics but do not involve health care. These accidents might occur to patients not under care but en route to an office (parking lot, entrance, hallway). Although the defendant is a provider of health care, the accident does not involve health care. Claims of negligent supervision of health care personnel, by contrast, involve allegations of malpractice but are sometimes treated as ordinary negligence. We have no information on the extent to which misclassified claims may evade the malpractice reporting mechanism and thus bias estimates of claims frequency.

The incidence and trends of malpractice claims are also affected by ambiguities in the accident (event) date, open date, and close date. In some cases the accident date is unclear owing to the lapse in time between the medical management that caused the injury and manifestation of the injury. An error in diagnosis, for example, might precede the discovery or spread of cancer by a year or more. In addition, the medical management might have continued over a course of years. The temporal

relationship between medical management, injury, and discovery that required special questions about chronology on our Adverse Event Analysis Form (AEAF) (Chapter 5) also applies to claims data. Unfortunately, traditional and current claims data management does not embrace this nuance. The recorded accident or event date of an incident can vary by several months or years.

The open date of a claim does not always mean the date a plaintiff files a malpractice action. As noted above, insurers encourage providers to report events early. The date of the initial report, not necessarily the date of suit, is the open date for the claim file. If the event leads to a formal claim, the open date remains the date of the provider's report. In a steady-state system of malpractice litigation and reporting, this discrepancy would have little practical significance. With efforts to improve early reporting, however, open date information might differ in many cases from claims date or suit date information.

The close date might also be the subject of some inter-insurer variation. We assumed that the date a claim is closed coincides with the date payment is made to a patient or the date of the final judgment. Often, however, the final accounting of litigation expenses postdates the final judgment by several months. Even if these delays are treated consistently by insurers, they do cause a lapse between the close date for indemnity payment and the date on which the insurer can administratively close, archive, and report a final disposition.

Finally, essential to any discussion of malpractice and litigation is a common understanding of how one is counting and reporting formal claims. Our Study addresses issues of compensation for patient losses and issues of incentives and deterrence for providers (Chapters 8 and 9). To investigate these issues we needed to count claims from the perspectives of both patients and physicians. Claims counts will differ according to the frame of reference because frequently one patient will sue several defendants. A single suit against two physicians and one hospital is often reported as three malpractice claims. Occasionally, authors will define the above

situation as one claim. To avoid ambiguity, we refer in this chapter to this situation as one patient-claim and three provider-claims. Because the literature often neglects to distinguish these two perspectives, reports of the numbers of claims can often mislead. In our discussions below, we also examine physician-claims. These are the subset of provider-claims in which the defendant is a physician rather than an institution.

The rates of claims and negligence that we estimate differ from other reports. Much of the difference is likely attributable to differences in definition. We hope, therefore, that the foregoing brief discussion of terms and definitions will assist the reader in interpreting the data and results that follow.[14]

B. Collection of Malpractice Claims Data

1. Methods for ensuring that claims data are complete

a. Statutes and regulations for claims reporting. A common problem with the analysis of claims data is assessing their completeness. We are fortunate because New York State has a central repository for reporting claims. Since the enactment of the 1975 malpractice reform legislation, each professional liability insurer has been obliged to report claims to the Office of Professional Medical Conduct (OPMC) at the Department of Health (DOH).[15] Subsequent amendments required reporting from hospitals that were self-insured or insured by out-of-state carriers.[16] But at the inception of the Study, compliance with these reporting statutes and their accompanying regulations was

[14] In several footnotes we refer to occurrence policies. Very simply, these insurance policies cover the physician for claims with an accident year during the year of coverage. Claims-made policies, by contrast, insure for claims opened during the period of coverage; the accident date is not controlling.

[15] N.Y. Laws 1975 ch. 109, sec 2.

[16] N.Y. Laws 1978, ch. 141, sec 1; N.Y. Laws 1980, ch. 866, sec. 17; N.Y. Laws, ch. 357, sec 1.

less than complete.[17]

At an initial meeting with DOH in December 1987, we defined the technical questions about the OPMC data base and the complications created by lack of full compliance with the reporting statute. Two meetings followed at the New York City offices of the Insurance Department with DOH representatives to discuss problems of reporting.

On May 31, 1988, the Insurance Department issued a circular to all insurers and hospitals informing them officially of the Study, requiring compliance with the earlier reporting requirements, and requesting certification of the number of claims filed and reported.[18] On June 30, 1988, the legislature passed an amendment to clarify the obligation of all hospitals not insured via conventional insurance to report claims to DOH.[19] The DOH followed these notifications with its own July 1988 advisory to all hospitals that they must comply with the applicable law regarding claims reporting or face possible enforcement actions.

b. Compliance with reporting requirements. These efforts produced a level of claims reporting not previously achieved in the state. As of December 31, 1987, OPMC had received 14,814 claims on its 787 reporting form, an average of 2,466 per quarter for the six previous quarters. Between January 1, 1988, and September 30, 1988, OPMC received an additional 12,995 claims, an average of 4,332 per quarter. From October 1, 1988, to June 30, 1989, OPMC received an additional 1,629 reports.[20] These claims included reports from the New York Liquidation Bureau, an agency that manages claims covered by

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[17] On July 9, 1986 the Insurance Department notified all insurers that backlogs of reports required under N.Y. Insurance Law sec. 315 were to be drawn down by August 15, 1988. State of New York, Insurance Dept., Circular Letter No. 6 (1986).

[18] State of New York, Insurance Dept., Circular Letter No. 14 (1988).

[19] N.Y. Laws 1988, ch. 184, sec. 6 (McKinney) (amending N.Y. Ins. Law. sec. 315(b)(2)).

[20] We do not interpret this drop in reporting either as a decline in the frequency of malpractice claims opened in 1988-1989 or as a regression in the level of compliance with claims reporting regulations. Rather, we believe there was a temporary lull after a period of intense effort to obtain data on all possible claims.

insolvent insurers. Only two organizations expressed special needs owing to delays in their reporting schedules. One reported an additional 1,414 claims and allowed Study investigators to inspect litigation records on site; the other could not report prior to the DOH keypunching deadline for the Study but did file 567 hardcopy reports suitable for manual matching. Where necessary, the Study keypunched these data so that it could benefit from all claims reported. In total, we had access to 67,900 provider-claims reported either to the DOH or to the Study.

2. Data Base Descriptions. The claims in our data base have been reported from 1975 through May 1989.[21] Our data come from four sources. First, the older closed claims (32,600 observations) reside on the NAIC data base. On magnetic tape are defendant identifiers, some coded clinical information, and key insurance data such as indemnity payments, expense payment, year of accident, and claim open open, and claim closed years. This data set contains no patient identifiers. Second, the more recent open and closed cases (27,900 observations) reside on the OPMC's 787 data base, which contains some patient identifiers for open claims and a richer set of clinical codes and insurance information than its predecessor. Third, we had access to the OPMC pending file of 787 reports that had not yet passed all edit checks (5,400 observations). Finally, as noted above, we had limited information from two additional insurance programs. These reports contained few patient identifiers in most cases and, for about 1,400 observations, contained no specific information on individual defendants.

3. Checking Data. Our study of litigation relied on the accuracy and integrity of these data sets. Although we checked by computer for out-of-range observations, we relied mainly on extensive manual verification of data elements to ensure

[21] In the case of the two insurance programs with special reporting needs mentioned in the text, we received data in July 1989. Several claims in these two data sets opened after May 1989.

accuracy. We did find errors and corrected those we believed would substantially affect our analyses.[22] Further error checking continues at OPMC and the Medical Practice Study.

IV. Levels and Trends in Malpractice Litigation

This brief overview presents the level and trends of malpractice claims activity in New York State and some comparisons with other reports. Because some data fields were missing with different frequencies, the sum of claims reported usually falls short of the total number of observations in our files.

A. The Long Tail of Malpractice Claims

A barrier to accurate analysis of malpractice claims data is the lag between the accident date and the open date and then between the open date and the close date.[23] For our study this phenomenon bears special importance because we surveyed hospitalizations as recent as December 1984. Our estimates of the incidence of litigation in the sample hospitalizations are sensitive to estimates of the percentage of claims reported.

We calculated two lags, from accident to open and from accident to close, to provide two estimates. First, we needed to determine the percentage of claims with 1984 accident years that we could expect to be open as of the end of 1988 (likely the latest period for which we have data). For the 54,887 usable observations, we found that 50% of provider-claims opened within 1.5 years of the accident date, and 90% within 4.4 years.[24]

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[22] For example, several indemnity payment figures greatly exceeded $10 million, at a time when we knew of no award or settlement above that amount. Subsequent checks with insurers confirmed our suspicion of decimal point misplacement. These high outlier payments would, if not corrected, have influenced mean payment figures.

[23] We should also consider the administrative delay between the open date of a claim and its report to, and processing by, OPMC. At this time, we are not prepared to address this issue.

[24] This result is somewhat surprising considering the 2.5-year statute of limitations in New York. Probably the reason why so many claims are brought after 2.5 years is that the continuous treatment rule permits claimants to file suit within 2.5 years of the date of the final treatment. From our manual review of claims reports at OPMC, we have noted that some claimants allege accident dates over several years. The continuous treatment rule was codified along with other tort reforms in 1975. N.Y. Laws 1975 ch. 109, sec 6. See Chapter 1.

These figures possibly underestimate the length of the tail because for the more recent accident dates, the provider-claims with a long lag are still unobserved (IBNR). Thus, as a check to these estimates, we calculated that for 19,510 provider-claims with accident years from 1975 through 1980, 1,893 (9.7%) opened after four years and 1,330 (6.8%) opened more than five years from the accident. Given that hospitalizations in January 1984 were five years old by the end of 1988, and that those in December 1984 were four years old at that time, we might expect that roughly 7% to 10% of provider-claims are yet to be reported.[25]

As one might expect, the lag from accident to close of claim affects many more of our 1984 hospitalizations. Of 34,057 closed provider-claims in our data bases, only 50% were closed within 5.5 years of the accident; 25% closed after more than 7.5 years; and 10% closed after more than 9.8 years. If these figures hold true for 1984 accidents, and they may well be biased downward, one can expect a long wait before we have the complete results of litigation from sample hospitalizations.

B. Trends of Provider-Claims by Accident Year

1. All Providers. Table 7.1 lists the total number of provider-claims reported by accident year.[26]

[25] We must note that the observations are not independent; the truly independent observations are patient-claims, not provider-claims. Our estimates are not necessarily biased, however: if the number of defendants per patient does not vary with the accident-open lag, then the percentages given for provider-claims should hold for patient-claims.

[26] These are figures "reported." It is an impossible task to ascertain for this table the degree to which reports and reality differ. Our manual review of claims reports at OPMC suggests some degree of over-reporting across insurers. Without the ability to audit insurers and insurance programs, we cannot ascertain the degree of under-reporting.

Table 7.1

Provider-Claims By Accident Year

Accident Year	Provider-Claims	Physician-Claims	Physician Claims as % of Provider-Claims	Claims per 100 Physicians[a]
1975	4,089	3,046	74.5	8.4
1976	3,200	2,256	70.5	6.3
1977	3,385	2,353	69.5	6.6
1978	4,155	2,867	68.7	7.9
1979	4,256	2,896	68.0	7.7
1980	4,320	2,925	67.7	7.6
1981	4,228	2,967	70.2	7.4
1982	4,435	2,992	67.5	7.1
1983	4,926	3,027	61.5	7.0
1984	5,428	3,215	59.2	7.3[b]

[a]For this column we used the number of patient care physicians as reported annually by the American Medical Association. See Roback, Randolph, Seidman & Mead, Physician Characteristics and Distribution in the U.S., A.M.A., Chicago, IL. (1980-1986); Center for Health Services Development, Physician Distribution and Medical Licensure in the U.S., A.M.A., Chicago, IL (1975-1980). Figures for 1984 were not available from the A.M.A.

[b]Estimate from physician counts for 1983 and 1985.

An initial observation is the large number of institutional defendants (the difference between the number of provider-claims and the number of physicians-claims in Table 7.1). Between 30% and 35% of the defendants are hospitals, about 300 in New York State. Table 7.1 suggests that each year hospitals become defendants 1,000 to 2,000 times, or about three to seven times per hospital per year. The average health care institution faces a risk of suit that is 40 to 90 times that of the average physician.

Many analyses of malpractice litigation concern the number of physician claims. What have been lacking, however, are reliable data on the frequency with which physicians are defendants in claims or suits. Table 7.1 offers a statewide estimate of the average number of physician-claims per patient care physician. It is quite possible that the denominators for these figures overestimate the true number of physicians who see patients regularly. Some of the physicians in these estimates are primarily engaged in research, where the risk of causing

injury to patients is low. Others bear substantial administrative responsibilities and devote less time to patient care. Many are residents, insured by hospitals and facing a lower risk of being named personally as defendants. In all such estimates the choice of an appropriate denominator is crucial.

2. Physicians Insured by Two Companies. To adjust for these factors and provide yet another estimate of the rate of litigation among physicians, we chose to confine our analysis to a group of physicians whom we know to be independent policyholders. Here, we chose OPMC data for the Medical Liability Mutual Insurance Company (MLMIC) and the Medical Malpractice Insurance Association (MMIA). Both companies have a reputation for excellent reporting of claims to OPMC. The Insurance Department relied on their data in producing its report in April 1988. Commentators quote their data frequently in descriptions of trends in claims and premiums. Table 7.2 reports the results for these two companies through 1984. The numbers of their policyholders has dropped in recent years owing to the entry of additional insurers into the market and to the establishment of hospital-based self-insurance programs for physicians.

Table 7.2
Physicians-Claims Per Accident Year: MLMIC and MMIA

Accident Year	Number of Physician-Claims[a]	Number of Insured Physicians[b]	Claims per 100 Physicians
1976	2,227	20,100	11.1
1977	2,275	20,520	11.1
1978	2,754	20,391	13.5
1979	2,693	20,593	13.1
1980	2,672	20,603	13.0
1981	2,602	20,914	12.4
1982	2,432	20,349	12.0
1983	2,048	18,286	11.2
1984	1,590	12,433	12.8

[a]These figures are claims reported to OPMC and containing either a physician license number or a physician name. License numbers are required before the data are accepted by OPMC.

[b]These numbers of physicians appear in the Medical Malpractice Insurance Association Rate Filing, November 27, 1985, as the number of "earned doctors." We used these figures to be consistent with the Insurance Department, which relied on data from the MMIA rate filings. See Balanced Prescription, note 11 supra, Table 4, at 58.

There are several reasons why the figures in 7.2 are much lower than those reported elsewhere. First, some studies are based on physician self-reporting.[27]

Second, we are counting here only formal claims, not potential claims. Other estimates might be especially sensitive to an absence of a formal definition of a claim. Actuarial reports often include in their claims total all potential claims reported to the insurer. This practice, although an accepted method of estimating future losses, can lead to severe overcounting of actual claims because many of these potential claims never mature into actual claims.

Third, we are not projecting from IBNR estimates, as actuaries often do to improve the accuracy of their predictions. Unlike the figures presented in Table 1.1 in Chapter 1, all the claims we report have actually been filed.

[27] Zuckerman, Medical Malpractice: Claims, Legal Costs and the Practice of Defensive Medicine, Chicago, IL, American Medical Association (1984). The author reports provider-claims per 100 physicians were 10.8 for the years 1978 through 1983.

Fourth, claims estimates from one period cannot be compared to the numbers of insured physicians from another period. In a statewide analysis, this problem will not occur except in the unlikely event of large fluctuations in the number of physicians practicing. In a company-wide analysis, however, the potential for error arises.[28]

Because we present only reported claims, and because a long lag exists between the accident year and the open year for some claims, we can expect that especially for accident years 1984 and 1983, the number of provider-claims filed will increase, perhaps by as much as 10%, and that the frequency of provider-claims will increase to perhaps 14 per 100 physicians. This estimate can be reconciled with the actuarial projections from MLMIC and MMIA data of physician-claims closed with payment (see Chapter 1, Table 1.1).[29]

These data suggest that the rate of physician-claims has been relatively stable for several years. We defer to the actuaries, who have access to detailed data on claims frequency and reserves, the task of explaining the rationale for increases (and leveling) in premiums.

We present these figures with several caveats. With the advent of several insurers in the market and a number of self-insurance programs, no company is guaranteed that its policyholders will be representative of physicians throughout the state. In one year, for example, a single insurer might have a

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[28] We can explain the GAO reports only by speculating that in its numerator claims the GAO used potential claims and possibly IBNR claims. We cannot recreate the selection of a denominator. Using data we obtained directly from MLMIC on the number of "occurrence" policies and the ultimate number of claims covered by those policies by accident year (claims, potential claims, and IBNR), we arrived at the following:

Policy Year	Ultimate No. Claims per 100 Physicians	
1982	27.7	(4,347/15,707)
1983	27.5	(3,499/12,710)
1984	23.6	(2,944/12,652).

Still, these numbers fall short of the GAO estimates.

[29] If we assume a 0.5 probability of payment, our figures will lead to 7 paid physician-claims per 100 insured physicians. The actuarial projections are 8 per 100, even for years with large numbers of claims still open.

disproportionate number of high-risk surgical specialties, for which the statewide incidence of litigation is higher. Thus, rates of claims for any company must be adjusted for the physician mix of its policyholders, just as rates of adverse events for a hospital need to be standardized for the case mix of its patients (see Chapter 6, section II). This report does not attempt to address this issue empirically. Such adjustments now appear in actuarial reports.[30]

C. Patient-Claims

The previous tables in this chapter deal with provider-claims. Few studies, the notable exception being the landmark GAO nationwide survey of claims closed in 1984, ever report numbers of patient-claims. Although our data bases were not designed to count patient-claims, we have attempted to arrive at reasonable estimates (Table 7.3).

As we describe in section III, the NAIC data base of closed claims does not identify the patient. In addition, although the newer and more comprehensive 787 data base contains patient identification information, it does not attempt to link provider-claims by patient. Thus, if the defendants in a patient-claim are, as is often the case, covered by different insurers, which use different claim numbering systems, it is impossible to

[30] Kaufman and Biondi, Medical Liability Mutual Insurance Company: 1989-90 Rate Analysis. On file at the Property and Casualty Bureau, State of New York Insurance Department, 160 West Broadway, New York, N.Y. When data are adjusted for specialty mix of the policyholders, the frequency of claims can change substantially. In this 1989-1990 rate analysis, MLMIC's actuaries offer these projections of paid claims per 100 "base class equivalent doctors" with occurrence policies only.

Policy Year	Paid Claims per 100 Base Class MDs
1980	4.83
1981	5.53
1982	4.90
1983	4.27
1984	4.60
1985	4.09

These figures are between 50% and 60% of the levels in the Insurance Department reports. Claims are the same; only the denominators are different.

determine by computer the number of provider-claims that belong to a single patient.

To overcome this problem we undertook to estimate manually the number of provider-claims per patient. For all reported provider-claims with a 1984 accident year for which we had patient information (4,752 observations), we printed a list sorted by patient last and first name. Then, using data on the time of the accident, we manually linked provider-claims by patient. Among the 4,752 provider-claims, we found 3,187 patients, or 1.49 provider-claims per patient. To cross-validate our results, we used the somewhat more complete data from three self-insurance programs that represent both hospitals and physicians. Without a manual check, we were able to link 2,083 provider-claims with 1,312 patients, or 1.59 patients per provider-claim. Because of the closeness of these two estimates, we feel that an estimate of about 1.5 provider-claims per patient is approximately correct. Table 7.3 reflects a year-by-year estimate of patient-claims using this value.[31]

Table 7.3
Patient-Claims by Accident Year

Accident Year	Patient-Claims (Estimates)	Admissions[a] Nonfederal (millions)	Patient-Claims Per 1,000 Admissions
1975	2,741	2.72	1.01
1976	2,146	2.73	0.79
1977	2,270	2.69	0.84
1978	2,787	2.64	1.06
1979	2,855	2.66	1.07
1980	2,901	2.65	1.10
1981	2,837	2.67	1.06
1982	2,981	2.66	1.12
1983	3,415	2.67	1.28
1984	3,783	2.68	1.41

[a]We obtained these data from the annual series, American Hospital Association Hospital Statistics, Chicago, IL, 1975-1988.

[31] For one set of hospitals, all claims are reported by patient-claim. These figures were not adjusted but were added to the adjusted totals of the provider-claim reporters. For this reason, the estimated number of patient-claims is not simply 0.67 times the number of provider-claims in Table 7.1.

D. Indemnity Payments per Provider-Claim

For the patients in our sample, we wish to estimate the number of patients who will eventually obtain compensation via the civil courts, and if they prevail, the amount of compensation they will recover. We could not estimate this number of patients directly from an analysis of patient-claims because the 787 claim file with patient identifier contains mostly open cases. For that reason we used provider-claims to arrive at a lower bound for this estimate.

Table 7.4 lists the empirical probability that any one provider-claim will close with some payment to the patient. Because many patients will name more than one defendant when they file suit, however, these figures do not reflect the probability that a patient will receive compensation, although they are a lower bound on that probability. To the extent that patients file claims against more than one defendant but receive compensation from only one, the probability of compensation will exceed these figures.[32] Although we have not yet calculated precise adjustments to these figures, we are satisfied that roughly one half of patients who file claims receive some compensation.

[32] To explain this point, we pose a simple example of one claimant and two defendants:

If the probability that a single defendant will pay indemnity to the patient is 0.43, then the probability that the patient will prevail is 0.57 (1-0.43). Assume that if the codefendant prevails, the other defendant faces only a 10% chance of being found liable. Then, the probability that both defendants will pay nothing is 0.51 (0.9*0.57). Under these conditions, the probability that the patient will receive some compensation from either defendant is 0.49 (1-0.51). This simple example shows how a patient has a greater chance of receiving compensation than the figures in Table 7.4 suggest.

Table 7.4
Probability of Payment: Provider-Claims, By Year Closed

Year claim closed	Closed	Paid	Probability that defendant paid*
1975	2,886	1,031	0.36
1976	2,236	795	0.36
1977	2,459	931	0.38
1978	2,335	1,123	0.48
1979	2,590	1,372	0.53
1980	2,576	1,266	0.49
1981	2,698	1,303	0.48
1982	3,396	1,625	0.48
1983	3,966	1,735	0.44
1984	3,088	1,395	0.45
1985	3,544	1,445	0.41
1986	3,932	1,624	0.41
1987	4,153	1,634	0.39
1988	2,490	994	0.40
1989	68	27	0.40
All Years	42,417	18,300	0.43

*The probability that the claimant received payment from any defendant is very likely higher than these figures. See note 32 and the text for an estimated probability of 0.5 that a patient will receive compensation.

E. Indemnity Payments per Patient-claim

When a patient does litigate and recovers some indemnity payment, the level of compensation rarely becomes part of the record in a reliable data base. As with estimates of patient-claims, current claims data bases are not designed to obtain these data. Most of the claims closed in New York are reported to the NAIC data base, which contains no patient identifiers. Thus, a direct estimate of the compensation per patient is not now possible because we cannot aggregate closed provider-claims into patient-claims.

Table 7.5 reports the total as well as crude (current dollar) and adjusted (constant dollar) average and median indemnity payments for provider-claims by year closed. Given our previous estimate of 1.49 defendants per patient-claim, we can suggest that on the average a patient prevailing at trial will receive 50% more than these figures suggest. This result follows because the total indemnity payments by all defendants

would be divided among a group of patients that is two thirds the size of the group of defendants.[33]

Table 7.5
Indemnity Paid: Provider-Claims, By Year Closed

Year Claim Closed	No. PAID	TOTAL PAID	AVERAGE PAID	MEDIAN PAID	ADJ AVG (Base yr=1982)	ADJ[a] MEDIAN (Base yr=1982)
75	1,031	32,010,538	31,048	10,000	52,446	16,892
76	795	22,501,900	28,304	8,500	45,215	13,578
77	931	32,558,386	34,971	11,250	52,431	16,867
78	1,123	45,854,016	40,832	15,000	57,028	20,949
79	1,372	66,619,269	48,556	17,305	62,092	20,950
80	1,266	73,674,603	58,195	19,500	67,200	22,517
81	1,303	84,128,246	64,565	22,900	68,251	24,207
82	1,625	118,392,241	72,857	22,500	72,857	22,500
83	1,735	164,747,139	94,955	30,000	91,215	28,818
84	1,395	142,208,235	101,941	25,000	94,303	23,127
85	1,445	170,440,233	117,952	32,500	105,502	31,925
86	1,624	214,876,933	132,313	50,000	115,760	43,744
87	1,634	246,632,255	150,938	60,000	126,308	50,209
88	994	157,461,644	158,412	59,146	127,239	47,469[b]
All	18,273	1,572,105,638				

[a]These adjusted figures are inflated or deflated to constant 1982 dollars using the GNP consumption deflator for personal consumption expenditures. Table B-3. The Economic Report of the President, 1989. Washington, D.C., 1989.

[b]The drop in 1988 counts, total indemnity, and median payments should not be read as a drop in the frequency of claims closed, but rather as incomplete reporting of recent closings to OPMC. Our deadlines have precluded our waiting for complete reporting for recent months.

Total indemnity payments and average payments per claim depict the increase in malpractice payments statewide and thus the increase in aggregate cost of the malpractice system. The increases are substantial even after adjustment for inflation. Averages do not represent the typical indemnity payment, however, because they can be influenced by relatively few large payments.[34] More representative of a typical payment is the median (50th percentile) payment, which is not influenced by large outliers. In recent years, median payments per provider-

[33] This result would not hold if in most cases of multiple defendants per claim the patient received compensation from only a single defendant. As stated in the text, we could not determine whether the ratio of patients to providers for all claims holds for paid claims.

[34] Localio, Variations on $962,258: the Misuse of Data on Medical Malpractice, Law Med. & Health Care 126-27 (1985). The distribution of payments is skewed to the right.

claim have more than doubled from 1975 levels, when the first malpractice "crisis" struck New York (see Chapter 1). If our estimates of the number of defendants per patient are valid, the typical successful patient now receives about $90,000 from all defendants.[35] Because the claims paid after trial are higher than those paid during settlement, the figures for the more recent years are likely biased downward by the omission of open claims.

With this background on the malpractice claims data used by the Study and with these estimates of the rates of claims for both provider and patient, we proceed with an analysis of the patients in our sample of hospitalizations.

V. Matching Claims and Hospitalizations

A. Hospitalization Data

1. Description of the Sampling Design. Our sampling method produced a random sample of hospitalizations in New York State in 1984 (see Chapter 4). To obtain unbiased measures of the incidence of injury caused by medical management and the subset of those injuries caused by negligent medical care, we chose to count only events discovered in 1984.[36]

2. Adverse Events and Negligence. As described in Chapters 5 and 6, for each record we had access to all data in the SPARCS (Statewide Planning and Research Cooperative System) data system. These data included patient descriptions, address, and diagnostic and procedure data coded under the ICD-9 system. For all records

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[35] We obtain this figure by multiplying the median indemnity per provider-claim for the last several years (see Table 7.5) by 1.49. As we explain above, we cannot determine directly the number of patient-claims per provider-claim for closed cases. We must build on our prior estimates although we are aware that they might overcorrect. Patient-claim averages and medians must be greater than provider-claim average and medians simply because the total indemnity payments are being divided among fewer patients than there are defendants.

[36] See Technical Appendix 5.III.1 to Chapter 5.

located on our initial visit to the hospitals (30,195), we recorded patient name and, where available, Social Security number. For 74 of these records, physicians did not conduct reviews. This analysis of claims considers 30,121 sampled records. For the 4% of medical records we failed to locate on first visit, we conducted an extensive follow-up search and review. The implications of missing records for this analysis appear at the end of the chapter. For all cases located and judged by at least one physician-reviewer to be adverse events, we had descriptions of the nature of the injury.

B. Matching Process

A key to this portion of the Study was our ability to match records from the Study sample with records from claims data bases. As explained in Chapter 8, we did not question patients interviewed about their own malpractice claims experience, if any. To determine which patients had litigated, therefore, we needed a process for linking medical records with litigation records.

1. Exact Matching for Record Linkage. Exact matching is the process for linking a "base" data file with a "reference" data file by means of a set of identifiers in both files. Exact matching is not always exact, however. Identifiers are not always common in both files; they have different definitions. For example, although the date of hospitalization from our medical record review was reliable in virtually all cases, the date of accident in the claim data might vary depending, for example, on the need of the plaintiff to allege facts sufficient to satisfy the statute of limitations for filing suit. Often missing were common identifiers, such as Social Security number, which are powerful predictors of a match of two records. For speed and accuracy, we chose to employ both computer and manual matching techniques.

Matching index hospitalizations with claims proceeded in several stages. First, we used computer exact matching to identify potential matches. The computer permitted rapid

reduction of the list of 30,121 hospitalizations and 68,000 claims to a smaller list of potential matches. Computer matching algorithms allowed for errors or differences in name spelling (see Technical Appendix 7.V.1). Next, we used manual matching to link additional descriptive information from the sample and the claims data bases and to confirm the identity of patient and claimant. Manual matching, a common step in record linkage processes, was especially effective for our records because of the amount of descriptive information that was not coded into machine-readable format.

In approximately 100 cases of potential matches, OPMC malpractice files failed to contain descriptions of the event because the insurers had reported via magnetic tape or disk rather than by hardcopy. For these cases, OPMC requested additional descriptive data from the insurers.

2. Manual Exact Matching of Claims to Hospitalizations. We used manual matching to determine whether the sampled patient's claim alleged malpractice in the medical care delivered or discovered in the sample hospitalization. Unlike the processes described above, this record linkage required analysis of all available clinical information on patient care. From the medical record review's Hospital Record Screen and Adverse Event Analysis Form, and from the SPARCS data set, we studied coded discharge data, notations of the medical record administrators (MRAs) who screened the records, and all physician-reviewer descriptions of the medical management and outcome. From the claims data we checked the coded information on the OPMC records and especially the written summaries provided by insurers. A team consisting of a physician-lawyer, an attorney experienced in malpractice claims data, and a health services specialist together examined each potential match. For each case, the group rated its confidence of a match using a scale of 0, 1-6, and 9. A score of 0 meant that the group was confident of a non-match, while a score of 9 meant that the group lacked sufficient information to support a judgment. All other judgments were on the 6 point scale

analogous to that described in Chapter 5 for the medical record review. The group scored each case by consensus.

VI. Results of Litigation Review

A. Results of the Matching Process

Our computer and manual matching of claimants and patients produced 98 persons who filed claims against 151 health care providers. The ratio of provider-claims to patient-claims (1.54) agrees well with the overall ratio (1.49) estimated in section IV of this chapter.

For these 98 persons, we matched the accident out of which the malpractice claim arose with the medical management and, where applicable, the adverse event discovered in the index hospitalization. For 48 of the 98 persons, we linked claim and sample hospitalization with a degree of confidence of "more likely than not." As Table 7.6 reflects, in most cases our judgments were very confident for or against linkage of claim and sample hospitalization. In the four cases in which data were insufficient, we chose to defer judgment rather than to guess. The analysis proceeded with the 48 individuals with confidence ratings of 4,5 and 6.

Table 7.6
Results of Matching Claims to Hospitalizations

Rating	Confidence in Judgment	Number of Persons	Percent
0	Non-match	44	44.9
1	Little Evidence	1	1.0
2	Slight to Modest	0	0.0
3	Not quite likely	1	1.0
4	More than likely	4	4.1
5	Strong evidence	2	2.0
6	Virtually certain	42	42.9
9	Insufficient Data	4	4.1
	TOTALS	98	100.0

B. The Incidence of Litigation and the Incidence of Adverse Events Caused by Negligence

As section II suggests, a major issue addressed by the California Study in 1974 was the relationship of actual medical negligence and subsequent litigation. In subsection C we analyze this issue with the detailed results of our medical record review. Here, we offer somewhat cruder estimates using several techniques for comparing the relative frequency of negligence and litigation during a comparable period of observation.

Because we were seeking incidence rates for both negligence and litigation, we needed to adjust for possible double counting of both events. Technical Appendix 5.III.1 explains why our sampling design, without a correction, would lead to overcounted adverse events and inflated incidence rates when the event could be uncovered via more than one hospitalization. Using the same logic, we had to exclude claims that arose out of adverse events caused by medical management in the index hospitalization but first discovered later. Of the 48 matched cases noted above, one case fit this criterion and was excluded, leaving 47 for inclusion in estimates of incidence.

These 47 cases, out of the total of 30,121 we reviewed, represented a New York State total of 2,967 events or 0.1% of the total discharges. From the medical record review of the same cases, we found 1,133 adverse events, which represent a population total of 98,609 discharges and 280 instances of negligence from a state total of 27,179. Thus, in our sample we found an incidence of litigation of approximately 10.9% (2967/27,179) of the frequency of negligence, i.e., nine patients suffer adverse events from negligent medical care for every patient who files a tort claim.

As we explain in section II in the discussion of Danzon's figures, the proper choice of a comparable set of malpractice claims data is essential to estimation. To cross-validate our estimate we used the actual number of patient-claims reported in New York for event year 1984 as well as the number of patient-claims opened in 1984, 1985, and 1986. For several reasons figures for claims opened in these years have merit as estimators

of the incidence of litigation for injuries discovered in 1984. First, as we have discussed, frailties in the definition of accident date in claims data make it unwise to rely heavily on a single annual figure. Second, we have estimated the incidence of negligently caused adverse events discovered in 1984 rather than caused in 1984. Therefore, we considered the number of patient-claims opened in 1984, 1985, and 1986 as proxies for the true rate of patient-claims arising out of injuries discovered in 1984. We did not rely on the number of claims closed during 1984 and following years. The long lag between accident date and close date for many claims undermines efforts to compare rates of negligence with claims closing rates.

Table 7.7 reports our estimates of ratios of adverse events from negligence and patient-claims. Estimate 1 flows from the matching of sample hospitalizations and malpractice claims. Estimates 2-5, which rely on statewide totals for patient-claims, use the predicted statewide number of adverse events from negligence in Chapter 6.[37] All five estimates suggest that the incidence of negligence is several times the incidence of litigation for a comparable period of study.

Our figures, based on independent estimates of negligence (Chapter 6) and several alternative measures of patient-claims (Table 7.7), largely confirm Danzon's estimates based on the California Medical Association study of 15 years ago. Although these ratios of negligence per patient-claim are slightly lower than for 1974 in California, they exceed Danzon's projection of 5:1 for the 1980s. Using a rule of thumb that one half of the patient-claims will eventually be paid, we provide an approximation of the ratio of negligence to paid patient claims.

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[37] Estimate 1 might be high to the extent that not all patients in our sample have yet filed claims arising out of the index hospitalization. On the other hand, estimate 1 might be low to the extent that our estimates of negligence in Chapter 6 are low. Likewise, estimate 2 might be subject to 2 errors in opposite directions: it is high if not all claims are reported or filed, but it is low if our negligence estimates are low.

For estimates 3-5, the number of claims opened will likely not change unless reporting is late. These figures are low if the negligence estimates in Chapter 6 are low. Estimates of the negligence per paid patient claim are, in addition, sensitive to estimates of the relative frequency of paid to total patient-claims.

Table 7.7
Estimates of Relative Frequency of Negligence and Patient-Claims

Estimate Number	Data Used in Estimate	Adverse Events Due to Negligence per Patient-Claim	Adverse Events Due to Negligence per Paid Patient-Claim
1	Sample of 30,121 Records	9.2	18.4
2	Patient-Claims with Accident Year 1984 (3,782)	7.2	14.4
3	Patient-Claims Opened in 1984 (3,821)	7.1	14.2
4	Patient-Claims Opened in 1985 (3,888)	7.0	14.0
5	Patient-Claims Opened in 1986 (3,306)	8.2	16.4

C. Results of Medical Record Review for Claimants

The foregoing analysis on the relative frequency of negligence and litigation is based on the methods first used by Danzon but uses our own data on negligence and claims. The analysis, which is similar to others in the literature, assumes that all claims arise from negligent AEs. Our data permitted a test of that assumption. As suggested earlier, the aggregate figures do not rely on a precise matching of hospitalizations and claims. With a case-by-case follow-up from discharge to litigation, however, we could determine when negligent medical care led to litigation.

When we matched claims with hospitalizations, far fewer than 1 in 8 instances of identifiable injury from negligence resulted in a claim. Table 7.8 combines the results of the medical record review with claimants in the sample. Each row of the table represents a subclass of the sample defined by the stage of review. As one would expect, the percentage of claimants in the sample increases as the findings of the reviewers rise in severity from no screening criteria met to adverse event caused by negligence. At all levels, however, the percentage of claims is tiny. Although the crude comparisons in Table 7.7 suggest

that there are 7 to 9 times the number of injuries from medical negligence as there are malpractice claims, our microanalysis reveals that for a given sample of adverse events with negligence, the rate of litigation is far lower.[38]

Table 7.8
Rate of Malpractice Claims in Sample of Medical Records

Medical Record Review Sample Subclass	Number of Claimants in Subclass	Percent of Claimants	Number in Sample	Percent of Claimants in Sample Subclass
				(Weighted)
Cases not referred by MRA	12	25.5	22,378	0.045
Cases referred; no possibility of AE	14	29.8	6,275	0.18
Low threshold AEs (less than likely)	3	6.4	335	0.30
AEs (more than likely) No Negligence	10	21.3	853	0.79
AEs (more than likely) Negligence	8	17.0	280	1.53
TOTALS	47	100.0	30,121	0.10

1. Patient-Claims Screened Negative at Stage 1 Review. As Chapter 5 describes, during the first stage of the medical record review MRAs screened for the presence of any of 18 criteria that suggest the possibility of an adverse event. One criterion was the presence of correspondence or notations in the medical record indicating that the patient had filed suit.

For twelve of the cases in litigation the MRAs, working prior to our review of claims, did not note any clinical criteria

[38] We are aware from a preliminary follow-up of medical records missing at the first visit to hospitals (see Chapter 6) that some hospitalizations not initially reviewed have been followed by litigation. Because of the small number of malpractice claims in our sample, these additional cases could have a major impact on the rates given in Table 7.8 by stage of record review. A follow-up analysis is underway to determine the impact of the missing cases on our estimates. We deal more with this issue in Section VIII.

warranting a physician review. The medical record review process stopped at that point. Table 7.9 summarizes the results of our analysis of those twelve claims.

In five of the twelve cases the allegation is failure to diagnose. All five appear to involve medical management during ambulatory visits prior to the index hospitalizations. As explained in Chapter 5, our medical record review is designed to uncover adverse events caused by medical management outside the hospital and serious enough to warrant inpatient treatment for the resulting injury. The same situation holds for one of the failed treatment cases. For these six records not flagged for review, the question arises whether these patients truly had adverse events, and if so, whether the screens are insufficiently sensitive to uncover injuries from outpatient management. In diagnostic errors, identification of an adverse event of necessity involves a determination of what would have happened in the presence of appropriate medical management. In other words, determinations of causation and negligence are intertwined. When the management occurred in an outpatient facility, screeners looking at the hospital medical record might have difficulty in spotting the shortcomings in medical management, because the events during hospitalization might be consistent with optimal treatment of the underlying disease (e.g., cancer).

For two claimants, the true allegation is impossible to determine. One patient appears to be acting pro se (without an attorney); the other seems to allege as an injury a psychiatric complication that our reviewers did not seek and were not trained to uncover.

Table 7.9
Litigants with Medical Records Negative for Screening Criteria

Allegation	Number of claimants
Failure in treatment	4
Failure to diagnose cancer	2
Failure to diagnose other condition	3
Birth-related neurologic deficit	1
Cannot Determine allegation	2
TOTAL	12

2. Patient-claims Found Negative by Physicians. In 14 cases, the physicians reviewed the record and found no adverse event. For most of these cases, the physicians examined the outcome and concluded that the cause was the underlying disease rather than medical treatment. In 9 of the 14, the reviewers knew of the possibility of pending litigation, but still could find no evidence of injury from medical management. In 4 cases, however, the two physician reviewers disagreed on the issue of causation. A senior physician who sought to resolve the discrepancy (see Chapter 5), found no causation. Therefore, the case was scored as having no injury caused by negligence. In this group, as with the cases not screened by MRAs, one-half (seven cases) of the allegations involved failure to diagnose. We could not determine the substance of one allegation.

These results are in keeping with the well-known fact that most malpractice litigation involves a disagreement among experts. In these 14 cases, our physician reviewers took a stand opposite to that of the plaintiff-patient's expert. In several instances our reviewers disagreed among themselves.

3. Low-Threshold Adverse Events. As explained in Chapter 6, for the low-threshold adverse events the physician reviewers as a team found causation of injury with "less-than-likely" levels of confidence. For the three cases in litigation, the confidence levels were borderline. In one case, one reviewer found negligence with a level of confidence of "more likely than not"; the other found no negligence.

4. Adverse Event: No Negligence Either Review. Of the 10 cases in which reviewers found adverse events but no negligence, 4 involved complications of surgery. In only one case did a single reviewer record even slight confidence of negligence.

5. Adverse Event: One Reviewer Found Negligence. In the remaining 6 adverse events in litigation, one reviewer found negligence with a confidence level of "likely or greater" (see Chapter 5).

6. Adverse Event: Negligence. Eight of the 47 cases in litigation involved findings of negligence by the team of reviewers. Because the reviewers worked independently, we feel that these determinations are more reliable than if the judgment had been made by a single physician (see Chapter 5).

The foregoing review of each category of the 47 cases in litigation highlights a caveat to our findings. The combination of a small number of cases in litigation and the uncertainty about some findings of negligence leads to instability in the estimate of the fraction of adverse events with negligence that precipitate litigation. For example, suppose that the following cases not judged to be negligent according to the Study protocols proved in fact to be instances of negligence: the 5 cases with allegations of failure to diagnose and not caught by the MRA screen; the 4 cases in which physicians disagreed on causation; the 1 low-threshold AE for which one reviewer found negligence; the 1 AE with a single, low-confidence finding of negligence; and the 6 AEs with a single finding of negligence. The addition of these 17 cases to the 8 with clear evidence of negligence would triple the percentage of claims with findings of negligence from 17% to about 50% (25/47).[39] Likewise, the fraction of cases of negligence in litigation would under this hypothetical example rise from 1.5% to 4.5% or more. Thus, the change of only a few cases produces large relative changes in estimates based on very small samples.

The figures of 1.5% or 4.5% are below the comparable estimate from the preceding analysis that the number of paid claims is about 1/16 (6%) of the number of negligent injuries. One might be tempted to conclude that we have understated the incidence of negligent adverse events in Chapter 6. This inference is unwarranted. First, we must emphasize that the Study's judgment of negligence follows a protocol that requires a disabling injury and two independent findings of negligence. Our definition of negligent adverse event does not encompass all the valid grounds for a malpractice claim. For example, claims are

[39] This figure is unweighted and is designed only to elucidate the hypothetical sensitivity analysis.

sometimes paid when pain and suffering are the only loss. Second, the 6% estimate arises from a simple comparison of the incidence of negligence and the frequency of claims. Because few of the sample cases in litigation are closed and because we did not have access to litigation files, we can offer no judgment on the prospects of individual cases in litigation. Therefore, we cannot assert that claims found not to be negligent adverse events under the Study protocol are frivolous. It is also possible that some claims are in fact non-meritorious, but we cannot make such a determination.

D. Comparisons of Claimants and Non-Claimants

Because of the extremely small numbers of adverse events and negligent adverse events that produced litigation in our sample statistical comparisons between claims and non-claims are not meaningful. We can report, however, that claimants who suffered adverse events are similar to non-claimants in terms of demographic characteristics, and they suffered disabilities that ranged from minor to major-permanent. Further, claimants as a percentage (weighted) of all patients in the sample are most numerous in Nassau and Suffolk Counties. Table 7.10 presents the rates of claims in our sample according to the four geographic regions approved by the Insurance Department for malpractice premium rate setting. Because of the small numbers of cases with both malpractice claims and negligence, we cannot determine whether the higher rate of claims on Long Island results from a higher rate of negligence or from a higher rate of litigation in which negligence is present.

Table 7.10
Litigation by Place of Hospitalization

	Malpractice Premium Rating Zones			
	Nassau Suffolk	Bronx,Queens Brooklyn, S.I. Rockland, Sullivan	N.Y. Orange Ulster Westch	All Others
Claimants (Wtd percent)	13 (0.22)	11 (0.12)	12 (0.12)	11 (0.06)
Others	4,911	6,346	7,999	10,818

E. Litigation as Indicator of Adverse Events and Negligence

Overall in our sample of 30,121 hospitalizations, the adverse event rate was 3.7% and the negligence rate among those cases of adverse events was 27.6% (see Chapter 6). Our analysis of cases in litigation suggests that the presence of a claim might be an efficient screen for both adverse events and negligence.

Table 7.11 displays the weighted rates for adverse events and negligence in the sample of cases with malpractice claims and the sample of all other cases. Among claimants a third (32.9%) suffered an adverse event, and of these nearly half (42.5%) suffered an adverse event caused by negligence. Of non-claimants, 3.66% suffered an adverse event. Thus, both negligence and adverse event rates were dramatically higher among the claimants, as one would expect. An implication of these findings is that the yield of adverse events from a review of medical care in litigation is ten times that of a review of a random sample of records.

Table 7.11
Adverse Event Rates, Negligence Rates
Among Claims and Non-Claims

	Adverse Events		Negligence Among Adverse Events	
		(weighted %)		(weighted %)
Claimants	18/47	(32.9)	8/18	(42.5)
Others	1115/30074	(3.66)	272/1115	(27.4)
TOTALS	1133/30121	(3.69)	280/1133	(27.6)

F. Characteristics of Negligent Adverse Events Not in Litigation

According to our estimates in Tables 7.7 and 7.8, the pool of patients with injuries from negligent medical care is far larger than the pool of claimants. One possible explanation might be that these patients suffered minor injuries of insufficient monetary value to interest trial lawyers in taking the case on a contingent fee basis. The ability of patients to seek redress and compensation via courts depends on the functioning of the market for legal services. These services are provided by personal injury specialists who are in the business of accepting cases that will return a profit in the form of a contingent fee. These attorneys tend to accept clients whose injuries bear a combination of: a high probability of negligence and thus a high probability of producing a favorable jury verdict and court judgment, and a large damage award if the verdict is favorable. A large award is a function of: (a) the degree of patient disability; (b) the level of lost wages and earning capacity; and (c) the remaining life expectancy of the injured patient. Patients with less severe injuries must rely on their own insurance and financial resources.[40] To shed further light on this possibility, we limited our analysis to adverse events discovered in 1984 with at least a strong likelihood of negligence in medical care and with no evidence of litigation.

[40] The same argument could apply to patients with limited financial losses from their injuries. Holding other factors constant, those patients with lower compensable losses (lower wages or limited earning capacity) might find access to the courts more difficult. Our data will not, however, support an empirical investigation of issues of access to the courts by injured patients.

Our results support the hypothesis that most of the patients who have injuries from negligent care but who have not filed claims have injuries and/or life expectancies that would likely render their tort claims of limited monetary value.[41]

Table 7.12 reports the estimated population totals of these patients, cross-classified by age and disability. First, we eliminated those reviews for which the physician could not determine the level of disability from the adverse event. Then we confined the analysis to cases for which the team of reviewers found strong or certain evidence of negligence.[42] Projecting to the population from this subsample of our data, 12,859 discharges resulted in the degree of disability shown and did not lead to litigation. Of these, 10,026 involved either temporary disability (complete recovery within 6 months) or persons over age 70.[43] Thus, most of the non-litigants (78%) one would expect to have claims of limited financial value and therefore of limited interest to the trial bar.

The remaining pool of non-litigants with injuries from medical care (2,833 discharges[44]), although small relative to the total number of cases of negligence, is large relative to the number of malpractice cases filed. Given that the total number of patient-claims ascribed to accident year 1984 was 3,783, the projected additional 2,833 persons under age 70 and with moderate or greater disabilities would have added 75% to the malpractice claims frequency if they had litigated. If we assume that 50% of the 3,783 malpractice claimants would receive an award or settlement, then these additional 2,833 persons represent an additional 1.5 times the number of persons currently receiving

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[41] Because of the very small number of adverse events with both negligence and litigation, the same statement could actually be made of all adverse events with negligence in our sample. Our Study cannot answer the question why, of the 280 patients who suffered adverse events from negligent medical care, 8 patients filed malpractice claims and 272 others did not.

[42] This level of confidence corresponds to levels 5 and 6 on a scale of 1 through 6, as explained in Chapters 5 and 6.

[43] This figure, the estimated total number of discharges in the state in 1984, is the sum of the cell entries in the left and lower portion of Table 7.12.

[44] This figure is the sum of the cell entries in the upper right portion of Table 7.12.

compensation via the tort system.[45]

Table 7.12
Adverse Events with Strong Evidence of Negligence
Not in Litigation
Statewide Estimates by Age and Disability Category[46]

Age Category	One	Two	Three	Four	Five	Six
Newborn	93	13	0	0	0	0
0-15	327	95	17	0	35	99
16-44	1,690	179	28	195	0	404
45-69	1,375	854	262	198	128	1,467
70+	1,822	1,015	96	222	101	2,144
TOTAL=	12,859 discharges					

In short, our data suggest that injuries caused by medical negligence and not resulting in litigation are predominantly minor or occur to persons with limited life expectancies. We do not mean to suggest that these injuries are acceptable or should not be compensated, but simply that the present-day market for legal services tends to exclude these claims of limited financial value from litigation.

We performed a similar analysis for all adverse events (i.e., including those with no negligent medical management), for which the patient has not litigated, to determine the possible extent of uncompensated injury. Table 7.13 reports this much larger pool of persons with adverse events for which the

[45] We do not know the extent to which deaths caused at least in part by medical management occurred to patients whose life expectancies were limited by underlying disease. We should caution that because such a large fraction of these adverse events with negligence resulted in death, the estimates in the text are very sensitive to assumptions about the financial viability of potential malpractice claims. For example, 1,467 of the estimated 2,833 discharges (52%) were deaths of patients over age 45.

[46] We describe the disability categories in Chapter 5, Table 5.1. Briefly, they are as follows:

one	Minimal impairment (1 month recovery)
two	Moderate incapacity (recovery within 6 months)
three	Moderate incapacity (recovery more than 6 months)
four	Permanent disability
five	Permanent disability requiring personal/nursing support
six	Death.

reviewers could determine the level of disability from the injury. All figures represent estimates of the statewide discharges represented by the cases in our sample. Table 7.13 includes all adverse events for which the combined level of physician confidence in causation was "more likely than not" or greater.[47] The following analysis is based on 1,115 cases (1,133 adverse events minus the 18 adverse events in litigation), using the weighted totals of those observations.

Table 7.13
Adverse Events Not in Litigation
Statewide Estimates; By Age and Disability Category

	Disability Category					
Age Category	One	Two	Three	Four	Five	Six
Newborn	828	175	0	85	16	15
0-15	3,607	308	99	67	17	260
16-44	16,819	2,675	431	818	16	1,014
45-69	19,633	5,372	1,279	1,600	405	4,490
70+	14,858	4,885	888	2,352	679	7,670

A large percentage (88.4%) of these adverse events involved no worse than moderate incapacity with recovery within 6 months or happened to persons over age 70.[48] The upper right quadrant of Table 7.13 represents those patients (10,612) under age 70 for whom disability is at least moderate and recovery will take more than 6 months. This projected total should be compared with the estimate above of the number of claimants (1,891) who will eventually receive compensation from malpractice litigation. According to these estimates, the pool of uncompensated persons who have suffered moderate to severe disabilities (including death) from adverse events arising out of medical care will be

[47] The level corresponds to ratings 4, 5, and 6 for causation. See Chapter 5.

[48] This figure is the sum of the cell entries in the left and lower portion of Table 7.13.

more than five times the number of successful malpractice claimants.[49]

VII. Discussion

Our analysis of malpractice claims, both all claims reported to the DOH and those involving our sample patients, suggests that while malpractice premiums have increased substantially in the past decade, the incidence of litigation remains far below the incidence of injuries caused by medical negligence. The pool of patients or their survivors with incapacitation and losses from negligence is large compared with the pool of persons now filing malpractice claims. We should note again that because the number of malpractice claims in our sample is small, our estimates are sensitive to possible biases from missing data.

A. Missing Medical Records

Of the 31,429 records in our initial sample, 658 have not been located. Because the SPARCS data set does not include patient name or Social Security number, we were unable to identify these patients or to determine whether they have filed malpractice claims. Compounding the problem of our lack of these record-linkage identifiers from SPARCS is the absence of medical record numbers on many claims reported to OPMC. At present, therefore, we cannot determine with certainty the incidence of litigation in the hospitalizations not found.

To address this problem we are trying, as part of our missing record follow-up at all sample hospitals (see Chapter 6), to identify all medical records associated with legal proceedings or with indications that attorneys are representing patients for any reason. We have asked our participating hospitals to allow us access to all records, regardless of whether they are sequestered in a risk management or general counsel's office. Analysis of these additional records continues, and results will appear in a supplemental report.

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[49] As Chapter 8 shows, many of these individuals not compensated through civil litigation might receive benefits through health or disability insurance policies or programs.

The absence of data from missing records from the analyses does not invalidate our population projections. If the located records represent an unbiased sample of hospitalization, then our estimates of population totals for adverse events, negligence, and litigation are also unbiased. The analysis in Chapter 6 suggests that these estimates are in fact unbiased. To adjust for records not located, we reweighted the located records so that they would represent population totals (see Technical Appendix 5.V.2).

B. Missing Malpractice Claims

Another criticism of our report might be that we have failed to locate all malpractice claims filed for care delivered in 1984. Our efforts, and those of the Health and Insurance Departments, to secure compliance with statutes and regulations on reporting claims have produced a large increase in the number of claims reported. We know of no more complete record of malpractice claims than now exists at OPMC. Fortunately, both the Department of Health and the Department of Insurance are continuing their efforts to achieve complete and timely reporting from all insurers, insurance programs, and hospitals.[50]

One possible source of undercounting will always remain intractable: the interstate referral of patients to New York for treatment to repair injuries from negligence. Adverse events caused by negligent medical management in neighboring states, and discovered and subsequently treated in New York hospitals, will precipitate claims, if at all, in the neighboring jurisdictions. Insurers have no obligation to report these out-of-state claims to OPMC. We are not aware of a solution to this possible source

[50] Statutes that mandate claims reporting by defendants can never become fully effective. A certain number of reports are lost when defendants are uninsured or when institutions change coverage frequently. Other reports encounter unacceptable delays, either because the reporter finds itself inundated with work or because it lacks essential descriptive information on the patient. One simple method to help improve and monitor reporting would be to require claimants to file a brief notice of claim with the Department of Health in conjunction with any formal litigation or demand for compensation. Requiring aggrieved patients to notify their Department of Health of their civil complaints on the quality of care constitutes a minimal individual burden and serves a substantial societal benefit. If the malpractice claims reporting statutes are to fulfill their stated public health objectives, new ways must be found to ensure reporting.

of undercounting claims. The limitations of our study design and budget precluded a search of litigation files of other jurisdictions.

C. Estimates of Negligence

Other sections of our report deal with potential design limitations of estimating adverse event and negligence rates (Chapter 6). The issues discussed there also apply to this analysis of claims in our sample. Injuries caused by medical negligence might never appear in hospital records. Deaths might occur at home, in the emergency room or outpatient clinic, or at a nursing home, and evade discovery in our survey of hospitalizations. If our estimate is slightly low, the real difference between rates of negligence and litigation would be somewhat larger. If our estimate of negligence is high, our evaluation suggests that any overestimate is small, and the true incidence of negligence would remain many times the frequency of medical malpractice litigation.

TECHNICAL APPENDIX 7.V.1

Matching Medical Record and Malpractice Claims

We used computer and manual matching to link medical records with malpractice claims in order to answer the following questions:

(1) how many of the patients in the sample of 31,429 discharges have filed a malpractice claim since 1975 for any medical care;

(2) which of the hospitalizations in our sample involved medical care that resulted in a claim;

(3) which of the AEs discovered by the record review resulted in a claim;

(4) which claims arose out of treatment that our reviews found to be non-AEs or not negligent?

I. Claims in the "787" file

The 787 file is the newest claims file at the Office of Professional Medical Conduct (OPMC). It contains both open and closed claims filed with OPMC after 1/1/87. Part of it is "pending," in that the data have not passed all of the OPMC edit checks. Because there is often a lag between the discovery of an adverse event and the filing of a malpractice claim, plus a delay of several years in closing a claim once filed, most of the claims filed by sample patients were on the 787 file.

Linking the records in the 787 claims data to our sample data

required exact matching, a process in which common record identifiers are linked between different data files. To achieve exact matching via computer, we applied several accepted principles[1]:

- Preparation (standardization of files, elimination of out-of-scope records)
- Selection of matching identifiers and definition of agreement and disagreement (tolerance) limits
- Blocking
- Determination of threshold for matches and non-matches
- Follow-up validation

Using this strategy as a starting point, we used the following matching process to link our claims data to the 30,121 medical records located during the initial visit to the hospitals.

A. Preparation of databases

Preparation of the database involved eliminating out-of-scope records and standardizing the data sets. Out-of-scope records, defined as those that could never be matched, were eliminated early in the linking process to reduce the size of the data base. Standardizing the data set included converting variables with the same information content (e.g. Social Security number, dates), to a consistent format (e.g. numeric, character, upper case). For

[1] Statistical Policy Working Paper 5: Report on Exact and Statistical Matching Techniques, U.S. Department of Commerce, June 1980

hospital, for example, we chose the facility identifier, a 4 digit code with a 5th check digit.

We created two large data bases for matching: one from the claims data and one from the medical data. All possible identifiers, the data fields on which to match, appear in Table 1.

TABLE 1

Percentage Present for Key Identifiers

Variable	787 21,657 obs[2]	Sample 31,429 obs[3]
Last Name	99.0%	96.0%
First Name	98.8%	96.0%
Social Security Number	34.8%	67.0%
Medical Record Number	30.7%	96.2%
Date of Birth	59.4%	81.0%
Age	59.4%	96.2%
Sex	82.6%	96.2%
Zip Code	91.9%	89.0%
Hospital (location of event)	53.3%	NA
Hospital (Policy holder)	38.2%	NA
Hospital (SPARCS)	NA	100.0%
Accident Month	99.2%	NA
Accident Year	99.2%	NA
Admission Date	30.9%	96.0%
Discharge Date	30.3%	96.0%

[2] Because claims data continued to arrive until mid-August 1989, we performed the initial matching on a smaller dataset of 21,657 records. We report the results of those tests here. Following the receipt of the updated claims dataset, including the pending file, we used the linking process outlined in this Appendix for all records in the 787 file.

[3] As the main text explains, we were able to locate and review only 30,121 records in the sample. The 96% rate for finding last names reflects the locate rate for the first visits to hospitals (See Chapter 6).

1. Claims Data

Out-of-scope records in the 787 file were those missing the patient's last name. Without this vital piece of information, record linkage was impossible. We standardized this file to be compatible with the sample of medical records.

2. Medical Data

The medical record review file included selected patient characteristics from the SPARCS data base for 30,121 records in the sample, as well as patient name, address, and Social Security number. It also included from the Adverse Event Analysis Form (Chapter 5) the date of medical management for those cases where the management preceded the index hospitalization, and the date of discovery where management occurred during index hospitalization but the AE was discovered after discharge. Out-of-scope records for this file were those for which we could not retrieve a name as part of the medical record review in participating hospitals.

B. Selection of Identifiers for Matching

The selection of matching identifiers depended in part upon the availability of each potential match item, and on the discriminating power of each characteristic, i.e. the ability of the variable to identify an individual correctly.

1. Discriminating Power

a.) Name

Variables with the greatest discriminating power are name and Social Security number. The problem with name was misspellings and the frequency of common names. We overcame this barrier by using the SOUNDEX code to reduce the last name to an alpha-numeric code based on phonetics (see section on SOUNDEX below). The SOUNDEX code is often used as a blocking mechanism, as is sex (see section on blocking below).

b.) Social Security Number

The difficulty with Social Security number is potential data entry errors and the fact that it appears in only one-third of the claims records (and 2/3 of the medical records, even though we asked MRAs to obtain this information on all patients). Some of the deficiency in our data results from the newborns or children, who do not usually acquire Social Security numbers until the parents discover a need for one. Where there was a match on Social Security number and other characteristics, it is highly likely that a true match has been found.

c.) Medical Record Number

Medical record number, in combination with hospital identifier, would be an ideal matching variable. Unfortunately, the record number was missing in a majority of claims files.

d.) DOB/Age/Hospital

Date of birth, age, and hospital have less discriminating power than name or Social Security number, but can be useful when used in combination. Recall of birth date can be uncertain for older individuals so some tolerance for possible errors must be built into the matching algorithm. One strategy used by researchers is to match on birth month in addition to age[4].

Infants and children needed careful matching. Typically,infant records had few pieces of identifying information: these records were treated separately.

e.) ZIP

Zip code presented special problems for matching since the claims records sometimes used legal counsel as the patient's address. In the New York City area this problem could be particularly acute as many people may come to the City for advice. To compensate for this problem, we allowed for a fairly broad tolerance for zip codes.

f.) Accident Date

Event month and year were included as potential matching characteristics because of our focus on treatment in 1984. Records with too few other identifiers were matched on accident date.

[4] Scheuren F and Oh RL, "Fiddling around with nonmatches and mismatches," in Record Linkage Techniques, 1985, Department of Treasury, IRS, Dec. 1985, pp79-88

2. Tolerance

In addition to considering the discriminatory power of a variable, we considered tolerance, that is, the range of values we considered in place of an exact match. Researchers typically allow 2 to 4 years around age and permit character by character matching on the first 4 to 6 letters of names, with a tolerance of 2 letters on any given character[5],[6].

We used the following variables to match, after blocking (see next section).

[5] Scheuren F and Oh RL, supra note 4.

[6] Howe GR and Lindsay J, "A Generalized Iterative Record Linkage Computer System for Use in Medical Follow-Up Studies," Computers and Biomedical Research 14: 327-340, 1981

TABLE 2

MATCH CHARACTERISTICS

VARIABLE	TOLERANCE
Last name:	agreement on first 4 letters, with a tolerance of 2 letters
First name:	agreement on first letter, with no tolerance
Social security number:	no tolerance[7]
Medical record number:	no tolerance
Age:	tolerance of 2 years
Month of birth:	no tolerance
Zip Code:	no tolerance at stage one (see below)
Accident mm/yy:	falls between admitting and discharge date, with a tolerance of 2 months, or corresponds to the date of medical management or the date of discovery of adverse event for records reviewed by physicians using the Adverse Event Analysis Form (See Chapter 6)
Policy Holder (5 digit code)	no tolerance
Location of injury (if in hospital) (5-digit code)	no tolerance

[7] We performed a sensitivity analysis on Social Security number, that is, we allowed the number to be off by two digits (transcribers sometimes reverse digits). This process yielded no additional matches so we abandoned tolerance in consideration of Social Security number matches.

C. Blocking

Blocking reduces the number of comparisons needed to achieve a match determination. Without blocking, matching becomes prohibitively expensive. We used two strategies. The first was to identify all exactly matched first and last names. The second strategy involved taking all non-exactly matched names and subjecting the surname to a SOUNDEX reduction. The SOUNDEX code (see section I,E) has proven to be a useful technique for blocking.[8],[9]. This technique eliminates unreliable components of the alphabetic surname without sacrificing much discriminatory power. We blocked by SOUNDEX and sex.

D. Matching stages

Because we wanted to avoid missing true matches, we linked records in stages, beginning with computer linkage and ending with group sessions involving the application of clinical judgment.

1. Stage One

First, we created a file of exactly matched first and last names and subjected them to the matching criteria described in Table 2. A case became a potential match if the name matched PLUS

(a) Social Security number

OR

(b) if accident month and year fell between admit and discharge date;

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[8] Quiaoit F and Mi MP, "Surname Blocking for Record Linkage", Record Linkage Techniques, 1985, Department of Treasury, IRS, December 1985, p. 275

[9] Newcombe HB, "Record Linking: The Design of Efficient Systems for Linking Records into Individual and Family Histories," American J of Human Genetics 19(3): 1967

OR

(c) if accident month and year agreed with date of medical management or the date of discovery of the adverse event;

OR

(d) any two other criteria.

2. Stage Two

At the next stage, we took the not-exact-match names, blocked by SOUNDEX and sex, and applied the name match criteria described above (first 4 letters of the last name, plus or minus 2 letters). Then we subjected the cases to the matching criteria described in Table 2. A case became a potential match if the last name and the first initial of the first name matched PLUS

(a) Social Security number

OR

(b) if accident and year fell between admit and discharge date;

OR

(c) if accident month and year agreed with date of medical management or the date of discovery of the adverse event;

OR

(d) any two other criteria.

3. Stage Three

Stage three involved a further search for exact matches, this time by Social Security number. We found several additional matches from this process; cases that had minor variations in the spelling of the last name had avoided blocking by SOUNDEX.

4. Stage Four

At stage four we reviewed each potential match against the hard copy claims file at OPMC in Albany. Through this process we gleaned information from the description of the event (not in computer format) and thus verified the computer matching. Furthermore, the hard copy sometimes contained data which we had

not considered, such as birth year. We had calculated the date of birth from the three birth date fields on the claims file. Obviously, such a calculation was impossible where only birth year was present and so we had inadvertently discarded a vital piece of data. The birth year from the claims file became an important piece of information in instances where medical record contained age or date of birth.

Cases were discarded from the potential match file if several key variables failed to meet matching tolerances, e.g., name, date of birth and zip code, or name, age and birth year. This part of the matching involved some subjective reviewer judgment. The output from this process consisted of all claims matched with an individual in the sample.

5. Stage Five

At stage five, we identified which persons in the sample filed claims for care related to the index hospitalization. This process involved excluding those claims where discovery was prior to the index hospitalization (the year the claim was opened was prior to index). We also excluded those claims where the event (not discovery) was after the index hospitalization. Finally, we excluded those cases where the description in the claim form clearly indicated that the event of interest was unrelated to the index hospitalization. To make this last determination, we compared the description from the malpractice claims file to the SPARCS diagnostic and procedure codes available for each patient (Table 3).

Table 3

IDENTIFIERS FROM 787 AND SPARCS

SPARCS
First name, last name and middle initial (from Record Review)
Zip Code
Date of birth
Sex
Social security number (from Record Review)
Medical Record Number

Hospital admission and
Discharge Date
Date of AE (from Record Review for some cases)
Sample hospital (5 digit identifier)
Admitting Diagnosis (ICD9-CM)

Discharge Diagnoses (ICD9-CM)
Procedure Codes (ICD9-CM)
DRG

787

First name, last name and middle initial
Zip code
Date of birth
Sex
Social Security Number
Medical Record Number
Hospital Admission Date, Discharge Date
Accident Date
Accident location (a code)
Hospital where event took place (5 digit code)
Hospital named in claim (5 digit)
Admitting Diagnosis (ICD9-CM)
Other Diagnosis (ICD9-CM)
Procedure Codes (ICD9-CM)
Iatrogenic Injury Codes (ICD9-CM)
Diagnosis or Treatment Misadventure (coded)
Person responsible for injury (coded)
Patient Occupation
Education Level
Number of Dependents
Income

E. Soundex

The Soundex code[10] is designed to remain unchanged across many common spelling variations of names and thus to facilitate linking records that would have not been matched with a strict alphabetical sequence. It works well for all populations, except those with a

[10] Newcombe HB, Kennedy JM, Axford SJ, and James AP, "Automatic Linkage of Vital Records," Science 130(3381): 954-959, 1959

majority of Oriental names.[11] The Soundex code discards the information provided by vowels and much of the discriminating power of the Oriental name lies in the vowel sounds.[12]

The rules of the Soundex code are as follows:

1. The first letter of the surname is used in its uncoded form and serves as the prefix letter.
2. W and H are ignored entirely.
3. A, E, I, O, U, Y are not coded but serve as separators.
4. Other letters are coded as follows until three digits are used up (the remaining letters are ignored):

B, P, F, V	coded 1
D, T	coded 2
L	coded 4
M, N	coded 5
R	coded 6
All other consonants	coded 2

5. Exceptions are letters which follow prefix letters which would, if coded, have the same code. These are ignored in all cases unless a separator (see 3 above) precedes them.

Examples:

Anderson	=	A536
Bergmans, Brigham	=	B625
Birk, Berque, Birck	=	B620
Fisher, Fischer	=	F260
Lavoie	=	L100
Llwellyn	=	L450

II. NAIC files

Older, closed malpractice claims were reported on a shorter form to OPMC before 1987. The computerized file contains no patient

[11] In our entire sample of 31,429 hospitalizations only 219 patients (0.7%) were Asian.

[12] Newcombe, HB, "Record Linking: The Design of Efficient Systems for Linking Records into Individual and Family Histories," Am J of Human Genetics 19(3): 1967

names. Only the hard copy contains the key element for matching.

Luckily, because so few cases with 1984 accident year were closed as of the end of 1986, this file contained relatively few potential matches with patients hospitalized in 1984.

A. Computer matching

We confined possible matches to claims with accident date after January 1, 1981. Although this limit reduced substantially the number of possible matches in the file of 32,000 closed malpractice claims, we needed to reduce the scope of the manual search further. We did so by limiting potential matches to those cases for which the defendants were either (1) hospitals in our sample, or (2) physicians with license numbers that appeared in 3 treating-physician fields of our SPARCS dataset. This further initial reduction produced 741 potential matches.

B. Verification

Beginning in early March 1989, members of the Study compared a list of sample patients (last name, first name, middle initial, Social Security number, DOB, age, sex, hospital) against the hardcopy files at OPMC. All reviewers assumed that misspellings or keypunching errors might occur. For any potential matches, we xeroxed the entire hard copy for additional review. Because of the absence of patient identifiers on this large dataset, we had no other choice but to employ manual matching techniques.

III. New York City Law Department Files

In order to cover all possible sources of information on malpractice claims, we searched the files of the New York City Law Department for matches with patients in our sample. This search, hampered substantially by the limitations of the City's litigation information system, involved two stages.

A. Computer matching

The Law Department provided a crude list of all plaintiffs who had claimed against the City hospitals participating in the Study. Claims against individual physicians practicing in those hospitals were listed under the hospital name. Initially, we compared the plaintiffs' names against our list of sampled patients to identify any remotely possible match. We allowed for the possibility that the claimant listed was either a parent or guardian (who might have a different surname than the patient) or an administrator/trix (who easily might have a different surname). When in doubt, we requested the hardcopy.

B. Verification

Verification occurred at the Law Department and at private law firms throughout the City. We determined whether the possible matches coincided with the list of patients in the sample. Study members abstracted information onto a form designed to conform in part to the 787 file specifications.

Chapter 8

PATIENT LOSSES AND COMPENSATION

Summary

The patient interview survey was used to estimate the economic consequences of adverse events. In particular, we present data on the amounts of lost wages and fringe benefits, costs of medical care, and lost household production that were experienced by workers, homemakers, children, retirees, and the disabled who have been injured. These data are then used to estimate for the New York population the net compensable losses that might be covered under a hypothetical no-fault patient compensation plan.

Most injured patients were disabled for a relatively brief period. Even combining the effects of adverse event and underlying illness, 42% of the living workers returned to their jobs within one month of admision to the hospital, and 76% within six months. However, for patients who suffered economic consequences from their injuries beyond six months from the initial admission to the hospital, the per capita losses were large. While we estimated that 86% of their medical costs were covered by health insurance, only 19% of their long term earnings losses were reimbursed by sick leave or disability insurance.

For the population of the more seriously injured patients, we estimate that the present discounted value of net lost earnings (in 1989 dollars) was approximately $284 million; of unreimbursed medical costs approximately $103 million, and of lost household production approximately $506 million (this factor having been valued at the average market wages earned by our cohort of working women). These data can serve as the basis for calculation of the bulk of likely expenditures under a no-fault patient compensation plan. We have not, however, estimated the

administrative and legal costs that would be incurred under such a plan.

I. Introduction

Results in previous chapters document the incidence and distribution of iatrogenic injuries within the health care system. Equally vital is understanding the consequences of those injuries on the lives of patients. To measure these consequences, we undertook a survey of our population of injured patients to determine the kinds of losses (financial and non-financial) that they experienced and the compensation, if any, that they received. Our survey draws upon and is similar in its aims to other studies of the fate of the victims of medical accidents to that of victims of aviation, motor vehicle, or workplace accidents.[1] Such information is crucial, both in assessing the performance of the present-day tort system and in considering whether a no-fault program would better perform at least the compensation function of our disability policy.

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[1]The following are the more notable prior pieces of research about the losses suffered and compensation received by injury victims in a variety of contexts: U.S. Department of Transportation, Economic Consequences of Automobile Accident Injuries (1970) (1969 survey of a nationwide sample of 1,037 victims of at least moderately serious motor vehicle injuries); W.G. Johnson, P. Cullinan and W. Curington, The Adequacy of Workers Compensation Benefits: in Research Report of the U.S. Interdepartmental Workers Compensation Task Force 95-120 (1979) (1976 survey of 1,918 workers in five states who had been permanently injured in an occupational accident between 1968 and 1970, and whose economic situation through 1975 was investigated); W.G. Johnson and E. Heler, The Costs of Asbestos-Associated Disease and Death, 61 Milbank Memorial Fund Quarterly, Health and Society, 177-194 (Spring 1983) and W.G. Johnson and E. Heler, Compensation for Death from Asbestos, 37 Industrial and Labor Relations Review 529-40 (1984) (1980 survey of 560 widows of husbands who had died between 1967 and 1976 as a result of an asbestos-related disease, to determine the economic situation of the widows through 1979); RAND Institute for Civil Justice, Automobile Accident Compensation (1985). (In particular, its 1977 survey of nearly 1500 households which had experienced an injury in a motor vehicle accident between 1975 and 1977, and who were interviewed about their experience during the most recent period of temporary disability); and RAND Institute for Civil Justice, Aviation Accident Study (1988) (a survey of the survivors of all 2,198 victims of every major airline crash in the United States from 1970 through 1984, to determine all the net financial losses experienced or predicted for these survivors, and all the tort compensation they received). With the exception of the RAND study of airline crashes, all this research documents not just compensation received from the tort or worker's compensation liability system, but also from all other private or public systems of medical and disability insurance.

II. Survey Aims

First, one must acknowledge that the tort system does not view the compensation of accident victims as its primary objective. Rather, the corrective justice rationale of tort liability is to shift the burden of injuries from innocent victims to those actors whose fault caused the accidents. The implication of this policy is that victims of negligent behavior (e.g., medical malpractice) should collect full compensation for all their losses, while victims of accidents due to no one else's fault should not collect damages through tort litigation. This policy does not ignore the plight of the injured patient: it assumes that in the absence of fault there is no reason to require that an innocent physician pay the patient's losses.

Given such a legal policy, one would expect to find a skewed distribution of tort damages from an avowedly compensatory point of view. Some patients collect substantial tort damages (in excess of their purely financial losses because of the award of additional money to compensate for pain and suffering); but patients who are equally or more disabled in non-negligent accidents receive nothing from the tort system[2]. Even within the domain of the tort/fault principle, it is important to know whether most, if not all, of those injured due to a provider's negligence are fully compensated, and if not, what variables influence the gap and its distribution. At the start of 1990 we are about half way through the "long tail" of malpractice litigation arising out of 1984 hospitalizations. Almost all the possible claims have been filed, but only a portion of the claims are resolved. The previous chapter presents the results of our

[2]As has been shown, for example, in the motor vehicle area (which produces the largest number of tort claimants and payments of any injury type) both by the Department of Transportation Study in the 60s and the RAND Study of the 70s: see references in Note 1. Airline crashes (the subject of the other RAND Study referred to in Note 1) are the exceptions to this generalization about the tort system. Given the peculiar nature of the latter accident context, with potential liability on the part of the airline, the plane manufacturer, the airport and others involved, the tacit assumption in these suits is that the passengers or their surviving dependents will collect tort damages from someone, and the issue contested in the tort process is how much damages will actually be paid.

efforts to date to match our sample of adverse events (AEs) (including negligent ones) with subsequent tort claims and dispositions, and the Study will continue to monitor the claims process to complete the rest of the picture.

As we noted in Chapter 2, however, many legal practitioners and other observers of the tort system are no longer persuaded by tort law's emphasis on fault as the sole predicate for redressing victims' injuries. Their skepticism is fed by the fact that liability insurance shifts these losses not to the individuals who may have been careless, but rather to all of those who pay liability insurance premiums. As tort litigation comes to be seen as a device that rations access to insurance funds, it is fair to ask whether the resulting distribution meets the objectives of a rational compensation policy (that is, a policy which focuses on the losses and needs of the victims rather than on the fault of someone else involved in the accident). Again, our review of the tort claims made by our sample of injured patients provides revealing data on this question.

In contrast to tort liability, a no-fault program provides a specified level of compensation to all the victims of the injuries associated with a particular activity (e.g., medical treatment). The no-fault idea has evoked quite a different response in the medical context, in part because of the rate of iatrogenic injury discovered in California hospitals in 1974 (a rate similar to that reported in Chapter 6 for New York). It was later suggested that only a small fraction of the patient-victims obtain any tort recovery.[3] Given a gap of those dimensions, many people dismissed the no-fault model for medical accidents on the ground that it would require too steep an increase in what were

[3]See P. Danzon, Medical Malpractice: Theory, Evidence, and Public Policy 22-25 (1985), for her rough calculations of the gap between actual torts (i.e., negligent adverse events) committed in California hospitals in the 70s and the torts claims and payments likely referable to these incidents.

already felt to be unduly expensive malpractice insurance premiums.

The objection that no-fault insurance would be too expensive raises fundamental questions of social value. However large and expensive, however uncompensated by the tort system, patients' losses are real and have to be borne (i.e., afforded) by the victims and their families if they cannot secure help from the broader community. (As we pointed out in Chapter 2, a part of these losses are the costs of treating these iatrogenic injuries within the same health care system in which the original accident was inflicted.) But several factual ingredients of this moral and political debate can be studied empirically, and our patient survey is designed to shed light on these.

One can ascertain through a survey not only the difference between the number of iatrogenic injuries and the number of tort recoveries, but more importantly, the size of the losses that these injuries inflict. Such losses might not be proportional to the differences in the number of injuries. The amount of loss in earnings depends not so much on the occurrence of injury as on the severity of impairment that it causes and on the interaction of this impairment with the physical demands of the victim's usual job. The hospital records survey revealed that most iatrogenic injuries were relatively minor and that more severe impairments were more likely to be caused by negligent treatment. Hence, compensating the non-negligent adverse events may not cause a proportionate increase in cost. A major aim of the patient survey was to determine whether this is true; that is, to estimate the effects of patients' injuries on their lives (e.g., in time and earnings lost from work) and to estimate the cost of compensating for losses caused by non-negligent adverse events through a no-fault plan.

No-fault schemes can vary considerably in their design, however, and our survey was designed to yield information that permits estimating the costs of alternative designs. For

example, a system that compensates all losses attributable to an accidental injury may not be desirable. On purely insurance grounds, excluding the more numerous short-lived disabilities may make sense on the assumption that these relatively modest losses could be handled through the victim's own personal resources without incurring the administrative cost of processing a claim. The focus and concern of such a no-fault program would be the longer-lasting disability that affects far fewer patients but inflicts a severe and even catastrophic loss that the individual and family concerned could not shoulder on their own.[4]

A focus on longer-lasting disability has another advantage, stemming from a peculiar feature of medical injuries. Patients who see a physician or who enter a hospital are often already disabled by their illness and thus are experiencing earnings losses and costs of treatment. An injury that the patient suffers during the course of hospitalization may prolong, but not initiate, a preexisting disability. A no-fault program financed by and through the health care system would take responsibility for the costs attributable to the iatrogenic injury but not the costs of an illness that preceded the injury. Separating the costs of injury from the costs of background illness might be difficult and administratively expensive. One sensible and administrable demarcation line would limit no-fault insurance benefits to those costs that were incurred by the patient after a fixed time had elapsed--perhaps six months following the treatment during which the iatrogenic injury took place. The Social Security Disability Insurance program uses a six month waiting period as one step to separate temporary from permanent work disabilities. Similarly, New York's Temporary Disability

[4]Recall our finding in Chapter 6 that while 3.7% of hospital patients suffer iatrogenic injuries, only about 30% of these injuries (or 1.2% of all hospitalizations) would be categorized as a serious injury, whether temporary, permanent or fatal. We should also note that surveys of victims uniformly find that under the tort system the ratio of compensation to actual economic losses is much higher for the less severely injured than for the more severely injured. See references in Note 1.

Insurance plan has limited the duration of benefits for temporary disability to six months. Our patient survey was designed to permit estimates of the patient's losses from these longer-lasting and more harmful disabling injuries as well as losses for shorter periods because we recognize that a different duration might be sensible for compensating victims of medical malpractice.

Measuring losses is important, but one must also decide which losses are to be borne by a patient compensation scheme and which left to other modes of community redress. The no-fault medical accident programs in Sweden and Virginia, for example, are designed to be secondary sources of compensation for the patient. They complement the broader, more easily administered medical and disability insurance that is provided by employers, individuals, or governments, a backstop role similar to that of the tort system in states like New York that offset collateral sources against damage awards. It was crucial, then, for us to inquire of our patients not only what losses they had suffered but also their sources of compensation and to what degree their losses (in particular, longer-lasting losses) had been paid by these sources.[5]

Finally, one issue that we should mention--though one we could not evaluate from our results--was the assessment of the costs of compensating medical accidents through tort-fault relative to the costs of a no-fault regime. The cost of claims administration--in particular, expenditures on lawyers--make up a sizable share of the claims dollar under any liability regime, whether fault or no-fault.

We did not inquire of our patients about legal fees. Most no-fault schemes do not require the services of a lawyer, and we

[5]Every one of the major surveys of injury victims referred to in Note 1, with the exception of the airline crash study, found that external programs-- such as Social Security, health insurance, and employer-provided sick leave or long-term disability-- delivered substantially larger amounts of compensation to these victims than did the liability systems of tort or workers compensation.

did not ask patients any questions about the tort system, including their use of lawyers. The experience in other injury contexts leaves no doubt that a no-fault program such as workers compensation has a much lower administrative cost ratio than does a tort system that must resolve the often highly contestable factor of fault.[6] However, the precise extent of the differences within any one injury context is harder to pin down. Thus, within the tort system, medical malpractice is considerably more expensive to administer than is motor vehicle litigation because of the greater ease in judging driver than physician fault. Litigation about airline crashes is even cheaper to administer because the liability of some enterprise is assumed and the only debate with the victim is about the amount of loss and compensation. Similarly, within workers compensation plans, the costs of resolving workplace accident claims is much lower than that for occupational disease cases because of the major difficulties in judging the true cause of a cancer or a respiratory illness. Thus, while the experience with no-fault patient compensation in Sweden or New Zealand suggests that the administrative costs of such a program would be substantially lower than those now paid under the malpractice system, we cannot estimate the precise dimensions of this saving.

III. The Interview Survey

Retrospective interview surveys that deal with events occurring several years in the past are difficult to complete because the information on the subjects' addresses is old. In fact, many of the patients in our sample had died. Nevertheless, as we reported in Chapter 3, the locate and response rates for the patient interview survey were quite acceptable.

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[6]See the references in Notes 33 and 34 of Chapter 2 for comparative estimates of the transaction costs in workers compensation and in motor vehicle or non-motor vehicle tort claims (the latter category composed largely of product liability or medical malpractice cases). The RAND Aviation Accident Study referred to in Note 1 of this Chapter develops the 30/70 ratio of lawyer's fees to victim compensation in airline crashes.

A. Survey Instrument

The survey instrument was designed to collect the information needed to estimate the economic consequences of iatrogenic injuries. Most questions were taken verbatim from national survey instruments, permitting us to avoid errors in logic and wording that may have occurred had we developed our own. We asked the respondents to describe their primary activity prior to hospitalization. The activity categories that we used to estimate losses and compensation are:

1. **Workers** -- all persons who worked for wages sometime during the six months before the date they were admitted to a hospital in 1984 or who were unemployed at admission but who had worked in 1982 or 1983. Persons of labor force age who did not work because they were students at the time of their admissions were asked the worker questions.

2. **Homemakers** -- all women who reported that they worked solely as homemakers at the time they were admitted. Losses of household services among women workers are reported as a separate item in the worker category.

3. **Disabled or retired adults**--all adults who reported that they had retired because of old age or who did not work because of ill health.

4. **Children** under the age of 17.

The survey instrument contains ten sections (see Appendix 8A). Every respondent was asked the questions in Section 1 (Medical Care) and Section 10 (Sources of Income). Sections 2 through 9 were designed to elicit a description of the patient's post-injury activities in the four years between hospitalization and the time of interview. Respondents were asked one of the Sections 2 through 9 according to their primary activity during the six months prior to hospitalization. The only exceptions were women workers, who were asked questions on both work and wages and on homemaking.

The survey questions refer to six time intervals: the six months before admission to the hospital; the period between the date of discharge and December 31, 1984; each of the years 1985, 1986, 1987; and the first six months of 1988. Adults of working force age who were disabled or unemployed at admission were asked when they had last worked before hospitalization and the hours and wages for their last job.

A record of weeks worked and wages earned was obtained for each of the six intervals. These data were used to estimate each patient's earnings during the post-injury years. We assumed that the patient's wages were zero during hospitalization.[7]

The time periods used to examine work and wages were also used to collect information on the amounts and sources of nonwage income (Section 10). To obtain this information, the interviewer read to the respondent 13 sources of income, including Social Security old age, Social Security disability insurance, Social Security survivor's benefits, Social Security (type not known), veteran's retirement, veteran's benefits for injury or illness, and one category for "any other sources." The recipient of the income (patient, spouse, parent), monthly amount, and number of monthly payments received were recorded for each source identified by the respondent. This procedure was repeated for each of the six time intervals.

B. Survey Interview Process and Data Protection

The first step was to send a letter to each person who was to be interviewed. The letter, signed by New York State Commissioner of Health David Axelrod, described the study and gave a toll-free number for those who wanted more information or who wished to be excluded from the study sample. The strenuous efforts that were made to find and interview patients in the

[7]We treated wage payments to hospitalized workers as sick leave compensation.

survey sample are briefly described in Chapter 3. We located 88.8% of the sample patients and completed interviews with 78.4% of those who were located. A more detailed description of the search procedures is contained in Technical Appendix 8.III.1.

Most interviews were conducted by telephone. Telephone interviews are an efficient method of data collection when the interviewees are distributed over a large geographic area, as was the case for our sample. Eighty-six persons who did not have telephones were interviewed in their homes.

In order to carry out the survey, the cooperation of many parties was necessary. To obtain such cooperation, we decided to minimize the chances that our interview would stimulate tort suits that would not otherwise have been lodged. Even though the statute of limitations in New York State is 2.5 years, our investigations (see Chapter 7) showed that in about 10% of the cases, the time lag from date of accident to filing a claim is longer than that because the courts allow certain exemptions from the statute of limitations. We, therefore, took the following precautions.

(i) The connection of the survey to malpractice was disclosed neither to the patients nor to the interviewers. As far as they were concerned, the subject of this research was the broader topic of the economic consequences of hospitalization. Indeed, a matched sample of patients who had not been injured were interviewed to estimate the baseline financial costs of hospitalization and recuperation and to disguise the true purpose of the survey.

(ii) The interviewers were not informed that a physician panel had reviewed each patient's medical records to explore the possibility of an adverse event from hospitalization, nor that judgments had been made about negligence in the medical management of the patient.

(iii) No questions were asked in the interview about the filing of any tort claim nor about the receipt of any tort settlement or award. There is not even a specific

category in the research instrument in which any information about tort actions could be entered. If a patient were to unilaterally volunteer any such information, this could be recorded only in a general "other" category in the instrument.

We were uncomfortable with aspects of these steps. However, we believed that calling attention to our interest in the malpractice problem could have created needless anxiety on the part of some people. Further, the goal of obtaining background information crucial to informing the debate on the problem and not available by other means seemed to us and others we consulted to justify the methods we used. The groups consulted included the Human Subjects Committee of the Harvard School of Public Health which reviewed and approved our research protocols.

The sensitive nature of the interview information demanded strict control over the confidentiality of the survey results. The following procedures govern the physical security of the survey data.

1. The final data tapes do not contain names or addresses of the persons interviewed.

2. Data tapes are stored at Syracuse University and Harvard University Computer Centers in limited access data libraries. Use of the tapes is restricted to the computer account and computer password of the investigators.

3. The survey instruments are stored in the closed archives at Syracuse University, and the interview "face sheets" that describe the interviewees' names and addresses at the Medical Practice Study at Harvard, thereby making it impossible to match names and addresses to the survey instruments. Access to the material in the Syracuse University archives is permitted only at the written direction of the person who submits the material to the archive.

IV. Estimating the Costs of Medical Injuries

A. Types of Costs

1. Compensation for Disability and Death. When someone is injured in the course of medical treatment, a variety of harmful consequences may follow. Usually there are expenditures for hospital care and other medical and rehabilitative treatment. In addition, the injured patient might lose earnings either during a period of recuperation, or if the injury is permanent or fatal, for the rest of what would have been his working life. Physical impairments caused by the injury will also limit the victim's performance of valuable services inside the household. This chapter focuses on estimating the economic consequences of adverse events.

2. Non-economic Losses. Injuries also produce personal and psychological consequences, including pain and suffering, the long-term loss of enjoyment of life due to physical incapacity, and the emotional loss experienced by family members of victims who die. The tort and no-tort models of liability differ about whether and to what extent victims should be compensated for injuries that produce no loss of income or expense for medical treatment. Sweden's no-fault patient compensation scheme does make payments for pain and suffering. While our patient survey emphasizes questions about the several categories of direct economic loss--and these experiences can most feasibly be documented through such a survey--it also asks questions about the patient's ability to perform a range of activities that are essential to a normal life. Some injuries permanently impair physical functions that are needed to participate fully in the activities of daily life, including leisure time activities. We made no attempt to assign dollar amounts to these non-economic losses. The questions did, however, facilitate estimates by

reviewing physicians on the link between the adverse event described in the medical record review and the patient's disability reported in the survey.

3. Attributed Costs: Causal Connection Between The Adverse Event And The Disability Or Expense. A key to the estimation of the economic consequences of AEs lies in our ability to attribute costs of disability to AEs rather than to an a underlying or pre-existing disease or condition. Part of this process of attribution occurred in the design of the survey instrument; part occurred in the review of survey responses by physician members of the Study.

Interviewers questioned patients about the condition for which they were treated in the index hospitalization. The interviewers were unaware of the results of the medical record review and could not mention the term "adverse event". As a result, we could not determine from the patients whether a disability or death, and the accompanying losses, were attributable to an adverse event, rather than to the underlying disease or condition. For this reason, the loss estimates in Tables 8.2 through 8.7 in section V, which derive from the patient interview, include all costs arising out of the condition treated during the index hospitalization. Those figures include both the losses attributable directly to the AE and, where present, the losses associated with an underlying disease or condition.

For Tables 8.8 through 8.9 and 8.11 through 8.13 we attempted to separate the work loss and medical expenses associated with the adverse event from those attributable to a pre-existing condition. For this attribution, physician investigators made a judgment based on a review of all the information in the Adverse Event Analysis Form and patients'

reports of disability and health care utilization. Details of the process appear in Technical Appendix 8.IV.1.

In brief, our calculations follow the following general formula:

Total costs of illness treated at index hospitalization
- Compensation received from benefits and insurance
= Net Losses of illness treated at index hospitalization

- Losses not attributable to adverse events
= Net costs of adverse events.

B. Costs of AEs based on Incidence Figures

1. Using Incidence Figures. As part of the medical record review, 1,278 AEs were identified and classified. Of these 1,133 were discovered during the index hospitalization in 1984. To prevent double counting of AEs and to arrive at unbiased estimates of the incidence of AEs during a one-year period, we limited our analysis to the 1133 AEs in arriving at population estimates of 98,609 AEs.[8]

2. Unit Non-Response Adjustment. Not all patients with AEs could be located, and not all of those contacted consented to an interview. To adjust for survey non-response, we reallocated the sampling weights of the non-respondents to the weights of the 794 respondents. This adjustment enabled us to extrapolate the results of 794 interviews to a population of 98,609 persons with AEs. The adjustment, described in detail in Technical Appendix 8.IV.2, considered the possibility that economic consequences of adverse events will vary according to whether the patient died and according to his or her occupational status. Because response rates varied by these patient characteristics, the

[8]Although the interviewers attempted to locate and survey all patients with AEs, including those with low-threshold AEs (see Chapter 6), estimates of the costs of disability and death for this chapter are based solely on the results of the survey of the 1,133 persons with AEs discovered in the index hospitalization.

adjustment of weights had to be stratified by patient group. We take up other issues associated with non-response below.

C. Medical, Health, And Rehabilitation Costs

The dollars paid for medical care are difficult to measure from a personal interview. Many patients do not know what is paid on their behalf by insurers who often pay the providers directly. Most patients also fail to recall after several years the charges that they once knew. Thus, our strategy was to ask about the services received rather than their costs.[9] Once we obtained information on the quantity or frequency of services used, we obtained total costs by applying costs estimates to each unit of service.

Costs also needed to be estimated for the period from the end of the survey (June 1988) until the end of the patient's life expectancy.

1. Costs During The Survey Period. The survey asked patients to identify hospitalizations by date, the name and location of the hospital, and length of stay. The questions on outpatient services emphasized health care services that required multiple visits, and included probes to stimulate recall. Patients were asked, for example, whether they required regular physician visits, physical therapy, or home health visits. They were read a list of nine categories of medical equipment and six types of medical supplies and asked to identify the duration and approximate frequency with which each was used. For each type of service, with the exception of equipment and supplies, we estimated medical care costs by imputing a cost for that particular service.

[9] The National Center for Health Statistics also does not ask about gross costs in conducting the National Health Interview Survey.

a. Hospitalization. We asked each respondent to recall the number and length of each of the hospitalizations, that were related to the illness or injury treated during the index hospitalization (in 1984). We used these responses to count the total number of days of hospitalization during the period 1984 to 1988. Then we computed the costs of hospital care as the product of the length of stay and the average daily cost for the hospital in which the patient received treatment. For each hospital, we obtained from the Office of Health Systems Management, New York Department of Health, annual cost data for each year 1984 through 1988. The costs represent each hospital's total inpatient costs divided by the hospital's annual number of patient days.

b. Physician visits. We asked patients for the number of their physician visits during each of the years during the interview period. We then estimated the charge per visit from annual surveys of physician charges.[10] The specific data are, for each year, the charges for first office visits to physicians in the Northeastern United States. Use of the charge for a first visit should offset the omission of ancillary charges, such as laboratory tests. For respondents who lived in New York City, we used the charge data from urban physicians; for patients living outside the City, we applied the charges for suburban physicians. In 1988 average physician charges in urban areas were $46, up from $36 in 1985, and in suburban areas they were $51, up from $41.

c. Home-health and therapy visits. The costs of home-health visits and visits for physical and rehabilitative therapy are estimated by multiplying the number of such visits

[10] **Medical Economics**, issues of October 7, 1985; October 6, 1986; October 5, 1987; October 3, 1988.

(derived from the interview) by the mean of the amounts charged for visiting nurse and home-health aide visits, (derived from 1988 data and expressed in 1984 dollars). The charges are the average rates for single visits in the State of New York.[11]

d. Medical equipment and supplies. We estimated the utilization of medical equipment and supplies by asking patients about their use of equipment and medical supplies. Items ranged in cost from home dialysis units to syringes. Owing to the lack of recall on the costs of equipment and supplies, we have provided only results of utilization.

e. Rehabilitation and education. A child who is disabled by an injury may require tutoring or specialized forms of instruction. The problems of collecting data on the costs of these activities are similar to those of collecting data on the costs of medical care. Therefore, we again followed the strategy of focusing the survey questions on the nature and quantity of tutoring and other forms of specialized instruction.

2. Utilization During Post-survey Period. Where we needed to predict a lifetime of medical care utilization after July 1988, we used the period January 1986 through July 1988 as the base period for projecting beyond the interview period. After 1985, we believed, medical care utilization would have stabilized to a long-term level. Thus, utilization was projected from July 1988 until the end of the patient's life expectancy, using costs in the January 1986-July 1988 period.

3. Costs During Post-survey Period. With the level of utilization estimated above we could also predict a base-line

[11]Visiting Nurse Association of Central New York, Syracuse, N.Y. Average charges for Home Health Visits in the State of New York for 1988.

annual cost of medical care. From this base we estimated future costs by inflating medical care costs at a real rate of 5.5% per year, approximately the rate of increase in recent years.

4. Imputation of Missing Costs. For several of the subjects, specific questions (items) were either left blank or were answered "do not know". As with the medical record review portion of the Study (see Chapter 5), these responses could not remain blank or missing for purposes of analysis, because they would thereby assume a value of $0. For example, the patient (or the survivor of the deceased patient) who does not recall any ambulatory medical care during part of the survey could have in fact received care. If ambulatory care did occur, it had a cost. To account for this possibility, we imputed from the average of responses with known values to the missing response. Details appear in Technical Appendix 8.IV.3.

D. Loss of Earnings

The appropriate measure of income loss borne by victims of injuries is the difference between estimated income received absent the injury and income actually received after the injury. To arrive at this difference, we first ascertained the patient's work and earning history and then asked the patient (or relative of the deceased patient) the post index hospitalization work history.

1. Pre-hospitalization Work History. The premise underlying our measure of health related work absences is that persons who were working prior to their hospitalization in 1984 would return to work after some period of post-discharge recuperation.

Each patient (or the proxy who responded to the interview) was asked whether the patient worked during the 6 months preceding the index hospital admission. In most cases, this

response established whether the patient was a worker for purposes of determining post-hospitalization loss of earnings. For those respondents who indicated that they were in the labor force but had not worked during this 6-month period, the interviewers obtained information on the person's last job, if the person had worked since 1978. Work history included not only average monthly income, but also questions on the work week, layoffs, and vacations. From these responses, we computed annual pre-index hospital income.

2. **Work Absence--Interview Period.** Recognizing that labor force careers can be interrupted for many reasons, we collected complete information for each year on weeks worked, weeks not worked for reasons other than health, and weeks not worked because of health problems. We measured work absences as the number of weeks of absence from the job caused by a health condition related to the index hospitalization. The data come from a series of survey questions about weeks worked, weeks absent because of ill health, and weeks absent for reasons other than ill health, for each year in the interview period (a fraction of 1984, 1985-1987, and the first 6 months of 1988).

Patients who did not return to work following the index hospitalization were asked to give their primary reason for leaving the labor force. Only those absences identified by the worker as caused by an illness or disability that was related to the index hospitalization were used to calculate the durations of health related work absences. Where a worker died either during the index admission or post-discharge but during the interview period, we assumed that the death was related to the index illness.

3. **Work Absence--Post-interview Period.** We computed work losses during the post-interview period for several groups. In the case of workers who never resumed work during the interview

period, those who did return to work but subsequently retired because of ill health, and those who were absent because of an index related health condition from January 1987 and until July 1988, we computed post-interview work loss if the respondent reported that the illness leading to withdrawal from the labor force was related to the condition treated during the index hospitalization. For those who died either during the index hospitalization or after discharge, we also computed a post July 1988 work loss.

4. Work Loss Until End of Work Life Expectancy. In all cases for which the patient died as a result of the illness treated at the index hospitalization, our calculations allowed for the possibility of loss of the deceased patient's income to the survivors. The next-of-kin who responded to the survey was asked about the relationship between death and the hospitalization. If the respondent did not know, we imputed a relationship as described in Technical Appendix 8.IV.3.

The central question in each case was whether the patient died prior to the end of his or her expected work life. It did not matter whether the end of expected work life occurred during the interview period (1984-June 1988) or would occur in the future. In all cases, we added to the work loss totals any period of remaining expected work life. Details of calculating work life appear below.

5. Base-year Income

a. For persons with work history. A disabling injury reduces one's productivity in the labor force and in the home. Wages are the best available measure of productivity for those who work in the labor force. To estimate the wage loss caused by an injury, however, requires knowing not only the worker's wage after the injury, which can be obtained directly from the survey,

but also what the wage would have been had no injury occurred. The latter figure is not observed, and we must therefore make some assumptions about it.

Our wage loss estimates assume that the workers pre-injury real wage income would increase at an average annual rate of 0.7%.[12] We estimated wage losses as the product of the work absences that the respondent attributed to the illnesses treated at the index hospitalization and the workers' wages. We also used New York State data on average earnings by industry and by counties in New York State to screen the survey data for anomalies.[13]

b. Fringe benefits. Injured workers may lose not only wages but also employer-financed fringe benefits such as health insurance and pension plans. Such benefits are a substantial portion of workers' total compensation. Fringe benefits are substitutes for direct wage payments but, unlike wages, benefits are difficult to value. In general, the value of fringe benefits to a worker is equal to less than the cost of employer-paid insurance premiums.[14] Because we cannot measure the wage equivalents of fringe benefits, we have used the costs to employers as the value of fringe benefits. Our results may therefore, understate the value of fringe benefits to workers and their families.

We used data from a 1984 Chamber of Commerce sample of 1,154 U.S. firms to estimate employers' contributions for fringe

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[12] This is the average annual real growth in wages over the last thirty years. See: Lambrinos, James L. "Nominal vs. Real Economic Variables in Estimating Earnings Losses" Journal of Missouri Bar, (September 1984) 389-393; (Revised- correspondence with author 1990). In fact, earnings of sick workers may increase somewhat less. If so, our estimates are too high.

[13] New York State Department of Labor, Bureau of Labor Market Information (Data Tape), "History of Average Employment and Wages," Albany, New York (1989).

[14] The logic is that the employee would have purchased the benefit on his or her own if paid in cash. However, this ignores the fact that employee paid fringes are generally paid from before tax income and that employers may be able to purchase more cheaply than individuals.

benefits.[15] The data are categorized by industry and by the nature of the fringe benefit (e.g., sick leave, vacation). It is, however, unlikely that the size distribution of the firms in the sample represents the size distribution of the firms in which the subjects of our study were employed. Thus, our estimates are likely to be inexact but we cannot estimate the amount or direction of the error.[16]

We excluded certain fringe benefits from our estimates. Payments for rest periods and vacations are excluded because they are typically included in the wages that workers report in interviews. We exclude employers' payments to Social Security since we do not deduct the workers' matching payments from our estimates of wage incomes. Employers' payments for legally mandated coverage for Workers' Compensation and Unemployment Insurance are also excluded since they are of value only to persons who are employed.

The set of employer payments for fringe benefits that we use for our estimates consists of the following parts:[17]

1. Pension and insurance, including employers premiums for pensions, life insurance, disability insurance, health and dental benefits, and miscellaneous benefits such as vision care and prescription drugs. In 1984, employers

[15] U.S. Chamber of Commerce of the United States, Employee Benefits, 1984, Washington, DC (1985).

[16] U.S. Chamber of Commerce of the United States, Employee Benefits, 1984, Washington, DC (1985). Employee benefit payments varied from less than $3,500 per employee to more than $13,000 among the 1,154 firms in the Chamber of Commerce sample. Some of the other important differences between the two samples are that the Chamber of Commerce data refer only to hourly employees, our survey includes salaried workers. The Chamber of Commerce data refer to the U.S.; our sample is for New York State.

[17] See Technical Appendix 8.IV.4 for a complete description of the fringe benefit data. The value of the excluded fringes is included so that those who wish to use alternative assumptions with our assumptions can estimate the approximate effect of the exclusions on our results.

c. Work life expectancy. To predict how long a person disabled by injury would have worked (and engaged in household production) absent the injury, we had to account for work life expectancy. The expected work life for each worker is assumed to be equal to the national average for persons of the same age, race, and sex.[20] Our estimates are obtained from the U.S. Department of Labor's (1986) estimates. The BLS estimates do not, of course, reflect the effects of recent changes in the mandatory retirement age, but they are not based on the assumption that the work life ends at age 65. In fact, they predict that a woman aged 65 will work for 3.1 years and one aged 75 for 0.9 years. Thus, the BLS estimates reflect the probability of being in the labor force after age 65, including persons who shift from full-time work to a combination of pension benefits and part-time work.

The BLS estimates refer to labor force participation, defined as <u>either</u> being employed or actively seeking work. We assume that a person is employed in each of the years of their expected work lives. In the future we shall account for expected work lives in more detail. For men we shall use a Markov model, which will account for the possibility of transitions from employment to unemployment and in and out of the labor force. For women we will use a method, outlined in existing wage loss research[21], that accounts for the secular increase in womens' labor force participation.

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[20]The average expected work lives of our subjects may be shorter than the national averages because many of the subjects are chronically ill. If so, we overstate costs. An additional issue is that our methods do not adequately capture the effects of the increase in the labor force participation rates of women. Thus, we understate the wage losses for women.

[21]Smith, James P. and Michael P. Ward, Women's Wages and Work in the Twentieth Century, The RAND Corporation, R-3119-NICHD, October 1984 and King, Elizabeth and James P. Smith, <u>Computing Economic Loss in Cases of Wrongful Death</u>, The RAND Corporation, R-3549-ICJ, 1988.

The BLS projections also assume that a person is employed in full-time work. There is no allowance for part-time work. Allowance for this factor would also somewhat decrease our estimates of the wage loss.

7. Imputation of Missing Values.

a. Amount of work loss. Several patients (or their proxies) were unable to answer some of the questions related to work loss. In general, we assigned to these patients the mean values for the group of patients who did respond. This treatment of missing values is explained in greater detail in Technical Appendix 8.IV.2.

b. Wages. To impute wages for those who did not recall their earnings we resorted to the New York State data on average wages by industry and county.[22]

E. Nonmarket Losses--Loss of Household Production

A disabling injury can limit the victim's ability to care for children, prepare meals, manage household budgets, and engage in other tasks necessary for daily living. An injury can also affect others in the household by requiring them to divert time from other activities to care for the injured person. Therefore, the losses that a patient might suffer from an adverse event will include not only the diminution of wage-earning capacity in the labor market but also a reduction of homemaking activities outside of the labor market. As with the case of loss of earnings, our calculations here include first a determination of the number of weeks of household activity lost and next an evaluation of the value of these losses.

[22] New York State Department of Labor, Bureau of Labor Market Information (Data Tape), "History of Average Employment and Wages," Albany, New York (1989).

1. **Persons Covered.** The questions on homemaking were originally intended only for persons whose primary activity was homemaking. Research indicating that women workers do nearly as much homemaking as do non-working women convinced us also to ask the homemaking questions of women workers. We distinguished between employed and not employed women because employed women generally spend fewer hours in household tasks. We did not ask men the questions on homemaking, and therefore we offer no estimate of the loss of household production of men. An approximate estimate of the effect of the omission of the value of homemaking services provided by men can be made from Walker and Wood's[23] result that employed men spend, on average, 27% as much time in household production as do employed women. In future work we intend to test the sensitivity of this result by using an alternative dataset on household time use.[24]

2. **Weeks of Household Production Lost.** Each female respondent alive at the interview was asked when she was first able to return to household production after her 1984 hospitalization. The weeks of lost household production were then calculated as the sum of the weeks spent in the hospital and the weeks after hospitalization before return to household work. For those who never returned to work because of death or disability we measured loss from admission until the end of life expectancy. Thus, we did not attempt to disentangle the value of weeks lost from the underlying disease from the weeks lost due to the AE.

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[23] K. Walker and M. Woods, Time Use: A Measure of Household Production of Family Goods and Service (1976).

[24] The Syracuse survey we adopted as the external data source for calculating hours of activity is not the only source of data. Another highly respected source is the University of Michigan Time Allocation Study. Juster TF, Stafford FP eds. Time, goods, and well-being. Ann Arbor, MI: Survey Research Ctr, 1985.

In all cases, we allowed for the possibility of a life expectancy continuing after the end of the interview period, June 1988. We used the BLS data on life expectancy for persons up to the age of 75 and the U.S. Department of Health and Human Services' (1978) vital statistics data for persons aged 75 and over.[25]

3. Evaluation of Lost Household Production. Evaluation of lost household production began with an assessment of the number of hours actually spent on household activities in an average week.

a. Activities covered. We designed the survey to elicit information only on persons' primary activities because it would have been too costly to acquire information on all of their usual activities. Included activities are: shopping and cooking, house cleaning, laundry, child care, household finances, care of relatives. Excluded are such items as hobbies, travel, entertainment, religious or political activities, education, sports, and passive leisure.

b. Evaluation of hours. To determine the extent of involvement in household production, we inquired about the respondent's household tasks in an average week during the six months prior to hospitalization. The six activities in the survey account for nearly all of the time spent in a typical household. We converted each activity into hours per day of household production by assuming that the average hours per day for each activity equaled those of households in a study of

[25]U.S. Department of Health and Human Services, "Vital Statistics of the United States, 1978: Life Tables," Volume 2(5), Hyattsville, MD (1980) and U.S. Department of Labor, Bureau of Labor Statistics, Work-Life Estimates: Effects of Race and Education, Washington, D.C. February 1986, Bulletin No.2254.

homemakers in Syracuse, New York.[26] Hours of activity per week was estimated by multiplying the daily hours of activity times seven. Then, we calculated the hours of household production lost because of illnesses as the product of the pre-hospitalization household hours per week and the number of weeks from the index hospital admission to the date of first return to household work, or to the end of life expectancy.

We resorted to external data on time use in the home because they are superior to any data we could gather from an already complex survey; few individuals maintain records of time spent by daily household activity.

c. Cost of lost hours of household production. There are two leading alternative methods for valuing each hour of lost homemaking activity: replacement cost and opportunity cost.

The replacement cost methods seeks to calculate the cost of securing an alternate homemaker to replace the injured or deceased patient. This method is notoriously difficult to implement for other than a case-by-case analysis. Although we might be able to determine the typical cost of child day care and of a cook, for example, we cannot determine easily whether the typical homemaker must perform these tasks separately. Often household tasks can be done simultaneously. Thus, the replacement method fails to consider how homemakers actually perform their domestic tasks.

The opportunity cost method, on the other hand, avoids this problem. The cost of an hour of household production lost is the amount that the homemaker could have earned by spending this hour in the workplace. Thus, if the injured patient earned $10 per hour prior to 1984 and then could not perform her usual 10 hours per week of household activity after the injury, her lost

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[26]See K. Walker and M. Woods, supra, note 23.

household production would be worth $100 (10*$10). We implemented the replacement cost method as follows.

If the woman was employed prior to the index hospitalization, we valued the lost hours of household production at the wage she earned in 1984. For women who were not working prior to their 1984 hospitalization, there is no satisfactory method for valuing the lost hours. We employed a simple model to impute wages for women who did not work. First, using all women workers, both those with and those without adverse events, we arrived at a predicted wage for a woman according to age, education, race, marital status, and location of residence.[27] Then, we computed a predicted wage for each woman in the sample who suffered an AE and had no pre-hospitalization wage record. Finally, we projected out this imputed wage level until the end of the woman's life expectancy, rather than to the end of her work-life expectancy.

4. Imputation of Missing Values. Respondents sometimes could not recall (or did not know) whether the patient engaged in certain household activities prior to 1984, whether the patient ever returned to these activities, or if she did, when she returned. In general, we imputed for these missing or ambiguous responses the mean value of the valid responses. Details appear in Technical Appendix 8.IV.3.

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We have described the categories of costs created by medical injuries. The sum of the costs can be considered to be an approximation of the social costs of injuries. Since our objectives include an analysis of the compensation of the victims

[27] We fitted a regression model with after-tax wages plus fringes as the dependent variable and age, age^2, education, race, marital status, and location as the predictor variables.

of injuries, we must next describe how we estimate the fraction of total costs that is borne by the victims.

F. Personal Consumption Offset for Decedents

The appropriate measure of the costs of injuries borne by the victims is the difference between the income that they would have received absent the injury and the amount they receive after being injured. Income conceptually includes both monetary and psychic components even though empirical measures of psychic losses (pain and suffering) are weak.

When an accident victim dies, the goal of a compensation system should be to reimburse the survivors for their loss of income provided by the decedent. Death of the victim presents a special issue: the decedent would, if he had survived with disability, have consumed part of any benefits owing to him. For this reason, his family would not have access to this consumption portion of compensation. When computing a loss to survivors, therefore, one must deduct the anticipated value of the decedent's consumption.

1. Equivalence Scales--Proportion of Family Consumption Consumed by Decedent. Several methods are used to estimate the consumption of decedents. Each method is imperfect.[28] We used the "equivalence scales" published by the U.S. Bureau of Labor Statistics (BLS).[29] The scales attempt to give an objective measure of equal levels of consumption for households that vary

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[28] A recent study on calculating losses in death cases attempts to solve the variations among the methods by averaging the results obtained from each of three of the methods. Elizabeth M. King and James P. Smith, **Computing Economic Loss in Cases of Wrongful Death** (1988).

[29] U.S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 1570-2, **Revised Equivalence Scales for Estimating Equivalent Incomes or Budget Costs by Family Type**" (Washington, DC: U.S. Government Printing Office, November 1968).

in terms of the number and ages of household members. Thus, if a family of three persons requires 81% of the income of a reference family of four persons to attain the same level of welfare, the equivalence scale equals 0.81.

The BLS data are useful because they result from a large national survey of the consumption of American families. They are limited because they were collected nearly forty years ago, and they assume that families spending the same proportion of their income on food are at equal levels of welfare. We use the BLS equivalence scales to calculate the consumption deduction as follows:

$$CD = (EV_1 - EV_0)/EV_1;$$

where

CD=the proportion of household (disposable) income consumed by the decedent

EV_1=equivalence value for the household including the decedent

EV_0=equivalence value for the household excluding the decedent.

We obtained an equivalence value for each respondent by matching the size and type of the victim's household with the age of the household head with the same characteristics for the households in the BLS data. The net wage loss to the survivors of a patient then is equal to: (1-CD) x (after tax wage loss).[30]

We applied the same adjustment to the gross losses of household production of deceased patients. Had the patient survived, she would have consumed some of her homemaking services; not all the services would have flowed to the family.

[30]The equivalence scales used in this study are further described in Technical Appendix 8.IV.5.

2. Dependency--Determining The "Effective Family. In order to be able to calculate the fraction of family income that the patient would have consumed, we needed to predict the family size over time. As family size increases, the family can realize economies of scale in food, housing, and other expenses. Thus, in a larger family one person consumes an ever smaller amount of resources. The equivalence scales account for family size. In addition, they facilitate a simulation of the aging of both parents and children from the date of death of the wage earner to allow, for example, for the eventual emancipation of children and the shrinking of family size over time (see Technical Appendix 8.IV.5).

3. Loss of Savings of Single Decedents Living Alone. Persons who live alone and have no dependents are assumed to consume all of their incomes. As a result, the estimated loss for someone who dies without survivors is zero: the patient has no future medical expenses and all wages would have been consumed rather than saved.

G. Taxes

Taxes account for the most important difference between a worker's earnings and the income available to the worker and family. New York State residents pay both federal and state income taxes and residents of New York City pay an additional wage tax to the city. We estimated the income taxes paid by the workers in our sample from data on (1) the average tax rates for federal and New York State income taxes for each of five income categories. The taxes on residents of New York City, which are added to the state and federal taxes, were estimated for each of

the five income categories from the New York City tax schedules.[31]

Tax rates depend not on the patient's income but on the patient's family income. Computing family tax rates required several imputations from our survey data. During the interview, patients provided data on their marital status and level of education. We obtained data from the Current Population Survey (CPS) using educational levels to determine the percentage of married women who work.[32] These data permitted a calculation of the probability that a wife worked given that her husband was also employed. The CPS also provided information on the fraction of family income earned by husband and wife. Then, for each education level, we estimated family income for married patients as follows.

If the patient was a married male, we knew his income from the survey. His wife's income was imputed to be the fraction of his income that she would earn (if she worked) times the probability that she worked. Thus, if the husband earned $15,000, the husband and wife's fractions of family income from the CPS data were, for example, .6 and .4 respectively, and the wife had a 75% chance of being employed, then the wife's imputed income was $15,000*(0.4/0.6)*(0.75) = $7,500. If the patient was female, we assumed that her husband was in the labor force (as CPS data indicate), and we estimated his income as her wages times the ratio of the husband's fraction of family income to his wife's fraction. Thus, if husband and wife's fraction of income were .6 and .4 as explained above, and the female patient's income was $10,000, we computed her husband's income to be $10,000*(0.6/0.4) = $15,000.

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[31]The tax rates are described in Technical Appendix 8.IV.6.

[32]U.S. Bureau of the Census, Household Income CPS Series P-60 No. 153

H. Compensation From Insurance and Entitlement Programs

An appropriate estimate of the costs of injuries borne by the victims should consider not only the loss of earnings and the costs of medical care but also the offsetting income and insurance benefits received after the injury. We used data from our survey to estimate the amounts, durations, sources and timing of compensation payments to patients. Compensation payments were deducted from the patients' total losses to estimate the costs that were borne by the victims.

1. Income Replacement Programs. The wage losses less personal consumption (in death cases) and taxes are the wage losses that individuals would suffer in the absence of private or social insurance. Most households would, however, be compensated for some of their losses by one or more of the programs that make up the nation's income security and income support system. The U.S. system of income security and support consists of three types of plans.

The three types of plans are:

1. Work related compensation for death or disability; the plans in this group are employment related private schemes such as sick leave or publicly mandated programs such as New York State Temporary Disability Insurance and New York State Workers' Compensation. Workers' Compensation plans pay for health care and provide benefits to offset losses of wage income caused by disabling work injuries.

2. Social insurance schemes for death, disability or poverty; The plans in this group pay benefits for the losses associated with work disability (e.g., Social Security Disability Insurance), income support payments (AFDC) for poverty level families and some are programs for which one must be disabled and poor.

3. Private pensions and social insurance for retirement; Plans that pay benefits for voluntary withdrawal from the labor force in the form of "old age" benefits are among the most common forms of pensions. It would not

be appropriate, however, to treat retirement benefits as compensation for health related consequences unless the individuals have "retired" because of a disabling injury or illness. We will report results for retirement benefits but we will also attempt to distinguish between benefits that were paid for voluntary retirements from those related to ill health.

For all of these programs, we made an initial determination from the survey responses that these payments were related to the condition treated at index hospitalization. Benefits that accrued prior to 1984, such as a monthly pension payment, were presumed to be unrelated to medical injuries that occurred in 1984. Next, we computed from the survey responses on the periods of receipt of benefit payment the total number of months of income replacement. Finally, we computed from the survey responses on the monthly level of benefits the total amount of compensation for the period 1984 to 1988.

To evaluate income replacement benefits during the post-interview period, we assumed that payments received continuously during 1987 and the first six months of 1988 would continue until the end of life expectancy. It is quite realistic to expect payments from Social Security Disability Insurance, and private retirement pensions to continue for the lifetime of the recipient.

2. Health Care Insurance Program. The same reasons that complicate accurate estimates of health care costs from interviews also raise difficulties in identifying patients' health insurance benefits from a survey. We could not determine from the patients the amounts of insurance received or even the fraction of health care costs covered by their policies. As a rule, many survey respondents cannot accurately recall information in this detail, especially about events that occurred several years in the past. Although we did elicit information on the form of insurance coverage, Blue Cross versus Medicare, for

example, we have not yet been able to use this detail in arriving at estimates of insurance reimbursement. Our reimbursement figures thus depend on simplifying assumptions.

Our results on the patients' share of health care costs are based on the assumption that their shares equaled national averages for hospital care and physician visits, and that the payments for therapy and home health visits can be represented by the national averages for "other" health care services. Since the services consumed by the patients in the survey sample are distributed over several years, we used the average patients' shares of costs for the years 1984 through 1987.[33]

For future health care costs, we also applied the national fraction of patients's share of costs to arrive at a deduction for health insurance benefits. We are primarily interested in the compensation provided by tort awards for medical malpractice although we report all the sources of income reported by the survey respondents.

We used data from our survey to estimate the amounts, durations, sources and timing of compensation payments to patients. Compensation payments were deducted from workers' total losses to estimate the costs that were borne by the victims.

I. Discounting

Discounting is the term used to describe the process of reducing future economic losses to their present value. If a fund expects to have to pay for losses in the future, it can invest a sum of money today and accrue interest until the time of payment.

While the need to apply a discount factor to arrive at present value estimates is universally accepted, the choice of an

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[33] S. Letch, K. Levit and D. Waldo, "National Health Expenditures 1987" Health Care Financing Review 109-122 (Winter 1988)

appropriate discount rate remains controversial. The rate depends on several factors. First, if one predicts future losses with inflation, the discount rate must consider the fall in the value of money over time. In our analyses we predict wage and cost growth in real terms (after adjusting for inflation). Thus, we apply a real (inflation adjusted) discount rate. Second, the rate should take into account the expected length of the fund's investment and the likely rate of return on low-risk investment. Payments expected to be made over a long period should be discounted using a long-term interest rate.

The U.S. Supreme Court has written that it would accept a trial court's decision to use a real discount rate of between 1 and 3%.[34] For this study we adopt the well-accepted rate of 2.75 percent for long-term investments.[35]

J. Compensable Losses Under a Hypothetical No-Fault Plan

The previous sections describe our methods of estimating the losses and sources of compensation for the illness related to the index hospitalization. Another important objective is to estimate the compensable losses under a no-fault plan for the victims of medical injuries.

This exercise required first that we establish hypothetical criteria for eligibility for compensation. Next, we needed to design methods to substitute for an administrative system that would, in practice, render decisions on: (1) the causal connection between medical management and injury, (2) the duration of disability from the injury, and (3) the need for continuing medical treatment for the injury.

We could not simulate the actual administration of a no-fault compensations system for several reasons. First, our

[34] Jones and Laughlin Steel Corp. v. Pfeifer, 103 S.Ct. 2541, (1983).

[35] Feldstein and Summers, Inflation, Tax Rules, and the Long-Term Interest Rate, Brookings Papers on Economic Activity, Vol. 1, 1978.

analysis looks from the perspective of 1989 at injuries that occurred in 1984. Reviewers were able to use retrospective data to assess with the benefit of hindsight whether work absences in 1986, for example, resulted from the AE in 1984. In practice the injured patient would be presenting his or her case for review soon after the occurrence of the disabling injury, or at least soon after the termination of a threshold waiting period (six months for the purposes of this simulation). Second, for some cases we needed to project losses and costs from 1988 to the end of the life expectancy of the patient. In practice, the injured patient would present additional claims for payment or coverage during his lifetime and would be eligible for periodic benefits. Although we did not estimate the administrative costs of a program, we did estimate the compensable losses under such a system.

1. Principles of No-Fault Compensation. The principles underlying a hypothetical no-fault plan are crucial to any estimates of the compensable losses. In arriving at estimates, we made the following assumptions on coverage.

a. Injuries caused by medical management. A fundamental prerequisite to eligibility for compensation would be the occurrence of a disabling injury caused at least in part by medical management. Chapter 5 outlines the methods used to determine which patients in the sample of 30,121 would be eligible for compensation according to the protocols outlined there.

b. Payment only for death or disabling injury. We next assumed that compensation would be payable only for injuries that resulted in death or disability. Part of the determination of disability follows from the definition of "adverse event" described in Chapter 5. An AE is an injury that

either extends hospitalization or results in disability that persists after discharge. A higher threshold in the form of an exclusion of injuries that do not persist for more than 6 months is explained below.

c. No compensation for non-economic loss. Although our survey gathered extensive information on the impact of injuries on the patient's quality of life, we assume for purposes of this report that a compensation program would not cover non-economic loss. These elements of loss are denominated "pain and suffering" or "loss of enjoyment of life" in personal injury litigation.

We do, however, present information on losses in fringe benefits because although private and social insurance plans, such as Social Security Disability Insurance and Workers Compensation in the United States, do not compensate for lost fringe benefits, as some plans in other countries do.[36]

2.Use of a Deductible Period of Disability (Six Months Example). The most frequent types of injuries are low severity, low cost injuries. A compensation plan that would attempt to compensate for all injuries or, alternatively, to evaluate the relatedness of every loss to a medical injury would soon exhaust its resources or greatly limit its ability to provide adequate benefits to the low frequency, high cost injuries that impose the greatest burdens on victims.

Most no-fault plans try to focus on more severe injuries by using efficient screening criteria to exclude low cost injuries. A special problem with no-fault patient compensation is disentangling the effects of the adverse event itself from the consequences (medical costs and time lost from work or household

[36] In Canada, for example, the Ontario Workers' Compensation plan will soon compensate injured workers for losses of retirement pension benefits as part of its newly authorized wage-loss benefit plan.

duties) that are normally expected during treatment of an recuperation from the underlying illness. A waiting period before eligibility for no-fault benefits is responsive to both these concerns. We used a six-month duration for this purpose. This rule seemed appropriate because it is consonant with other disability programs, most notably Social Security Disability Insurance (SSDI), which applies a 6-month exclusion of benefits. Second, and the New York State Temporary Disability Insurance program, which pays disability for up to six months from injury. Our survey data will permit, however, tests of the cost effects of alternative waiting periods, e.g., three months.

In practice we applied this rule as follows. First, any person who died or reported work loss or disability more than six months after the index hospital admission was deemed to satisfy the threshold. Therefore, if a patient returned to work or household activity within six months but later experienced disability from the condition treated at the index hospitalization, the patient was included in the group eligible for compensation.

Second, for all persons eligible for compensation, we deducted losses incurred during the first six months from the index admission. Deductions were implemented for several major categories of losses: wages, household production, and hospitalization. Because the interview instrument was able to elicit only general information on the timing of ambulatory medical expenses (physician, therapist, and home health visits, supplies, and equipment), the full cost of these items is included in estimates. It should be noted that therapist refers to non-psychiatric outpatient therapist such as physical or rehabilitation therapist.

3. Attributing Disability and Medical Expenses to AE

As explained above, estimates in Tables 8.2 to 8.7 include all losses attributable to the illness or injury treated at the index

hospitalization. Because we could not ask patients or the survivors whether a disability or death was attributable to medical management rather than an underlying disease, we employed physician reviewers to judge the causal connection between the specific AE found in the medical record review and the specific period of disability of medical care reported by the patient.

Details of the methods of attribution appear in Technical Appendix 8.IV.1. In short, physicians using the results of both the medical record review and the patient survey, assessed their confidence in judgments on the link between the AE and the post-six-month disability. The reviewers thus had access to two independent physician judgments on the marginal or incremental disability caused by the AE, the summary clinical data from the AE Analysis Form description, the hospital data discharge summary, and the patient's report of post-discharge disability.

Because our definition of an adverse event was related to the consequences of treatment and did not consider the appropriateness of compensation, physician reviewers identified some adverse events that would probably not be included in any no-fault compensation scheme. These include such events as transplant organ rejection and complications of chemotherapy or radiation therapy for cancer, hazards that are known and accepted by patients and physicians as common and, at the present state of medical knowledge, non-preventable consequences of complicated treatments for desperate conditions. Nonetheless, since each case would require a decision on its individual merits, we have left patients with these AEs in our data base for calculating medical care costs and disability. Thus, our final estimates are higher than might actually be the case in a no-fault compensation plan.

Physicians performed these assessments on two groups of patients. For workers, reviewers attributed to AEs annual periods of work disability and medical care costs for 1984 to

1988, and a percent of future disability, household, and medical care costs.

For students, reviewers attributed to AEs annual percentages of medical care utilization for 1984 to 1988, and a percent of future disability and medical care utilization.

For children, one member of the investigative team, a pediatric surgeon, calculated the fraction of medical care attributable to the AE after reviewing the written descriptions of the adverse event and the disability scores assigned to the AE by the two physician reviewers; the telephone survey information regarding length of stay for the index hospitalization; the annual number of hospital days, physician visits, home health care use; and the need for specialized medical equipment (wheelchairs, ventilators, etc.). With this information, the reviewer made a clinical judgment about the fraction of medical care that was reasonably attributable to the AE. A prediction was then made of the fraction of post-interview health care that would be incurred because of the AE. In cases where the information was inadequate to make a judgment, most or all of the medical care utilization was attributed to the AE.

The attribution process made no case-specific allocation between AE and underlying disease for homemakers, retired persons, and the disabled. We estimated the compensable costs of medical care for these adults by assuming that the proportion of their total costs that is attributable to medical injury equals the proportion observed for adult workers. In further work we intend to perform a similar case-specific allocation process for these groups. Estimates do not include possible future losses in household production for children. As with the overall estimates of the costs of AEs, the no-fault simulation does not address costs of supplies and equipment.

4. Deduction for Entitlements and Insurance Benefits

As we have described previously, our estimates of the net costs of illness assume deductions for income replacement and health insurance benefits. For this assessment of the costs of a no-fault compensation plan we have applied program specific estimates of income replacement and the national averages for patient contribution for health care.

In practice, the patient's share of health care expenses might be higher than these estimates. Current federal health benefit programs (Medicare and Medicaid) prohibit their reimbursement intermediaries from paying for medical expenses where another insurance program, including state-mandated no-fault programs, could be expected to cover the expense.[37] Enforcement of these regulations with regard to a patient injury no-fault program would result in larger estimates for health care costs payable by a patient compensation fund. We offer rough estimates only. Our survey results will enable us in the future to estimate with more precision the reimbursement-specific rates of patient contribution for health care. This enhancement to our methods will support better inferences about the share of health care expenses that would not be covered by existing insurance and thus would remain the responsibility of a patient compensation fund.

5. Deduction for Consumption, Fringe Benefits and Taxes

Finally, we assumed that certain losses would not be redressed under a no-fault compensation program--e.g., earnings that would have been consumed by a deceased victim had he lived, and taxes

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[37] Dept. of Health and Human Services, Health Care Financing Admin. Medicare as Secondary Payer and Medicare Recovery Against Third Parties. Proposed Rule. 53 Fed. Reg. 22335, June 15, 1988. CCH, Medicare and Medicaid Guide, Transfer Binder, ¶37,138. 42 U.S.C.A. §1396a(25) (Supp. 1989). 42 CFR §433.138 (1988). 42 U.S.C.A. §1396k(a)(1)(A) (Supp. 1989). 42 CFR §§433.145-.146, 435.604 (1988). Abrams v. Heckler, 582 F. Supp. 1155(S.D.N.Y. 1984); Rubin v. Sullivan, F.Supp. (D. Hawaii 1989), CCH Medicare and Medicaid Guide, ¶38,324.

payable out of gross earnings. The details of these deductions have already been discussed.

6. Zero Wage Loss for Deceased Patients Without Dependents In computing the losses associated with adverse events, we included a wage-loss estimate for minor children, and we assumed that workers with no dependents would not consume all of their earnings. In no-fault compensation systems the estate of those who die with no dependents receive no death benefits. Therefore, we applied the same standard and excluded these losses from the compensation system.

7. Confidence Intervals for Estimates. Variance estimates account for the effects of a stratified, unequal cluster sampling design. Details appear in Technical Appendix 5.V.3.

K. An Alternative Method of Attribution

We also conducted extensive interviews of a cohort of control patients in order to answer a different question: what are the costs of adverse events to society? This estimate, which will be one of the extensions of the current study, will consider that for some patients with adverse events wage loss and medical expenses are in part attributable to an underlying disease of pre-existing injury. Had the AE not occurred, they might still suffer some disability. Thus, viewing AEs from the point of view of the expenses of injury to society, the costs are only the incremental costs of treating additional disability from the AE. To carry out this analysis, we selected and interviewed a control patient, who suffered no adverse event, for each patient with an adverse event. By comparing the losses of the controls with the losses of adverse events, we propose to determine the net costs to society of adverse events over and above the costs of underlying illnesses. Details of methods for selecting controls is described in detail in Technical Appendix 8.IV.7.

L. Summary of Methods

We produced estimates of losses and costs by estimating lost time or days of hospitalization, valuing the loss per unit of time, and multiplying the two estimates. Losses included wages, household production, and medical care. We assessed sources and levels of income replacement and health insurance benefits, and computed net losses. Deductions for taxes and personal consumption followed well-accepted principles of injury evaluation. We calculated the present value of losses with 1984 as the base year using a discount rate of 2.75% for future losses. We then inflated all values to 1989 dollars using the implicit GNP deflator for personal consumption expenditures.

V. Results

This section describes the economic consequences of background illnesses and medical injuries for the adult members of the interview sample.

We first describe some important characteristics of the persons who responded to the survey and compare them with the characteristics of the non-respondents. The losses of wages, household production and the costs of medical care are then reported for each of four activity groups. The final section presents estimates of the costs of a no-fault compensation scheme for medical injuries.

A. Characteristics of Respondents

The results reported in this section use data from interviews of a sample of patients to represent the losses of the population that the sample was designed to represent. The overall interview response rates for the 1133 patients who suffered adverse events was 71.1% (weighted). As we have described earlier, the response rate varied according to both the employment status of the patient and whether the patient died.

Table 8.1 lists the response rate by the patient categories used for reweighting. We also compared respondents to non-respondents and reweighted respondents to all patients with adverse events.

A larger fraction of non-respondents were black, on Medicaid, and from New York City (not shown). Low income, non-white residents of a large city are often difficult to locate and interview. The survey was structured to focus extra efforts on interviewing members of this target group. With reweighting of the respondents to account for non-response (see section IV), the weighted characteristics of respondents assumed a socio-economic distribution more like that of all patients with adverse events rather than that of only the respondents. For patient sex, length-of-stay, and case mix, respondents differed only slightly from non-respondents, and the reweighting made the respondents' distributions virtually identical to that of all patients with adverse events. To the extent that gender affects market income levels and household production, as employment data suggest, the respondents (as reweighted) should represent non-respondents as well. To the extent that length-of-stay and case mix characteristics are proxies for severity of illness and likely medical expenses, the respondents' medical care experiences should also fairly reflect that of the entire population.

It is important to recognize, however, that whatever the response bias associated with ethnicity and income, it does not affect the sample measures of the frequency of negligent adverse events, nor the average AE score assigned by our physician reviewers.

The complete analysis of potential non-response or selectivity bias in our results will be accomplished as one of the extensions of the current study.

TABLE 8.1

RESPONSE RATES

	Living*	Dead*	Total
Children (Patients under age 18)	66%** (79/123)**	46% (4/9)	65% (83/132)
Employed	74% (220/296)	47% (10/18)	72% (230/314)
Retired	78% (135/173)	66% (32/51)	75% (167/224)
Students	63% (13/20)	None	
Disabled	85% (37/44)	79% (7/10)	84% (44/54)
Homemaker	77% (70/90)	75% (10/14)	76% (80/104)
Unemployed	63% (49/74)	41% (5/10)	59% (54/84)
Unknown and Others	62% (96/165)	77% (27/36)	66% (123/201)
TOTAL	72% (699/985)	66% (95/148)	71% (794/1,133)

* Determined at time of medical record review.
** The percentages are weighted. The ratios are unweighted.

The classification of adverse event cases according to activity presented in Table 8.1 uses information from the medical record and was thus available prior to patient interview for all cases. Based on information obtained in interview, all respondents were reclassified into only five categories, worker, housewives, retired, disabled and children/students. All subsequent tables are based on this reclassification (totals in each category are given in Table 8.2).

Additional information on subsequent deaths among respondents was also obtained by the interview process. Overall, 45.3% adults died, either during hospitalization or during the interview period. The percentage of deaths in four of the activity categories is: workers, 18%; housewives, 45%; retired, 64%; disabled, 59%.

B. Consequences of Illnesses and Injuries

This section describes the economic consequences of the illnesses that led our subjects to enter hospitals in 1984 and of the medical injuries that occurred during those hospital stays. The results do not distinguish between the costs of the background illnesses and the costs of the injuries. That distinction is the subject of the next section in this chapter.

The results, summarized in Table 8.2, show that workers' gross wage losses, before taxes or compensation payments, equaled slightly more than $2.6 billion.

We present estimates of the costs of illness, disability, and death for each of the four adult activity groups (that is, workers, homemakers, retired, and disabled) and for children and students. Greater detail on the results for children are presented in section D. Our discussion emphasizes the results for workers because the costs of death and disability are higher when the victim is a worker than for adults who are not in the labor force.

TABLE 8.2

GROSS COSTS* OF UNDERLYING ILLNESSES AND ADVERSE EVENTS

	Workers	Homemakers	Retired	Disabled	Children and Students	Total**
Population	**27,944**	**18,181**	**33,187**	**11,571**	**7,727**	**98,610**
Sample Size	**295**	**120**	**188**	**100**	**91**	**794**
		(millions of dollars)				
Lost Wages	$2,610	$ ---	$ ---	$ ---	$122	$2,740
Lost Household Production	1,140	1,000	526	640	---	3,306
Costs of Medical Care						
1984-July 1988	683	427	2,160	385	70	3,730
July 1988 -	5,300	618	1,050	3,890	575	11,400
Total Costs***	$9,740	$2,040	$3,736	$4,915	$767	$21,176

* Nominal, undiscounted dollars

** The total population size estimate varies from other tables due to rounding

*** Columns and rows might not sum exactly to totals due to rounding

1. Workers. The total costs of illness and injury to workers include (1) losses of productivity caused by work absences and health-related limitations on the productivity of some of those who return to work following an illness; (2) expenditures for medical care, supplies and medical or rehabilitative equipment; (3) losses of household production because of health related limitations on the ability to do housework.

Of the 27,944 workers who suffered an adverse event, 93.7% were employed and 6.3% were temporarily unemployed in the six months before they were hospitalized in 1984. Some of the workers (4.2%) died during hospitalization and 5.5% died soon after discharge.[38] An additional 15.4% of the workers living at discharge never returned to work.

In calculating health related work absences, we excluded persons whose post-index absences from work were not related to the conditions associated with the index hospitalization. Of the workers who never returned to work, 5.5% retired from the labor force for reasons other than ill health; 2.7% left to care for their families; 1.4% entered school; 4.1% "could not find work," and 2.7% left for "other reasons" or were "doing something else." We followed a similar approach for the post-discharge absences of workers who returned to work, counting only those absences for which a health condition related to the index hospitalization was identified as the primary cause of the work absence.

Because we could not ask patients about their medical injuries, the work absences that the patients reported represent the combined effects of the injuries and background illnesses.

Most injured workers returned to work soon after they were discharged. As indicated in Table 8.3, 76.0% of the workers, who were alive at the time of the interview, returned to work in six

[38] Some of those who returned to work subsequently left the labor force because of disability or death.

months or less. The durations of work absences reflect the fact that most illnesses and injuries are not permanently disabling.[39] The distribution of the costs of work injuries is also consistent with that expectation.

[39]The duration of work absences among workers who died is determined by the workers' expected worklives. Approximately 4.2 percent of the workers died during the index hospitalization and an additional 12.7 % died during the interview period.

TABLE 8.3

DISTRIBUTION OF WORK ABSENCES DUE TO UNDERLYING ILLNESSES AND ADVERSE EVENTS*

Duration**	Population	Percent (weighted)	Cumulative Percent
1 Month or less	9,595	42.0	42.0
2 Months	3,411	14.9	56.9
3 Months	1,994	8.7	65.6
4 Months	1,118	4.9	70.5
5 Months	1,077	4.7	75.2
6 Months	191	0.8	76.0
6 Months to a Year	1,086	4.8	80.8
1 Year to a 1.5 Years	292	1.3	82.1
1.5 Years to 2 Years	293	1.3	83.4
2 Years to 2.5 Years	0	0.0	83.4
2.5 Years to 3 Years	315	1.4	84.8
3 Years to 3.5 Years	100	0.4	85.2
3.5 Years to 4 Years	30	0.1	85.3
4 Years to 4.5 Years	352	1.5	86.8
4.5 Years to 5 Years	45	0.2	87.0
5 to 6 Years	195	0.9	87.9
6 to 7 Years	427	1.9	89.8
7 to 8 Years	97	0.4	90.2
8 to 10 Years	349	1.5	91.7
10 to 12 Years	383	1.7	93.4
12 to 14 Years	496	2.2	95.6
14 to 16 Years	281	1.2	96.8
More than 16 Years	717	3.1	99.9
Total Cases	22,843	100.0	

* Based on a sample of 248 workers who were alive at interview in 1988.
**Includes predicted future work absences.

Valued at the pre-hospitalization earnings of each worker, the average loss of earnings caused by illness-related work absences equaled $82,400 in direct wages and $11,250 in fringe benefits for a total of $93,600 (Table 8.4). The relatively high average loss reflects a combination of very high losses among workers who died (the average loss is $339,000) and the relatively low losses of workers who were alive at interview. The average loss among the living workers was $38,700. Even within the group of living workers, the most frequent (modal) loss is substantially less than the average.

The total losses of wages and fringe benefits during work absences stemming from the 1984 hospitalizations is $2.6 billion.[40] Slightly more than 35% of the total loss was incurred during the interview period (January 1984 to July 1988). The remaining 65% of the total loss is attributable to predicted post-interview work absences among workers who died, retired due to ill health, or were permanently and totally disabled. The results also show that 74% of the total loss of wage is due to the minority (21% of the total) of workers who died.[41] Thus, the loss data show that most injured workers have illnesses and injuries that are not severe. Their periods of work disability are short and their wage losses are small. Most of the costs are attributable to the few cases in which workers died.

The results for women who work for wages and who work in the home are reported next. The losses for women who were fulltime homemakers are reported separately. Approximately one-half (50.1%) of the injured workers were women. Approximately

[40] Pre-hospitalization wages adjusted to include fringe benefits, are used to estimate the losses. We imputed wages for 20.0 percent of the workers who were interviewed. We assumed that these workers earned the average wage for their industry of employment and county of residence. If we exclude imputed wages, the estimated loss of wages and fringe benefits is $2,144,767,070.

[41] The concentration of very high losses among a relatively small part of the injured worker population is a familiar pattern to students of the consequences of automobile and workplace injuries.

4.6% of the women workers died during the index hospitalization. Of the women who were alive at discharge, 14.5% never returned to household work.[42] The mean duration of absence 86.5 weeks. We estimate the dollar value of the lost weeks of household production by pricing the time at the pre-hospitalization wages earned by each woman. The mean value of the lost weeks is $81,202 and the total value of lost household services equals $1.1 billion.[43]

We next consider the costs of the medical care consumed by workers. As in the previous discussion of wage losses, a small proportion of the workers consume most of the services.

[42]Among those who returned to household work, approximately 19 % of women were prevented by illness from resuming the household duties they had performed before being hospitalized in 1984. Our data do not permit us to estimate the dollar values of losses in reduced housework. Our loss estimates are limited to the costs of absences from housework.

[43]We imputed wages for women workers whose pre-hospitalization wage was not reported. If we exclude imputed wages, the total value of lost household services is $563,000,000.

TABLE 8.4
GROSS COSTS OF UNDERLYING ILLNESSES AND ADVERSE EVENTS FOR WORKERS*
(N=295, POP=27,944)

	Weeks/Visits per capita	Gross Costs per capita	Gross Costs Total
Wage Losses			millions
Weeks Lost	155		
Gross Wage Losses		$93,600	$2,600
Losses of Household Production**			
Weeks Lost	87		
Value of Weeks Lost		$81,200	$1,140
Medical Care 1984-July 1988			
Weeks in Hospital	7		
Cost of Hospital Care		$22,800	$637
Physician Visits	18		
Cost of Physician Visits		$739	$21
Therapist Visits	12		
Cost of Therapist Visits		$643	$18
Home Health Visits	8		
Cost of Home Health Visits		$251	$7
Total Medical Care Cost			
1984-July 1988		$24,400	$683
July 1988 --		$190,000	$5,300
Total Medical Costs***		$214,000	$5,990

* Nominal, undiscounted dollars
** Based on a population of 13,989 female workers
*** Totals may differ due to rounding

TABLE 8.5

NET COSTS* OF UNDERLYING ILLNESSES AND ADVERSE EVENTS FOR WORKERS (N=295, POP=27,944)

	Per Capita Costs	Total Costs	Net Costs
Net Losses - Wages		millions	
Gross Wage Losses	$82,392	$2,610	
Less: Income Taxes	$22,399	$ 626	
Consumption Deduction	$13,270	$ 371	
Net Direct Wage Losses**	$46,723	$1,613	$1,613
Net Losses-Household Production* **			
Value of Weeks Lost	$81,202	$1,140	
Less: Consumption Deduction	$36,303	$ 510	
Net Loss	$44,900	$ 630	$ 630
Medical Care			
Gross Medical Costs 1984-July 1988	$24,400	$683	
Less:			
Compensation for:			
Hospital Care	$20,624	$ 576	
Physician Visits	$546	$ 15	
Therapist Visits	$274	$ 8	
Home Health Care Visits	$107	$ 3	
Compensation 1984-July 1988**	$21,551	$ 602	
Net Medical Costs 1984-July 1988	$2,849	$ 81	$81
Gross Medical Costs July 1988-	$189,794	$5,300	
Less: Compensation	$167,478	$4,680	
Net Medical Costs July 1988-	$22,316	$620	$620
Total Net Costs			$2,944

* Nominal, undiscounted dollars
** Totals may differ due to rounding
*** Based on a population of 13,989 female workers.

The average cost of all forms of past and future medical care for these illnesses is $214,000. The total costs of care equal nearly $6 billion.

We do not report results on equipment costs because the interview data on equipment costs were extremely sparse. Instead we report on equipment use. Technical Appendix 8.V.1 presents medical care equipment use for workers and others.

We next consider the losses that occur among adults who were not in the labor force when they entered a hospital in 1984. The not-in-the-labor force group includes disabled persons, homemakers and persons who retired from the labor force.

2. Adults Not in Labor Force. The costs of illness and injury for adults who are not in the labor force include losses of household production and the costs of medical care. As indicated in Table 8.6, the total loss of household services including the losses for dead or disabled homemakers in the years after July 1988, was almost $2.2 billion and the total cost of medical care was $8.5 billion.

TABLE 8.6
GROSS COSTS* OF UNDERLYING ILLNESSES
AND ADVERSE EVENTS FOR NON-WORKING ADULTS

	Homemakers (POP=18,181) (N=120)	Retired (POP=33,187) (N=188)	Disabled (POP=11,571) (N=100)	Total Gross Costs
		(millions)		
Household Production**				
Gross Costs	$1,000	$526	$640	$2,166
Medical Care				
Gross Costs 1984- July 1988				
Hospital Care	$368	$2,110	$337	
Physician Visits	$6	$13	$8	
Therapist Visits	$11	$12	$11	
Home Health Visits	$42	$31	$30	
Total Medical Cost 1984- July 1988	$427	$2,160	$385	
Medical Care Cost July 1988-	$618	$1,050	$3,892	
Total Cost of Medical Care***	$1,040	$3,220	$4,280	$8,540
TOTAL				$10,706

* Nominal undiscounted dollars.
** Based on female populations of homemakers (18,181), retired (16,612), and disabled (5216).
*** Totals may differ due to rounding.

TABLE 8.7

NET COSTS* OF UNDERLYING ILLNESSES AND ADVERSE EVENTS FOR NON-WORKING ADULTS

	Homemakers (POP=18,181) (N=120)	Retired (POP=33,187) (N=188)	Disabled (POP=11,571) (N=100)	Total Net Costs
		(millions)		
Household Production				
Gross Costs	$1,000	$526	$640	
Less: Consumption of Decedents	415	324	368	
Net Loss	$585	$220	$272	$1059
Medical Costs				
Medical Cost 1984-July 1988				
Gross Costs	$427	$2,160	$385	
Compensation for:				
Hospital Care	$333	$1,910	$305	
Physician Visits	$5	$10	$6	
Therapist Visits	$5	$5	$5	
Home Health Care	$18	$13	$13	
Net Cost	$68	$229	$58	$354
Medical Care July 1988-				
Gross Costs	$618	$1050	$3890	
Compensation for: Future Costs	$621	$939	$3,310	
Net Cost	$97	$111.3	$580.0	$788
Total Net Costs**				$2,201

*Nominal, undiscounted dollars
**Totals may differ due to rounding

As one would predict, retired persons have the largest per capita consumption of medical care during the study period. Future medical costs are highest for disabled persons. The higher average costs of medical care among disabled and retired persons reflects the prevalence of chronic diseases in these two groups. It is also likely that a very small part of these costs are attributable to medical injuries since the typical person in this group was seriously ill before being hospitalized in 1984.

Our estimates of household losses to non-workers are likely to be high because they value work losses at an imputed wage even during the years in which persons are likely to have retired from work. Indeed, even in the homemaker group, many of the women were elderly.

The effect of age and mortality is quite pronounced for the non-workers. The fact that the future medical care costs of retired persons are slightly less than one-half of the costs to July 1988 is a reflection of the high mortality rate among elderly, retired persons.

Similarly, the very high future medical care costs for disabled persons reflects the fact that the disabled persons are chronically ill and relatively young, and thus require medical care for many future years.

We estimate that 87% of the medical care costs of adults were paid by third parties.

3. Summary. We have described the costs of the illnesses and injuries that occurred among persons who were hospitalized in acute care hospitals in New York State during 1984. The costs that we described result from deaths and disabilities that the patients attributed to the illnesses for which they were hospitalized during 1984. The estimates do not, therefore, distinguish between the effects of underlying illnesses and the effects of medical injuries. In the next section, we estimate the additional losses attributable to medical injuries from those attributable to the background illnesses. The results are obtained from physicians' evaluations of post hospitalization deaths and disabilities.

C. Compensable Losses Under a Hypothetical No-Fault Plan

Our objective is to estimate the compensable losses that would be paid by a hypothetical no-fault plan. As indicated in Table 8.4, the wage losses from death and disability among workers who were medically injured equalled more than $2.6 billion. As explained above, we next excluded patients who were alive at interview **and** whose total periods of work disability were completed within six months of their admission to the index hospitalization **and** who had no subsequent periods of work disability. Thus, the worker cases that were submitted for physician reviews included: (1) all workers who had died and (2) all workers who reported an episode of work disability that they believed to be related to their index hospitalization, and that occurred more than six months after their admission to the index hospital. At this point in the process, the only exclusions were workers who did not attribute their work disabilities to the index hospitalization or those for whom all work disability was completed during the first six months. Approximately 50% of the cases were excluded, but the reduction in total wage loss is small, because the work absences of those excluded was short,

approximately four weeks. The remaining 146 cases were then submitted for physician review. The physician reviewers separated periods of work disability into those attributable to background illnesses and the additional loss attributable to medical injuries. An evaluation was made of whether deaths were attributable to the injury. In some cases, patients were judged to have injury-related work disabilities but to have died from other causes.

The results of the physicians' evaluations of work disabilities and deaths were used to calculate wage losses under the hypothetical plan. Those losses that were attributable to medical injuries but which occurred during the first six months were then deducted from the gross totals. Out of the 146 workers only 34 had injury-related deaths or periods of disability that occurred after the first six months. The gross wage losses of the remaining 112 workers totalled approximately $1.6 billion. The 34 workers with injury related deaths or disabilities lasting longer than six months form the group that would be compensated under our hypothetical no-fault plan.

To summarize, the six month rule was first used to exclude living workers whose episodes of work-disabilities, resulting from either an injury or underlying illnesses, were completed within the first six months. We then screened the remaining cases to determine if the work disability was attributable to the injury. If it was, the six-month rule was applied to remaining injury-related periods of work disability. That is, the first six months of attributed losses were deducted from the losses of persons who were work-disabled after the first six months.

TABLE 8.8

COMPENSABLE* COSTS FOR ADVERSE EVENTS SUFFERED BY WORKERS (N=34, POP=2,762)

	Total Costs millions	Net Costs millions
Wage Losses		
Gross Losses (excluding fringe)	$386	
Less: Losses During First Six Months	25	
Income Taxes	77	
Consumption Deductions	75	
Net Wage Losses	$208	
Less Compensation for Wage Losses	40	
Compensable Wage Losses (excluding fringe)	$168	
Compensable Fringe Benefit	52	
Compensable Wage Loss	$220	$220
Costs of Medical Care		
Gross Costs 1984-July 1988	$67	
Less: Costs of First Six Months of Hospital Care	35	
Compensation for Medical Care	27	
Net Costs of Care (1984-1988)	$4	$ 4
Gross Costs July 1988-	321	
Less: Compensation	279	
Net Costs July 1988-	$42	$42
Losses of Household Production		
Gross Losses	$436	
Less: Losses During First Six Months	7	
Less: Consumption Deductions	179	
Net Loss of Household Production	$250	$250
Total Compensable Costs**		**$516**

* In nominal undiscounted dollars. Estimates exclude losses not attributable to medical injuries and attributable losses lasting less than six months.
** Totals may differ due to rounding

The majority of the patients had small losses which were confined to the six month period that was excluded from our estimates. Thus, the number of potentially compensable cases was reduced to approximately 10% of the original cohort of injured workers. The compensable cases are, however, persons with large losses. The average wage loss, net fringe benefits, for these workers was $151,000, for a total population estimate of $386 million. The mean duration of work absences among these cases is 442 weeks, an amount nearly three times the average (155 weeks) for all injured workers. The high average loss of work weeks reflects the fact that the eligibility criteria for the hypothetical no-fault plan are designed to serve those patients who suffer the most severe injuries.

The injured patient's portion of the total loss of his or her injury is determined by the difference between the real income that he or she would have received, absent injury, and the incomes that are received. In the not-injured state, a person cannot directly consume the taxes that are deducted from his income. Deducting federal, state and New York City taxes from the incomes of injured workers reduces the estimated average losses from work-disability and deaths by $77 million. The survivors of persons who died did not lose the income that would have been consumed by the decedent. We deducted $75 million from after-tax income to represent the potential consumption of persons who dies. Thus, our adjustments for the six months of losses, income taxes and the consumption of decedents, create a compensable wage loss equal to $208 million.

The cost of medical care during the study period was $67 million. Hospitalizations accounted for the largest share of health care costs. Future health care costs were quite high for the minority of the patients who will require care in the future.

A substantial portion of all patients in the interview sample (56%) was covered by federally funded health reimbursement programs (Medicare and Medicaid). If the federal authorities

were to assert, as they have with auto no-fault programs, their status of secondary payer of health care, the state medical no-fault plan would have to assume additional costs of compensation now covered by federal reimbursement. Using the patient's health care insurance status in 1984, we estimate that the state would incur roughly $230 million in additional health care costs over and above those noted in Table 8.9.

Unlike the tort system, neither private nor social insurance plans provide benefits for losses of household production and it is not clear that a no-fault plan for medical injuries would pay such benefits. However, our results included these losses to permit an evaluation of the cost of such benefits should it be desired. The value of lost household services equaled $436 million. It was reduced by the amounts that decedents would have consumed had they lived.

The physicians' review of workers did not include an evaluation of the extent to which health-related absences from household work were caused by medical injuries. There is, therefore, a possible bias in our results because some losses of housework may have been counted, incorrectly, as compensable costs.

Private and social insurance plans in the U.S. do not now compensate for workers' losses of fringe benefits, though such benefits are sometimes provided in other countries, [for example, in Workers' Compensation in Ontario]. If no-fault compensation were to be provided for the fringe benefits lost by the workers in our study, it would add approximately $55 million to the total compensable costs.

Because we assume that a no-fault plan would supplement rather than replace existing private and social insurance plans, we next reduce our estimates of compensable losses by the amounts that injured patients received from existing plans.

Ideally, we would like to count only those payments that are made to compensate for medical injuries. The difficulty of

making this attribution is similar to that faced in attributing costs to medical injuries. We first adopt a screening rule, as we did for the attribution of losses to injuries, that excludes the compensation payments received during the first six months. In addition, we do not include compensation payments such as monthly pensions, if the first payment was received before January 1, 1984, because such payments are presumed to be unrelated to medical injuries that occurred in 1984. Thus, for example, the benefits paid by New York Temporary Disability Insurance and private sick leave plans are almost entirely excluded by the application of the six month rule.

The most frequent source of compensation for long-term wage losses is Social Security Disability Insurance. The highest average payments are provided by private pensions and Social Security Disability Insurance. To evaluate the extent to which the injured workers would receive compensation payments during the post-interview period, we first limited our evaluation to the persons for whom we calculated post-interview period losses. Within this group, we assumed that payments that had been received continuously during 1987 and the first six months of 1988 would continue to be paid for the period during which the injured person would, by our estimates, have incurred losses. It is quite realistic to expect payments from Social Security and private retirement pensions to continue for the lifetime of the recipient. Since these plans account for 78% of the payments to injured persons between 1984 and 1988, we think our estimate that payments from these plans would form the bulk of post-interview period compensation to be a reasonable approximation.

We estimate the ratio of total compensation payments to net total wage losses both past and future to be equal to 19%. Thus, the uncompensated portion of the wage losses caused by medical injuries equals $168 million, the amount that would need to be paid by our hypothetical no-fault plan for wage loss benefits for

the medical injuries that occurred among persons hospitalized in 1984.

Table 8.9 summarizes the results for compensable losses for adults under a hypothetical no-fault plan. The figures in parentheses show the present values of losses in 1984 dollars. To the right of each figure in square brackets is a 95 percent confidence interval for the estimate. A 95% confidence interval means that if we repeated this survey 100 times, in 95 of those surveys we would arrive at a confidence interval that contains the true value of the loss. Therefore, it is unlikely that the true losses fall outside of the intervals shown in Table 8.9.

TABLE 8.9

COMPENSABLE COSTS FOR ADVERSE EVENTS SUFFERED BY ADULTS

	Workers*		Homemakers**		Retired**		Disabled**		Total	
	(millions of dollars) [95% confidence interval]									
Net Lost Wages										
Total	$168	[77, 260]	--	--	--	--	--	--	$168	[77, 260]
(Present Value)***	($139)	[64, 215]	--	--	--	--	--	--	($139)	[64, 215]
Lost Fringe Benefits	$55	[24, 86]	--	--	--	--	--	--	$55	[24, 86]
(Present Value)	($46)	[20, 72]	--	--	--	--	--	--	($46)	[20, 72]
Net Costs of Medical Care										
Total	$46	[-15, 107]	$10	[4, 15]	$20	[12, 28]	$38	[-4, 80]	$114	[40, 188]
(Present Value)	($21)	[0, 46]	($7)	[4, 11]	($19)	[12, 25]	($19)	[0, 39]	($67)	[34, 99]
Net Lost Household Production****										
Total	$250	[14, 486]	$224	[120, 327]	$78	[28, 127]	$104	[14, 194]	$655	[371, 939]
(Present Value)	($157)	[9, 305]	($149)	[83, 216]	($62)	[23, 101]	($65)	[14, 116]	(433)	[253, 614]
Total	$519		$234		$ 98		$142		$992	[616, 1368]
(Present Value)	($363)		($156)		($ 81)		($ 84)		($685)	[429, 942]

*Costs strictly attributable to medical injuries, excluding first six months.

**Compensable medical costs of injuries are estimated by assuming that the ratio of compensable medical costs to total net medical costs equals the ratio of compensable costs to total net costs (5.9%)among workers.

***Owing to item non-response for the year of the loss or expenditure, we could not compute a present value of loss for some individuals. In these few cases, the present value has been set to zero. For this reason, some of the present values might understate the true figures.

****Household losses to workers exclude losses during the first six months and losses to persons with no attributed work disability, but are not strictly limited to the costs of medical injuries. Household losses to non-workers are estimated by assuming that the ratio of potential compensable losses to total losses equals the observed ratio for women workers.

D. Children and Students

1. Total Costs. The total costs of illness and adverse events for children are shown in Table 8.2. The sample of 91 (75 children and 16 students) represents 7,727 New York state children and students who were hospitalized in 1984. We estimate that these individuals incurred or will incur $767 million in total costs. The total costs included $122 million in lost wages for students, $70 million in medical care costs during the study period (1984 through June 1988) and an estimated $575 million in medical care costs after June 1988. We do not present a detailed breakdown of costs by children or student subgroup because of the small number of cases.

2. Utilization of Services. Since children with injuries represents an important subgroup in terms of future costs and public policy, we examine their utilization of special services in Table 8.10. Children with disabilities frequently require years of special services or special schooling. Of the 6,253 children we estimate as suffering medical injuries, only 8.3% required special instruction. Of these, 408 (6.5%) were already school-age. Two hundred and fifty-three (4.0%) required only special instruction at school. The remaining 155 (2.5%) of the school-age children attended a special school for children with impairments and received special instruction at the school.

Only 113 (1.8%) of the children with injuries were pre-schoolers. Of these, 53 (0.8%) will need to receive special instruction at school and 60 (1.0%) will need to attend a special school for children with impairments.

TABLE 8.10

UTILIZATION OF SPECIAL INSTRUCTION BY CHILDREN WHO SUFFERED MEDICAL INJURIES*

	Population	Percent
ALL CHILDREN WITH MEDICAL INJURIES	**6,253**	**100**
CHILDREN WHO HAVE STARTED SCHOOL		
Receiving only special instruction at school	253	4.0
Attending only a special school for children with impairments	0	0
Receiving only out-of-school tutoring	0	0
Receiving both special instruction at school and attending a special school for children with impairments	155	2.5
CHILDREN WHO HAVE NOT STARTED SCHOOL		
Will need only special instruction at school	53	0.8
Will need school for children with impairments	60	1.0
Will need both special instruction at school and school for children with impairments	0	0
TOTAL UTILIZING SPECIAL INSTRUCTION	**521**	**8.3**
TOTAL NOT UTILIZING SPECIAL INSTRUCTION	**5,732**	**91.7**

*Children age ≥16 are not included.

3. Allocated Costs. We employed the same process for allocating costs related to adverse events for the children and students as we did for workers. Physicians reviewed each case with all pertinent information and estimated the additional medical care cost attributable to the adverse event, thereby disentangling the disease process from the adverse event. As with workers, the first six months of medical cost were excluded. Table 8.11 presents the results.

We found that only 416 (weighted number) children and students had medical care costs attributable to the adverse event. Since this was based on only 8 cases, our estimates are necessarily unstable.

We estimate that the total cost of hospital care for children whose injury resulted in further hospitalization to be $2.9 million. When compensation costs are subtracted, the net cost is $0.3 million. As might be expected, physical therapist and other outpatient services account for much more than the costs of hospitalization. Injuries may lead to substantial periods of rehabilitation. The total cost of physical therapist visits is $2.8 million (net = $1.6 million); of physician visits, $230 thousand (net = $40 thousand); and home health visits $170 thousand (net= $100 thousand). The medical care costs for the study period, then are $6.1 million (net = $2.2 million).

Future medical care costs for the affected individuals, on the other hand, are enormous relative to the number of individuals involved. Over the life expectancy of the injured children and students, the future medical care costs are $575 million (net = $82 million). Thus, the total medical care costs attributable to adverse events are $581 million (net = $84 million).

About 30% of the children and students in the interview sample were covered by Medicaid during the index hospitalization. Assuming that Medicaid was their sole source of health insurance

and that the federal government would assert its rights as secondary payer, a state no-fault plan would have to assume these medical costs, estimated to be an additional $35 million in present value, over and above the estimates in Table 8.12.

For the few children with AE-related deaths, injuries or permanent disabilities, we estimated wages that might have been earned had they not been injured. Total potential loss of gross wages equaled $123 million (Table 8.12). The estimate of potential wages of children are obviously extremely uncertain. The data we present in tables 8.11 and 8.12 should be interpreted as useful but uncertain approximations. Because they are uncertain we do not adjust estimates for consumption, fringes and taxes as we did for wage losses of adult workers.

Overall, few children and students in the sample have costs of medical care that are attributable to adverse events. Their short term medical costs consist primarily of outpatient rehabilitation services such as physical therapist visits. Over their lifetime, however, these few individuals will account for a very large dollar outlay. Most of the affected children are pre-schoolers, and thus medical care costs have been calculated to the end of an average life-expectancy. One must keep in mind, however, that the average life-expectancy of a severely injured individual will probably be less than the population average. Therefore, our estimates overstate the true future medical care costs. The average cost of medical care (net of compensation) per child is approximately $203,000 compared to $17,000 for workers. In addition to medical care costs, these few children and students will probably require special schooling and instruction.

TABLE 8.11

ATTRIBUTED MEDICAL CARE COSTS EXCLUDING FIRST SIX MONTHS: CHILDREN AND STUDENTS

	Children & Students (N=8, POP=416) Total
	Millions
Cost of Hospital Care	2.9
Less: Compensation	2.6
Net Cost of Hospital Care	0.3
Cost of Physician Visits	0.2
Less: Compensation	0.13
Net Cost of Physician Visits	0.04
Cost of Therapist Visits	2.8
Less: Compensation	1.19
Net Cost of Therapist Visits	1.61
Cost of Home Health Visits	0.17
Less: Compensation	0.07
Net Cost of Home Health Visits	0.10
Medical Cost 1984-July 1988	6.1
Less: Compensation	3.9
Net Medical Cost 1984-July 1988	2.2
Cost of Future Medical Care	574.5
Less: Compensation	493.0
Net Future Medical Care	81.5
Total Medical Care Costs	580.6
Less: Compensation	496.9
Net Medical Care Costs	83.7

E. Summary of Compensable Costs

The results of our estimates for workers and adults who were not in the labor force are described in Table 8.9 and 8.12. We report the absolute amounts of total losses, in current dollars and their present values discounted to the year 1984.

The compensable losses of household production and the costs of medical care for adults not in the labor force are estimated by assuming that the proportion of the total cost that would be attributable to medical injuries equals the proportion obtained from the physicians' reviews of injured workers.

The total compensable costs, in current dollars, for adults equal $992 million and the corresponding present value is $685 million (Table 8.12). The results for adults show that medical injuries impose high costs on a small fraction of patients and, for most injured patients, the ill effects end within a few months. Thus, the cases that would be compensable under our hypothetical no-fault plan are those most in need of compensation because individual losses are so high.

The results for children, which are added to the total for adults in Table 8.12 also reflect the pattern of low frequency severe injuries among the patients who would be compensated by a no-fault plan.

Table 8.13 summarizes compensable losses for all categories of individuals and expresses them in 1989 dollars. We find that lost wages, including fringe, totals $285 million. Loss of household production equals $506 million. Total loss, then, reach $894 million.

TABLE 8.12

TOTAL COMPENSABLE COSTS OF ADVERSE EVENTS

	Adults	Children/ Students	Total
		(Millions)	
Net Lost Wages			
Total	$168	$123	$291
(Present Value)	($139)	($58)	($197)
Lost Fringe Benefits	$55	--	$55
(Present Value)	($46)	--	($46)
Net Costs of Medical Care			
Total	$114	$84	$197
(Present Value)	($66)	($22)	($88)
Net Lost Household Production			
Total	$655	--	$655
(Present Value)	($433)	--	($433)
Total	$ 992	$206	$1,198
(Present Value)	($685)	($ 80)	($ 765)

Table 8.13

PRESENT VALUES OF LOSSES IN 1989 DOLLARS

	Workers*	Homemakers**	Retired**	Disabled**	Children	Total
			(Millions of Dollars)			
Lost Wages	$163	--	--	--	$68	$231
Lost Fringes	$ 54	--	--	--	--	54
Costs of Medical Care	$ 25	$ 8	$22	$22	$26	$103
Losses of Household Production***	$184	$174	$72	$76	--	$506
Total						$894

*Costs strictly attributable to medical injuries, excluding first six months.

**Compensable medical costs of injuries are estimated by assuming that the ratio of compensable medical costs to total net medical costs equals the ratio of compensable costs to total net costs (5.9%) among workers.

***Household losses to workers exclude losses during the first six months and losses to persons with no attributed work disability, but are not strictly limited to the costs of medical injuries. Household losses to non-workers are estimated by assuming that the ratio of potential compensable losses to total losses equals the observed ratio for women workers.

VI. Discussion

Having arrived at $894 million as our best estimate of potentially compensable losses under a hypothetical no-fault patient compensation program, we must now consider the implications and the limitations of that figure.

First, it is considerably less than the more than $1 billion now being expended in New York State for malpractice liability insurance.[44] However, we must immediately caution the reader against too quick a comparison of these figures, for reasons of both compensation policy and scientific technique.[45]

First, the tort system entails some major expenditures that are not encompassed within our tabulations, at least one of which would have to be included in any meaningful estimate of the overall costs of a no-fault system. That is the expense of program administration (including legal fees) which is estimated to comprise fully 55-60% of malpractice liability costs. We have not endeavored here to calculate what it would cost to administer a patient compensation scheme. For what is the best-known analogy, workers compensation, the administrative share of

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[44] This malpractice cost estimate was devised as follows. In 1988, the latest year for which figures were available, the Insurance Department reported that doctors and hospitals paid approximately $850 in direct malpractice premiums. Our analysis of data from 1984 indicated that an additional 40 to 50% over and above direct premiums (then under $300 million) was spent by various health care organizations on self insurance. We do not know whether self insurance costs have shot up as fast during the intervening five years as did premiums paid to commercial malpractice carriers. Indeed, we do not know whether these steep premium increases were actually warranted by real present and future trends in tort litigation, or might instead be the prelude to premium decreases (as has occurred in some other states). Thus, we use this $1 billion plus figure to reflect what New York health care providers are now actually spending on their malpractice coverage, and thus as some index of what could be "afforded" for no-fault coverage.

[45] We add here this final caveat. Our estimate is of the compensable losses suffered by patients injured in 1984, while the malpractice costs are those estimated by insurers for patients injured in 1988. We assume that there is a high degree of stability in the injury rate in the two years; that is why the incidence estimates for Chapter 6 are useful for policymakers in future years. On the other hand, inflation in the four year period will make a difference in the expected financial losses of patients injured in the later year. Our final adjustment of these 1984 losses into 1989 dollars does account for the vast bulk of this inflation factor, though there may not be a fully precise offset.

aggregate costs is about 20%.[46] Although we found the "causal" and "attribution" judgments about medical injuries to be reasonably manageable in the aggregate, we believe that a patient compensation scheme would be somewhat more difficult to administer than is workers compensation. Thus, adding a 20% administrative allowance to our compensable figure would be a lower bound on total program costs.

Second, we have not included any estimates of the cost of compensating pain and suffering or other non-economic losses of injured patients and their families. These items are major components -- some scholars believe around 50% -- of the damages now being awarded in the tort system. No-fault programs typically pay little or no benefits for such harm, and in fact, the desirability of pain and suffering damages has been under sharp theoretical and political challenge within the tort system itself. In any event, while we have detailed survey data about the extent of permanent physical and functional impairment suffered by injured patients, we have not yet tried to translate these findings into financial terms.

Even with respect to inherently economic harms, we must remind the reader of the assumptions we made in visualizing a hypothetical patient compensation program. In line with the tort model, we contemplated full redress for all medical expenses, lost wages and fringe benefits, and lost household production (the latter calculated at market wages for working women). In these respects, we have been considerably more generous than, for example, workers compensation now paid to people injured on the job. On the other hand, for practical administrative reasons we have assumed a deductible of the economic losses suffered in the first six months following the hospitalization. (Many of these losses were likely caused by the original illness itself.) We

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[46] See Priest, the Current Insurance Crisis and Modern Tort Law, 96 Yale Law Journal 1521, 1560 (1987).

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[46] See Priest, the Current Insurance Crisis and Modern Tort Law, 96 Yale Law Journal 1521, 1560 (1987).

small percentage of those patients who were injured. Thus, even with respect to the worker category, the group for which we have the most extensive and best analyzed data, the confidence intervals around our estimated $168 million net lost wages extend more than 50% in either direction.

Despite these qualifications, we underscore what we believe to be one important conclusion of our findings. When we began our research four years ago, scholars and policymakers assumed that however one felt about no-fault patient compensation in principle, it would not be affordable in practice. Analyses of the California study of medical injury in the mid-70's indicated a large gap between potentially compensable events occurring in the hospitals and tort claims being successfully litigated in the courts. We found a smaller incidence of adverse events than in California in 1974, but a larger fraction of events caused by negligence and thus potentially litigable. Further, actual tort costs have increased greatly from the mid-70's to the present time. Even more important, when we interviewed patients to determine their actual net economic losses from more serious injuries, we found that no-fault compensation for the more substantial disabilities (i.e., those lasting six months or more) would be plausible. Indeed, if one used as a benchmark the amount of compensation for New York citizens who are now injured on the job -- full payment of medical costs and partial replacement of lost wages (not fringes) --, a no-fault arrangement for people injured in the hospital would be readily affordable (our point estimates being $330 million), even with worst case projections about administrative costs and confidence intervals were borne out.

Still, important issues both of principle and of design remain in the policy debate about no-fault compensation for medical injuries. Our estimates of net compensable losses can inform, but not resolve the controversies. A major additional issue, of course, is the impact of any liability system on the

prevention of future injuries. This is the problem that the research reported in the next two chapters has addressed.

SURVEY INTERVIEW PROCESS

I. INTERVIEWER SELECTION AND TRAINING

Interviewing for the Patient Survey was conducted by a small group of interviewers experienced in conducting surveys on public policy issues at Mathematica Policy Research (MPR) in New Jersey. A total of 20 interviewers were trained to conduct searching and telephone interviewing activities. Of these, 13 conducted almost all of the interviews. One of the interviewers was multi-lingual, and conducted interviews in Spanish and Italian. The remaining seven either resigned, were terminated, or assigned to other projects.

Patients who could not be interviewed by telephone (usually due to unpublished telephone numbers), but who were traced to residences in New York City or other metropolitan areas in New York state were contacted in person by field interviewers. Field interviewing in New York City was conducted by two interviewers, employed by Valdes Research, a minority owned company with an experienced staff of black and Hispanic interviewers. One of the two interviewers who worked on the project was fluent in English and Spanish. Field interviewers were also employed to conduct in-person interviews in the Syracuse and Long Island areas. We did not employ field interviewers elsewhere because there were too few potential respondents in other areas to resort to more costly in-person interviewing methods.

A successful survey depends upon a well trained interviewing staff. A central focus of MPR's training for all interviewers is a 90-minute videotape, "Interviewing," developed by MPR staff. It provides an introduction to

interviewers is a 90-minute videotape, "Interviewing," developed by MPR staff. It provides an introduction to interviewing procedures, including avoiding interviewer bias, probing techniques, reading questions, and recording answers.

Viewing the videotape and discussing interviewing methods required approximately four hours. The remainder of the training session, which consisted of two six hour sessions, focused on the interview. Separate training manuals were developed for the telephone and field interviewers. The following topics were covered:

- o Overview of the Study and Sample. Interviewers were told that the purpose of the study was to examine the impact hospital stays have on a family's economic well-being. They were not given any other information about the purpose of the research. The topics included in the questionnaire were summarized, sample characteristics that affected administration of the questionnaire (such as age and labor force status) were explained, and the criteria for conducting interviews by telephone or in-person were discussed.

- o Review of the Questionnaire. The screener (used to verify eligibility) and the questionnaires were reviewed, focusing on the intent of each section, definition of terms, probing techniques and recording procedures.

- o Contacting Sample Members and Use of Proxies. We reviewed the advance letters and provided guidelines on introducing the study and responding to questions about the need for and confidentiality of the study. Since many of the interviews would be conducted with next-of-kin or other family members (primarily for sampled children, deceased patients, and the frail elderly), interviewers were made aware of potentially sensitive topics and situations and how to respond to them. All interviewers were trained to schedule callbacks at convenient times, to provide toll-free numbers as needed, and to make calls to Directory Assistance to verify telephone numbers. However, as explained below, the searching procedures proved to be very complex and only a few interviewers were trained to locate patients who were not living at addresses provided on the Patient Data Summaries.

o Practice Interviews. Practice interviews were conducted with project staff to ensure familiarity with the questionnaire and ability to cope with uncommon responses.

o Use of Case Records. Interviewers were shown how to use information provided on the Patient Data Record in contacting sample members, how to document their contacts, and how to assign status codes.

o Interviewer Edit. Although completed questionnaires were carefully reviewed and coded by Quality Control editors before being data processed, interviewers also were trained to review their work and to call back patients to obtain any missing data.

Separate training sessions, directed by MPR senior staff, were conducted for the telephone interviewers and field interviewers employed by Valdes Research in New York City. A few telephone interviewers, who had been employed by MPR on other projects, were added after the initial training session, and were trained in one-on-one sessions by the supervisor. The two field interviewers used in Syracuse and Long Island, each of whom had several years of interviewing experience, were mailed the training materials and briefed by the supervisor by telephone.

II. INTERVIEWING AND SEARCHING ACTIVITIES

The patient sample was delivered to MPR in nine segments from October 1988 through July, 1989, and interviewing and searching activities continued through the first two weeks of October, 1989. Sample delivery was staggered because of the time required to obtain and review the patient hospital records, from which the patient survey sample was selected. Each sample delivery included a data tape and hard copy Patient Data Summaries for each sampled patient. These data, which were

obtained from hospital records, included reported information about the patient's and next-of-kin's residence and employment, and the patient's social security number and Medicaid number (if applicable) at the time of discharge in 1984. Although it became apparent when we began interviewing that many patients and relatives listed on the Patient Data Summaries had moved or that some of the information was incorrect, these data provided very useful aides for subsequent searching efforts.

The procedures for locating and interviewing sample members are summarized below, after which we describe the results of these efforts in more detail. All sampled patients (or the parents of children or next-of-kin of deceased patients) were mailed a letter (Attachment A) seven to ten days before they were called. Initial calls were scheduled for evenings and Saturday shifts since those are the most productive times to conduct interviews in homes. Households with valid telephone numbers that could not be reached at those times were contacted during the weekday shift. The first few calls were made to the telephone numbers listed for the patient and next-of-kin on the Patient Data Summaries. If the patient or a suitable informant (a close relative of a deceased or infirm adult or the parent of a child) could not be located after several calls, the case was assigned to the searching staff. The searchers used several sources (described below) in attempts to locate acceptable respondents. Once a valid respondent was located, every reasonable effort was made to complete the interview. Interviews were scheduled at any time that was convenient for the respondent. Persons who refused to be interviewed were asked why they declined, and the reasons were recorded on Interview Contact Sheets, coded and saved for use in making subsequent calls. Approximately two weeks later, persons who

refused were mailed a customized letter asking them to reconsider their decision (Attachment B), and offering them a $15 incentive to participate. Near the end of the study, this payment was increased to $25 (Attachment C). Approximately two weeks after the letter was mailed to non-participants, a second interviewer called to persuade the respondent to participate. The interviewer used the information about the reason for the refusal, coupled with the monetary incentive, to persuade the respondent to reconsider.

Attempts were made to interview sample members (or valid informants) in person, if we believed that we had a correct address for the patient or close relative but could not obtain a telephone number (because it was unpublished), or the potential respondent refused to be interviewed by telephone, but was willing to be interviewed in person.

Interviewers recorded information on the disposition of each call on Record of Contact forms maintained by the supervisor. Data on interim status codes, the outcomes of searching efforts, in-person interview attempts, the reasons for refusals, the outcomes of attempts to persuade respondents who refused to participate, and the final disposition of each sample member were maintained in a computer file.

Disposition of the Sample. A total of 3,372 discharges were sampled for the Patient Survey. Of these, 18 were multiple discharges for the same patient and 13 were ineligible because the patients maintained that they were not hospitalized in 1984 or had never been hospitalized. Interviews were completed for 70% of the eligible sample of 3,341 (see Table 1).

TABLE 1

FINAL DISPOSITION OF THE PATIENT INTERVIEW SAMPLE

	Number	Percent of Eligible Sample
Complete		
Adult	2135	
Child	205	
Total	2338	70.0
Refusal		
First Refusal--could not contact in subsequent calls	12	
First Refusal--no additional efforts because patient or relative called New York State or other extenuating circumstances	30	
Break-off-interview unusable	13	
Second Refusal	248	
Total	303	9.1
Other Non-Interview (patient or next-of-kin located)		
Patient located, but could not obtain interview by the end of the field period (multiple broken appointments)	93	2.8
Moved out of New York State--could not obtain new telephone number	73	2.2
Language other than English, Spanish, or Italian	15	0.5
Institutionalized	5	0.1
Total	186	5.5
Patient deceased according to relative; respondent unavailable	153	4.6
Could not locate patient or acceptable respondent (mortality undetermined)	361	10.8
Total	3341[a]	100.0

[a] Excludes 13 sampled patients who said that they had not been hospitalized and 18 discharges for patients sampled more than once.

A total of 9.1% of the sample refused, most after extensive efforts to persuade them to reconsider. An additional 2.8% were located but had not been interviewed by the end of the field period, despite numerous calls and attempts to set up appointments. Most of these persons were relatives of sampled patients who, while they had not refused, were clearly reluctant to participate in the survey. Therefore, a better estimate of the refusal rate is 12%.

The primary reasons for refusals are summarized in Table 2. The last or more specific reason is cited for potential respondents who refused more than once. As is often the case for household surveys, the most frequently cited reason (mentioned by 44% of the persons who refused) is lack of interest in the study. It is possible that this response may have masked other concerns, since these persons were offered either $15 or $25 to compensate them for a 30 to 45 minute interview. Other reasons that were often cited by relatives of deceased sample members were grief (11% of the refusals), insufficient knowledge about the patient to respond (6%), and confidentiality (6%). Only a few potential respondents declined because of unspecified fears, legal advice, or anger related to the patient's hospitalization. We were not able to obtain specific reasons for 28% of those who refused (2.5% of the eligible sample).

TABLE 2

PRIMARY REASON FOR REFUSAL[a]

	Number	Percent of Refusals	Percent of Eligible Sample
Not interested in study	133	43.9	4.0
Grief for deceased relative	33	10.9	1.0
Relative with insufficient knowledge of patient	18	6.0	0.5
Privacy, confidentiality	18	6.0	0.5
Fear of participating in interview	11	3.6	0.3
Advice of lawyer	5	1.7	0.2
Anger about hospital	1	0.1	---
Not specified	84	27.7	2.5
Total	303	100.0	9.1

[a] If potential respondent refused more than once, the last or most specific reason is cited.

An additional 2.7% of the eligible sample were located but not interviewed because they had moved to other areas of the country or abroad, where telephone numbers could not be obtained, were institutionalized, or the patient spoke languages other than English, Spanish, or Italian.

The remaining patients either were deceased (according to relatives) and knowledgeable proxies unavailable (4.6%) or their location and mortality was not determined (10.8%). The mortality of some of these cases could be determined by checking the National Death Index, maintained by the National Center for Health Statistics. The index, which currently contains death records through 1987, will be updated to include 1988 death records in January, 1990.

The procedures used to locate sample members and minimize refusals are discussed in the following sections.

Searching and Refusal Conversion Efforts. The success of the Patient Interview Survey was primarily a result of the efforts that went into locating patients for whom the information in the Patient Data Summaries was insufficient and persuading reluctant persons to respond. Table 3 summarizes the results of these efforts. A total of 765 interviews (23% of the total sample and 33% of the completed interviews) were completed only after extensive searching efforts, using sources that were not included on the Patient Data Summaries or efforts to persuade reluctant respondents to participate.

TABLE 3

LEVEL OF EFFORT TO COMPLETE INTERVIEWS

	Number	Percent of Completed Interviews	Percent of Eligible Sample (including deceased)
Telephone Interview-- no searching or refusal conversion	1487	63.6	44.5
Telephone Interview-- searching and/or refusal conversion	765	32.7	22.9
In-Person Interview	86	3.7	2.6
Total	2338	100.0	70.0

The process used to locate patients and their relatives, (see Table 4) was similar to that used to locate missing persons. All letters mailed to potential respondents requested address corrections from the Post Office. However, this effort was not very effective since many of the moves had taken place many months or years ago. Extensive use was made of local directory assistance and reverse address directories (which provide listed telephone numbers sorted by address). If the residential information listed on the Patient Data Summary was out-of-date or incorrect, we used the patient's and next-of-kin's addresses to contact neighbors who might know where potential respondents had moved. Reverse address directories enable the searcher to obtain telephone numbers for households that are located in nearby addresses. The searcher can

request telephone numbers within an ever widening radius until she contacts someone who has information about the person's location. Once we identified a possible new address, the searcher would call directory assistance in that area to locate a number for the patient or known relative. If this effort were unsuccessful, we called other persons with the same last names in attempting to locate relatives.

TABLE 4

RESULTS OF SEARCHING EFFORTS

Searching Method	Total Number of Patients	Provided Useful Lead In Locating Potential Respondents	
		Number	Percent
Directory Assistance	1257	461	36.7
Reverse Address Directories	757	281	37.1
Medicaid Records	145	34	23.5
Letters To Employers or Landlords	76	24	31.6
N.Y. Dept. of Motor Vehicles	221	27	12.2
Credit Search	242	25	10.3

These efforts were very time consuming and often extended over several weeks. During this period, we pursued other potential contacts, using information provided on the Patient Data Summaries,

including Medicaid identification numbers and employers listed on 1984 hospital discharge records. New York State provided current addresses for patients still receiving Medicaid. Employers were contacted by telephone and sent letters (Attachment D) verifying the purpose of the inquiry. Although employers could not divulge current addresses, they usually verified employment, which enabled us to locate potential respondents through calls to Directory Assistance or reverse directories in the area where the plant or office was located.

In other cases, we were able to locate an apartment building from which a potential respondent had moved, and contacted the building manager to attempt to locate a new address or, at least, a city or town to which the person had moved. A copy of the letter sent to building managers is included as Attachment E. In a few cases, we obtained the names of professionals (doctors or lawyers) who had treated or served the patient from other relatives. These persons also were contacted by telephone and mailed a letter describing the project (Attachment F) in attempts to obtain their cooperation in locating the patient.

The New York Division of Motor Vehicles (DMV) will provide an address update report for a person holding a current New York state driver's license. This source did not generate very many useful leads (12.2%) and turnaround was unpredictable (anywhere from two to eight weeks), so it was eventually abandoned.

When other sources proved unsuccessful, we contacted a credit search agency to help in locating potential respondents. The payoff from this source was limited; useful leads were obtained for only 10% of the cases searched. However, it should be noted that these cases were limited to "hard core" missing persons.

Once a potential respondent was located, every reasonable effort was made to complete the interview. As noted above, we recontacted

most persons who initially refused to persuade them to reconsider. Only persons who called New York State or where there were extenuating circumstances, such as grief over a recent death or extreme hostility, were not recontacted. These calls were preceded by a letter promising payment of $15 (increased to $25 during the last several weeks of the field period). These efforts were very successful, as 46% (207/455) of the persons recontacted eventually agreed to be interviewed.

The process by which potential respondents were contacted and persuaded to participate was often serendipitous and entailed many of the sources described above. To illustrate this process, we have described the efforts made to locate and complete interviews for three adult patients and one child.

FIRST CASE: The patient was an adult for whom the address on the Patient Data Summary was incorrect, and the reported telephone number was disconnected. Her parents were listed as next of kin at the same address. No employer information was provided for either the patient or her parents; nor was a Medicaid number listed.

Initial attempts to locate a telephone number through directory assistance for the patient or her parents in the area where they resided in 1984 were unsuccessful. Repeated calls to persons with the same last name in that area identified a relative who recalled the patient's father, but he had not seen him in 20 years.

At this point, we contacted both the Department of Motor Vehicles and a credit search agency. The credit search did not uncover any new information; however, DMV provided an address for the patient issued on a non-driver's identification card. Neither the patient nor her parents had a telephone number listed at that address, according to Directory Assistance. However, a reverse directory search revealed a telephone number listed under a relative's name.

The patient's mother was eventually reached at this telephone number and agreed to complete the interview for her mentally retarded, disabled daughter. A total of 27 calls were made to various sources before the interview was completed.

SECOND CASE: The patient was an adult female for whom the information on address and telephone number were incorrect. (The advance letter was returned as undeliverable.) No data was provided on employer or next of kin, and she did not have a Medicaid number.

A Directory Assistance search yielded a new telephone number and address listed under the patient's husband. A second letter was mailed to that address, which was returned several weeks later, with a message noting that the resident was temporarily away. Prior to return of the undelivered letter, we had unsuccessfully attempted to contact the patient at the second telephone number. After determining that the patient was temporarily away, we obtained the telephone numbers of neighbors from reverse address directories. One neighbor confirmed that the patient's family had moved but did not know the location. A second neighbor provided the interviewer with the patient's address and telephone number in Florida. A third advance letter was mailed and the patient was successfully interviewed in Florida by telephone. A total of 47 telephone calls were made before the interview was completed.

THIRD CASE: The patient was an employed female, who was no longer living at the residential address listed on the Patient Data Record. Also, the social security number was omitted. However, the employer of the patient's husband was listed.

Our interviewer spoke to two different persons in the employer's personnel department. The first would state only that the husband

was no longer an employee of the company; however, a second contact in the department confirmed that he had retired in 1984.

The advance letter had been returned as undeliverable. We called several neighbors who lived near the patient's 1984 address. One person we contacted recalled that the patient had a brother in a nearby town and gave us his name. We were not able to locate the brother, but discovered the patient's son after calling several persons with her last name who were listed in the area. After several calls to this number, a friend of the patient's son agreed to give our toll-free number to the patient, but would not give us her address or telephone number. The patient eventually called us on the toll-free number and completed the interview. A total of 57 telephone calls were made to complete this interview.

FOURTH CASE: The patient was a child, with parents listed as next-of-kin. A residential address and telephone number and the father's employer were listed on the Patient Data Record.

The first five calls to the listed telephone number resulted either in no answers or "trouble on line" messages. Contact was eventually made with the patient's grandmother at this telephone number. She agreed to pass on the toll-free number to the patient's parents, who had moved out of the state, but would not give us their location.

We contacted the father's employer and sent the personnel department a letter describing the study and asking for information on the father's location. The employer would only verify that the father had worked at a plant which was located in California.

Three months after the last contact with the grandmother and one month after the speaking with the employer, the patient's mother called us on the toll-free number and left an out-of-state

telephone number where she could be reached. An interviewer called and completed the interview. A total of 18 calls were made.

In-Person Interviewing Efforts. These efforts were concentrated in New York City, where we were unable to locate telephone numbers for a significant portion of the sample. We also had sufficient samples in the Syracuse and Long Island areas to justify the cost of in-person interviewing. The results of these efforts, which are summarized in Table 5, were impressive in New York City and Syracuse, but ineffective on Long Island (where most of the addresses we contacted were vacation residences). Excluding Long Island, we located 60% of the persons we attempted to contact in-person and completed interviews with 81% of them.

TABLE 5

RESULTS OF IN-PERSON INTERVIEWING EFFORTS

Area	(1) Number Sent To Field	(2) Located		(3) Interviewed	
		Number	% of (1)	Number	% of (2)
New York City	169	97	.59	81	.83
Syracuse	14	9	.64	5	.56
Long Island	13	0	.00	0	.00
Total	191	106	55	86	.81

Field interviewers were provided with the results of all previous searching efforts, letters of introduction (Attachment G), copies of the advance letter mailed to the potential respondent (Attachment A), and letters to be given to building managers (Attachment E), as necessary. The most difficult problem faced by the interviewers was getting past the building managers in large apartment buildings in New York City. The letters, coupled with modest payments to encourage cooperation, were the most effective methods used in obtaining access to buildings. Field interviewers also spoke to neighbors, postal carriers, retail stores' operators, building supervisors, and security persons in the area about the patient's whereabouts, and used telephone directories in looking for persons with similar last names.

III. EDITING, CODING, AND DATA PROCESSING OPERATIONS

All completed questionnaires were reviewed by quality control editors in MPR's Coding Center. Using the study's Quality Control Manual as a guide (see Appendix 8B), the editor reviewed the questionnaire logic, the consistency of related data items, marginal notes made by the interviewer, and the completeness of the document. If the questionnaire contained a significant number of omitted or inconsistent responses, the respondent was recontacted.

The editor also coded open ended textual response to questions on hospitals, industry, occupation, type of physician, type of therapist, and type of other health care professional. SPARCS was used to code hospitals in New York state and two digit Census codes were used to code industry and occupation. A modified version of the specialty coding structure used by the American Medical Association was used to code physicians' specialties, and coding structures were developed to code therapists and other health care professionals.

After the documents were edited and coded, they were data entered and edited to check and correct for out of range responses and errors in the questionnaire logic. A SAS file was submitted to Harvard research staff. Documentation of the data entry and SAS programs are available.

STATE OF NEW YORK
DEPARTMENT OF HEALTH
Corning Tower The Governor Nelson A. Rockefeller Empire State Plaza Albany, New York 12237

David Axelrod, M.D.
Commissioner

ATTACHMENT A

October 3, 1988

Harvard University has been asked by the New York State Department of Health to conduct a study of some of the economic consequences of hospitalization. One purpose of the study is to determine the costs associated with the post-hospitalization phase of an episode of illness. Participation would involve a telephone interview of approximately 30 minutes duration.

In approximately one week, an experienced interviewer from Mathematica Policy Research calling on behalf of Harvard University will be telephoning or visiting you to explain in greater detail the questions we would be asking. At this time we invite you to participate.

All information obtained through the interview will remain strictly confidential and will be used for research purposes only. If you have questions regarding any aspect of the study please do not hesitate to contact Mr. Christopher Delker in the Division of Public Health Protection at (518) 486-1311.

Sincerely,

David Axelrod, M.D.
Commissioner of Health

STATE OF NEW YORK
DEPARTMENT OF HEALTH
Corning Tower The Governor Nelson A. Rockefeller Empire State Plaza Albany, New York 12237

David Axelrod, M.D.
Commissioner

ATTACHMENT B

January 1989

Recently, I wrote to request your participation in a study concerning the economic consequences of hospitalization. The study is being conducted in the state's behalf by Harvard University. At that time, you indicated that you did not wish to participate.

I am writing to urge you to reconsider participation in this important study. You may have heard or read news reports that in recent years health insurance charges to patients and their insurers have soared. Many people think that more and more of the increases in health care costs will not be paid by insurance but will have to be paid by the patient. A major purpose of this survey is to find out just how much of the costs of illness are now being paid by patients and not by insurance. It is very difficult to obtain this kind of information without the help of people like you. We are asking for your help so that we can get a better picture of the proportion of hospitalization costs borne by patients.

Shortly, an interviewer from Mathematica Policy Research, the research company that is conducting the survey, will be calling you. I realize that a telephone interview may seem burdensome, and have authorized a $15 payment for your participation.

All information obtained through the interview will remain strictly confidential and will be used for research purposes only. If you have questions regarding any aspect of the study, please contact Mr. Christopher Delker in the Division of Public Health Protection at (518) 486-1311.

We look forward to having your assistance in this important study.

Sincerely,

David Axelrod, M.D.
Commissioner of Health

MATHEMATICA
Policy Research, Inc.

P.O. Box 2393
Princeton, NJ 08543-2393
TEL (609) 799-3535
FAX (609) 799-0005

ATTACHMENT C

October 17, 1989

ADDRESSEE
STREET ADDRESS
CITY, STATE, ZIP

Dear

Harvard University has been asked by the New York State Department of Health to conduct a study of the economic consequences of hospitalization. As part of the study, we will be interviewing a sample of patients who were hospitalized in New York state during 1984.

Name Name was / You were selected to be interviewed as part of that study. Unfortunately, we have not been able contact you/him/her directly. Mathematica Policy Research (MPR) of Princeton, New Jersey, is conducting the interviews for this study. We realize that a telephone interview may seem burdensome, and are authorized to offer a $25 payment for your participation. You can call MPR toll free at (1-800-777-0085) anytime between 9:30 AM and 9:00 PM, Monday through Friday. Enclosed with this letter is a copy of the letter from the New York State Department of Health that was sent to all of the selected patients.

All information obtained for this study will remain strictly confidential and will be used solely for research purposes. If you have any questions concerning the authenticity of the study, please call Mr. Christopher Delker in the New York State Department of Health, Division of Public Health Protection, at (518-486-1311).

Sincerely,

Roland Scurato
Survey Supervisor
Mathematica Policy Research

MATHEMATICA
Policy Research, Inc.

P.O. Box 2393
Princeton, NJ 08543-2393
TEL (609) 799-3535
FAX (609) 799-0005

ATTACHMENT D

October 17, 1989

ADDRESSEE
STREET ADDRESS
CITY, STATE, ZIP

Dear

Harvard University has been asked by the New York State Department of Health to conduct a study of some of the economic consequences of hospitalization. As part of the study, we will be interviewing a sample of patients who were hospitalized in New York State during 1984.

Name Name was selected to be interviewed as part of that study. Unfortunately, we have not been able to locate (him/her). If this person is a past, or present employee in your company, we would appreciate any information you may have regarding his or her location.

Mathematica Policy Research (MPR) of Princeton, New Jersey, is conducting the interviews for this study. An interviewer from MPR will call you to ask for any information you have about Name Name's location. Or, if you prefer, I can be reached at (1-800-777-0085).

All information obtained for this study will remain strictly confidential and will be used solely for research purposes. If you have any questions concerning the authenticity of the study, please call Mr. Christopher Delker in the New York State Department of Health, Division of Public Health Protection, at (518-486-1311).

Sincerely,

Roland Scurato
Survey Supervisor
Mathematica Policy Research

MATHEMATICA
Policy Research, Inc.

P.O. Box 2393
Princeton, NJ 08543-2393
TEL (609) 799-3535
FAX (609) 799-0005

ATTACHMENT E

October 17, 1989

ADDRESSEE
STREET ADDRESS
CITY, STATE, ZIP

Dear

Harvard University has been asked by the New York State Department of Health to conduct a study of the economic consequences of hospitalization. As part of the study, we will be interviewing a sample of patients who were hospitalized in New York State during 1984.

Name Name was selected to be interviewed as part of that study. Unfortunately, we have not been able to locate (him/her). If this person is a past or present tenant in a building you own or manage, we would appreciate any information you may have regarding his or her location.

Mathematica Policy Research (MPR) of Princeton, New Jersey, is conducting the interviews for this study. An interviewer from MPR will call you to ask for any information you have about Name Name's location. Or, if you prefer, I can be reached at (1-800-777-0085).

All information obtained for this study will remain strictly confidential and will be used solely for research purposes. If you have any questions concerning the authenticity of the study, please call Mr. Christopher Delker in the New York State Department of Health, Division of Public Health Protection, at (518-486-1311).

Sincerely,

Roland Scurato
Survey Supervisor
Mathematica Policy Research

MATHEMATICA
Policy Research, Inc.

P.O. Box 2393
Princeton, NJ 08543-2393
TEL (609) 799-3535
FAX (609) 799-0005

ATTACHMENT F

October 17, 1989

ADDRESSEE
STREET ADDRESS
CITY, STATE, ZIP

Dear

Harvard University has been asked by the New York State Department of Health to conduct a study of the economic consequences of hospitalization. As part of the study, we will be interviewing a sample of patients who were hospitalized in New York State during 1984.

Name Name was selected to be interviewed as part of that study. Unfortunately, we have not been able to locate (him/her). If this person is a past or present client or patient of yours, we would appreciate any information you may have regarding his or her location. If this person is unable to answer a telephone survey, any information you may have about his or her next of kin would be greatly appreciated.

Mathematica Policy Research (MPR) of Princeton, New Jersey, is conducting the interviews for this study. An interviewer from MPR will call you to ask for any information you may have about the location of Name,Name, or his or her next of kin. Or, if you prefer, I can be reached at (1-800-777-0085). I have also enclosed a copy of the letter from the New York State Department of Health that was sent to all of the selected patients.

All information obtained for this study will remain strictly confidential and will be used solely for research purposes. If you have any questions concerning the authenticity of the study, please call Mr. Christopher Delker in the New York State Department of Health, Division of Public Health Protection, at (518-468-1311).

Sincerely,

Roland Scurato
Survey Supervisor
Mathematica Policy Research

HARVARD UNIVERSITY

HARVARD SCHOOL OF PUBLIC HEALTH
BRIGHAM AND WOMEN'S HOSPITAL
HARVARD LAW SCHOOL

MEDICAL PRACTICE STUDY
221 LONGWOOD AVENUE
BOSTON, MA 02115
(617) 732-5991

ATTACHMENT G

February 9, 1989

To Whom It May Concern,

. is an authorized field interviewer for a research project Harvard University is conducting for the New York State Department of Health.

Mathematica Policy Research of Princeton, New Jersey, and Valdes Research are conducting interviews for this project. Anna Rodriguez is a field interviewer with Valdes Research. Any questions regarding this project can be directed to Mr. Roland Scurato, survey supervisor, at Mathematica Policy Research at (609) 275-2354 after 1:00 p.m. or to Russell Localio, the project director at Harvard University at (617) 732-5991.

Very truly yours,

A. Russell Localio
Project Director

Attributing Disability to Adverse Events

I. Introduction

To determine the causal connection between disability and the adverse event, we used physician reviewer judgments based on the results of the medical record review and the responses to the patient interview. This technical appendix describes that process.

As the text of chapter 8 explains, interviewers did not ask patients whether specific periods of hospitalization or disability resulted from an AE; they asked only whether they resulted from the index hospitization. In order to determine whether the disability was actually caused by the AE or whether the results of the AE had attenuated prior to one of a series of periods of disability, we relied on clinical evaluation. The most obvious exclusions would be those cases in which a new injury or illness after the AE caused additional losses unrelated to medical management (an auto accident, for example), or cases in which a person is disabled by his medical injury but died because of his underlying illness. In the first case an intervening cause supercedes the AE as the reason for disability; in the second the pre-existing condition terminates any disability caused by the AE.

As explained in the main text, the survey included a series of specific questions to measure physician limitations that would restrict the daily living activity of the patient. To measure such limitations we borrowed questions from national interview surveys in the United States and Canada. The questions include limitations on hearing, handling, lifting, seeing, standing, sitting, stooping, and walking. The survey respondents reported three levels of limitation for each function, no limit, some trouble, or unable. We created a summary measure of limitation by

simply summing the scores for each function (0 = no limit, 0.5 = some trouble, 1 = unable). The index is not a measure of pain; indeed, such measures do not exist. The index should, however, be correlated with each individual's capacity to enjoy the activities of daily living. The physicians relied on these responses in evaluating whether periods of disability were related to the adverse event.

II. Attribution for Workers

The physician reviewers were given the survey data on the timing and duration of each patient's periods of work disability or the date of their death. The physicians were asked to determine the extent to which the disabilities or deaths could be attributed to the patients' medical injuries. Work absences that the survey respondents linked to health conditions not related to the index hospitalization were not considered.

The information that was used to evaluate the cases consisted of two physician ratings of disability, the survey data and clinical data obtained from the hospital record. In some cases, the original reviewing physicians' judgments regarding disability fit the worker's self-report perfectly, and the entire work absence was attributed to the adverse event. In others, the worker had severe underlying disease, and the adverse event was judged as causing minor disability. Therefore, only a fraction of the work absence was attributable to the adverse events. The following cases which were changed slightly to maintain confidentiality, illustrate these points.

Example 1: A patient with severe diabetes received dye for an indicated angiogram. Subsequently, the patient developed acute renal failure secondary to acute tubular necrosis caused by the angiography dye. This renal failure was only transient and the patient's kidney function returned to normal. Our physician reviewers rated disability as resolving in less than one month. As a result, three missed weeks of work were attributed to the

injured caused by the angiography dye. The patient reported that he had missed work for 37 weeks in 1984 and 52 weeks in 1987. Of course, the patient was having the angiography procedure done because he had severe ischemic disease of his lower extremities secondary to the diabetes. Although there were no other adverse events noted, the patient did have a long hospitalization and slow recovery largely because of his ischemic leg disease. The disability caused by the diabetes was easily disentangled from that caused by the transient renal failure. Moreover, it is unlikely that the transient renal failure in any way aggravated the ischemic disease. Therefore, although the patient was out of work for a long period after the hospitalization, only a small portion of that period of disability is attributable to the adverse event.

Example 2: A patient, receiving nonsteroidal anti-inflammatory medication for arthritis, was not checked carefully for renal function and developed interstitial nephritis leading to renal failure. The patient had no other predisposing conditions to cause the renal failure. Nor did he have significant other diseases except for the arthritis. When interviewed, the patient reported that he had been out of work for most of 1984-8. The physician reviewers had noted that the disability caused by the adverse event was significant. Therefore, we attributed all of the time lost from work to the renal failure.

In some cases, we attributed a patient's death, but not any work loss, to an adverse event. This apparent paradox is explained by the disentangling process. A critically and terminally ill patient may suffer an adverse event which causes death. However, if the adverse event would never have happened, the patient may have lived only a few hours or days. Moreover, it is extraordinarily unlikely such a patient would have ever returned to work, given his disease state. Therefore, none of the work absence is attributed to the adverse event. The

following case is illustrative.

Example 3: The patient had widely metastatic breast cancer which is very aggressive. During therapy for the breast cancer the patient received adriamycin which caused a cardiomyopathy. The patient eventually died, at least in part as a result of congestive heart failure secondary to the cardiomyopathy. It is difficult to disentangle the disease process from the adverse event in this case, as the death may have been secondary to the breast cancer, but may have also been secondary to cardiomyopathy. In any case, however, it is doubtful that a patient with widely metastatic breast cancer would ever have returned to work. Therefore, none of the work absence is attributable to the adverse event although the death itself was attributed to the adverse event.

III. Children/Students

One member of the investigative team, a pediatric surgeon, predicted long-term disability attributable to the AE on the basis of projected medical care usage (see main text) and an analysis of the survey information regarding the patient's functional ability as of 1988 (such as impairment in the ability to see, hear, stand, walk, grasp, etc.). When information was inadequate to permit an informed judgment, the entire disability was attributed to the AE.

Adjusting Sample Weights for Unit Non-Response

This appendix describes the methods for adjusting case weights for unit (case) non-response in the interview survey. The resultant weights permit projecting from the sample of AE-respondents to the population. This adjustment process applies only to the group of adverse events discovered at the index hospitalization. As described in Chapters 5 and 6, we limited our analyses to 1133 adverse events to adjust measures of incidence for problems of double counting (Technical Appendix 5.III.1) Of the 1133 patients with adverse events, 794 (70.1% unweighted, 71.1% weighted) responded to the interview. The process described below is similar to that described in Chapter 5 (Technical Appendix 5.V.2) for the adjustment for missing and non-reviewed hospitals records. We are repeating some of the materials covered in Chapter 5.

I. Choosing Weighting Subclasses

Where data internal to the sample are available, the common method of adjustment for non-response is the sample weighting adjustment,[1] by which one (1) divides the sample into weighting adjustment subclasses, and (2) adjusts the weights of the cases in each subclass by the inverse of the probability of survey response in that subclass.

A first step was to choose appropriate subclasses for weight adjustment. Our goal was to ensure that non-response did not distort data on the economic consequences of adverse events. To

[1] Kalton G, Kasprzyk D. The treatment of missing survey data. Survey methodology. 1986 June; 12(1):1-16.

determine appropriate subclasses for missing record adjustment, we examined the response rates of several patient characteristics thought to be associated with the degree of economic losses from an injury. The characteristics had to be available for all patients, both respondents and non-respondents.

We looked at response rates both by employment status and by death. The patient's employment status could affect the economic impact of an injury because employed persons would have wage losses from an injury, while children, students, homemakers, and retired or disabled workers would not. Death could also affect economic losses: those patients who died have a permanent loss of earning capacity. On the other hand, the patients known to be alive might have continuing medical expenses.

Employment status was defined for all persons based on information derived from the hospital record review. With medical record information on occupation and employment, we classified all patients to be interviewed into eight categories: children, students, employed, unemployed, homemakers, retired, disabled, and unknown. Children were classified as all patients age 17 or under. Death was defined by whether the patient died during the index hospitalization or afterwards as indicated by the medical record. These two variables were present for all 1133 AEs.

Response rates varied both by employment status and death. The percentage of respondents varied from a low of 58.6% (weighted) for the unemployed to a high of 83.6% for the disabled, and from 65.8% for the deceased patients to 72.2% for those alive. Response rate for the dead was lower for each employment status except for the unknown/other category. For the subclasses formed by the cross-classification of employment status and death, response rates (weighted) varied from 41.2% (unemployed and dead) to 85.3% (disabled and alive).

Because economic consequences of injury and response rates vary according to both death and employment status, we chose to

factors such as advances in the science and technology of medicine, changes in societal expectations as to what constitutes an appropriate level of care, or changes in PRO, state and hospital requirements, is unclear.

Our final important finding concerns physician attitudes towards iatrogenic injury and negligence. When asked to review a set of standardized cases, physicians tended to equate a finding of negligence with a judgment of incompetence. Thus, although willing to admit that all physicians make mistakes and that physician error is possible, physicians were often unwilling to label substandard care as negligent and were frequently opposed to compensation for iatrogenic injury. These professional attitudes led to significant disagreement about issues of causation and negligence when asked to judge the standard cases.

I. Introduction

Chapter 7 presents data showing a large gap between the rate of tort claims and negligent adverse events and a huge gap between paid tort claims and all iatrogenic injuries. These differences are important in our appraisal of the uses of the tort system not just in compensating the victims of past injuries but also in preventing future injuries. Indeed, while we have depicted some shortcomings of tort litigation as a mode of compensation, at least this system clearly delivers considerable amounts of money into the hands of some seriously injured patients. But while tort theorists vigorously debate whether medical malpractice law has a deterrent effect, no connection is immediately discernible between the legal system holding doctors liable for malpractice in the courtroom and the health care system improving the quality of medical practice in the operating room. That is why the Medical Practice Study invested considerable resources in our effort to document empirically any such deterrent effect of malpractice law. In this chapter we report our exploration of the physicians' experience with and perception of tort litigation, and in Chapter 10 we report an econometric study of whether actual differences in the intensity of that tort experience had any detectable impact on the incidence of provider negligence and patient injuries within our statewide sample of hospital admissions.

II. Theory of Tort Deterrence

A priori, the tort system appears to have a deterrent impact. The aim of litigation is to identify those providers who have engaged in negligent behavior and to require any parties at fault to pay for damages that they have inflicted on their victims. The prospect that one's unduly risky behavior will be penalized in this fashion should give everyone a real incentive to be more careful and conscientious in their actions. In that respect tort law rests on the same commonsense notions of deterrence that influence fields of human behavior ranging from child rearing to criminal justice to defense policy.

A distinctive characteristic of the tort system is that its penalties are meted out if, and only if, a person's lack of care actually inflicts an injury on someone else. Further, the size of the legal penalty is the measure of monetary damages needed to provide full redress for the harm suffered by the victim. Critics have regularly observed that often only a fortuitous relationship binds the gravity of the actor's fault and the severity of the victim's injuries. At the same time, however, an elaborate law and economics literature[1] explains and justifies this tort regime as a means of securing the optimal level of care, which is defined as avoiding the risk of those injuries more costly than the precautions needed to prevent them. The law, in effect, establishes and assesses a price for negligent behavior by ensuring that the actor who refuses to undertake reasonable but costly precautions must bear the burden of the even more costly injuries that result.[2]

A number of obstacles impede performance of this prevention function by the tort system, some of which are specific to the medical field, others more widespread. One particular problem was documented in Chapter 7: a large proportion of negligent adverse events, many severe or even fatal, do not now produce even a tort claim, let alone a tort payment. To the extent that injured victims systematically underutilize their tort rights, actors have a corresponding reduction in their incentive to adopt the socially optimal level of precautions against such injuries (at least unless the actors in question systematically and persistently overestimate the true risk of suits for their negligent behavior).

Arguably, this is not as serious a problem for medical malpractice as it might be for products liability because of the

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[1] The most prominent exponent of this persuasion within the medical liability area is Patricia Danzon: see her Medical Malpractice: Theory, Evidence and Public Policy (1985).

[2] In the current fault-based tort system, the negative implication of this principle is that if it is not reasonable (i.e., not cost-effective) for an actor to adopt such precautions, then the loss must remain with and be borne by the victim. By contrast, in a no-fault system such as workers compensation, the costs of all injuries, even the not reasonably avoidable injuries, are shifted to the actor deemed liable (i.e., the employer). The assumption is that such an additional legal responsibility will not detract from the financial incentive of the actor to undertake reasonable measures that will prevent currently avoidable injuries and will have the desirable effect of compensating, and eventually even reducing, those injuries that do not now appear reasonably preventable.

actors' differing situations in these respective areas. Even abstracting from the personal and professional ethic that normally moves doctors to exhibit real concern for the well-being of their patients rather than simply for themselves, doctors do not face anything like the same monetary incentives as do manufacturers to economize on safety. Many of the tests and procedures that doctors may undertake to avoid patient injuries and tort suits (e.g., cesarean rather than normal deliveries) may prove financially advantageous to the doctor and impose little or no additional cost on the patient who is insured for such health care services.

Malpractice law tacitly acknowledges these and other special features of the medical context by deliberately refraining from an independent evaluation of the reasonableness (i.e., the optimality) of the standards of treatment developed within the medical profession. Such restraint is in marked contrast to the readiness of contemporary tort law to scrutinize and second-guess the practices of auto or drug manufacturers. Thus, malpractice litigation contents itself with enforcing rather than defining the appropriate standard of physician care by penalizing those doctors who deviate from that standard in individual cases.

At the same time, sharp debate flourishes among legal scholars about the efficacy of tort law in performing even that more modest deterrence role. Some question whether the threat of tort sanctions is present and influential in the minds of doctors in their daily practice, in which most negligence consists of a failure to be conscious of and attentive to dangers in the patient's condition, or the doctor's mode of treatment (rather than in a deliberately planned decision to run an unreasonable risk with the patient's safety[3]). Others note that however sizable may be the tort penalty if and when inflicted, the prospect that this penalty will ever occur is remote and problematic. Thus they argue that the deterrent force of tort litigation is attenuated by comparison to milder disciplinary measures if these can be

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[3] Compare Bell, Legislative Intrusions into the Common Law of Medical Malpractice: Thoughts About the Deterrent Effect of Tort Liability, 35 Syracuse L. Rev. 939 (1984), and Latin, Problem-Solving Behavior and Theories of Tort Liability, 73 California Law Rev 677 (1985).

routinely and expeditiously applied.[4]

The most common and fundamental criticism of tort law as a mode of prevention is that any possible deterrent force of the tort award has been removed because the award is no longer paid by the individual doctor, who may have been careless, but instead by a malpractice insurance carrier that collects premiums from all such doctors, careful and careless alike. This critique is not directed against liability insurance itself: that institution serves to protect the doctor from possibly crushing damages from a momentary inadvertent mishap and also guarantees that the patient who has been hurt will actually find a source of funds to pay the damage verdict won in the courtroom. But the presence of this insurance buffer between the doctor and the tort sanction has persuaded many that we should place little independent weight on the supposed deterrent value of malpractice litigation as an instrument for enhancing the quality of medical care.

To be sure, insurance and prevention are not inevitably incompatible. One can devise a system for pricing the insurance policy that incorporates premium surcharges and rebates based on the actual claims experience of individual insurers and thus build into the liability insurance the deterrent threat that has apparently been removed from the tort process. Although such an experience-rating program is widespread in fields such as workers compensation in which large firms may face thousands of employee compensation claims every year, it has not found much favor with the carriers that insure individual doctors against malpractice suits that are still only an occasional event in their lives. It simply has not proved feasible to develop a formula that is both an actuarially credible measure of the relative risk posed by individual doctors and that also generates premium adjustments that are sizable enough to be a meaningful financial incentive for enough doctors to make a tangible impact on the incidence of

[4] On the analogous problem within the criminal justice system, see Geerken & Gove, Deterrence: Some Theoretical Considerations, 9 Law & Soc'y. Rev. 493 (1975).

patient injuries.[5]

Still, the attention paid to liability insurance with or without experience rating obscures the fact that an insurance policy is by no means a complete buffer between the doctor and tort process. Although the carrier will pay any tort awards or settlements (and also the costs of defending against any such legal outcomes), the individual doctor still experiences substantial unhappy consequences from being involved in such litigation. These consequences include the financial losses from practice time and revenues that are foregone while the doctor is consulting with lawyers, reviewing and producing records, undergoing depositions, and attending at trial. Even more distasteful may be the psychological stress felt by the doctor from being the target of a lawsuit by one's own patient, seeing the quality of one's care and competence attacked in open court, and perhaps having one's professional reputation stigmatized by an adverse jury verdict (which itself may cause future loss of patients and referrals). These immediate and entirely uninsured consequences of being sued and found liable likely dwarf any statistically valid increase in the doctor's future malpractice premiums from experience rating.

Ultimately it is an empirical question whether the prospect of becoming embroiled in litigation produces a significant reduction in medical negligence and patient injuries. The aim of the research reported in this chapter and in the next is to investigate whether any such deterrence can be detected. But regardless of whether one can discern such an effect from tort litigation, one should not assume the latter to be the only policy instrument available for this prevention role. As with other risky activities (e.g., occupational health and safety or motor vehicle use and design), administrative regulation is a growing force in the medical arena: doctor behavior is more and more likely to be scrutinized by medical registration and disciplinary bodies operating within the state's health department. Perhaps even more salient is the influence that can be exerted over individual

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[5] See Rolph, Some Statistical Evidence on Merit Rating in Medical Malpractice Insurance, 48 J. Risk & Ins. 247 (1981).

doctors by the hospital organization through its medical staff and quality assurance programs. Such groups can draw upon the broader institutional experience and its perspective on safer versus riskier modes of practice. A body of literature now elucidates the determinants of success within such hospital programs, in particular vigorous departmental leadership and active involvement of physician colleagues in reviewing cases and establishing protocols.[6] Both tort litigation and administrative regulation may serve as powerful prods to the institution to establish and conscientiously implement reform.

At the moment, these numerous theoretical claims and disagreements regarding tort deterrence lack much in the way of factual underpinning, a shortcoming which the third leg of our research effort tries to address. We have already reported on one important facet of this problem, the gaps and imprecision with which malpractice litigation now responds to cases of even severe patient injury produced by negligent treatment. In this chapter we describe the results of two surveys of New York State physicians that document the actual consequences to doctors becoming involved in tort litigation, their subjective perceptions about the risk they faced of being sued and thus having to experience these negative consequences, and their appraisal of the force of this tort signal by comparison with the other institutional and regulatory programs to which we have referred. We have also begun a detailed inquiry of all 51 hospitals in our sample about the structure and operation of their medical staff and quality assurance programs. These results are not ready for presentation in this Report.

We are conscious of the likelihood that such physician self-reports will be influenced by social and professional expectations about the appropriate responses. Thus, the acid test for the effectiveness of tort litigation is whether it has produced an observable reduction in actual provider negligence and patient injury. Our hospital records review revealed the pattern and

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[6] See A.B. Flood & W.R. Scott, Hospital Structure and Performance (1987), and Shortell & LoGerfo, Hospital Medical Staff Organization and Quality of Care, 19 Med. Care 1041 (1981).

differences in adverse events and negligent cases across a large representative sample, and this information enabled us to do an econometric analysis of the deterrent impact, if any, of malpractice litigation. The nature and results of that portion of our research program are reported in Chapter 10.

III. Mailed Survey

A. Introduction

1. Research Questions. The mailed survey of doctors in New York State addressed the impact of malpractice suits on physicians.

What is the perceived risk of being sued?

What is the perceived risk of being sued for a bad outcome? for negligence?

How do physicians view the threat of a malpractice suit as compared to other influences in shaping physician behavior and in providing incentives to maintain quality of care?

What is the information content of a malpractice suit regarding the quality of a physician's care vis a vis hospital and state disciplinary actions?

What are the out-of-pocket expenses associated with being sued?

2. General Context for Questions. The effectiveness of a deterrent depends not only on its objective reality but on the perceived certainty and severity of punishment. For this reason we inquired into each physician's perception of tort systems incentives. To provide a context, we asked physicians to compare these incentives with hospital patient safety and quality assurance programs as these now operate. Changes in the tort system, of course, may change the incentives to adopt and use these other important and well-established prevention mechanisms.

To examine the signal heard by the physician, we designed the mailed questionnaire. This survey of a larger population was intended to provide the context for the subsequent in-depth discussion in interviews. The structured interview illuminates the issue of perception through extensive qualitative data not designed

to permit generalization to the larger population of doctors.

Other researchers have conducted mailed surveys of physicians on the effect of the tort system on their lives and practice. Charles et al queried 154 physicians about the psychological and practice impact of being sued,[7] but their inquiry was limited to physicians who had been sued and who resided in a single metropolitan area. Their follow-up survey included physicians who were not sued, but was still limited to a single area.[8]

Questions about practice changes have been asked by the American Medical Association,[9] by the American College of Obstetricians and Gynecologists (ACOG)[10] and most recently by researchers in Maryland.[11] The AMA asked whether physicians were maintaining more detailed records, prescribing more diagnostic tests and treatment procedures, spending more time with patients, and having more follow-up visits with patients in the last twelve months in response to the growth in malpractice claims.[12] The ACOG survey asks, "Which of the following changes, if any, have you made in your personal practice as a result of the risk of malpractice?" Changes included decreasing procedures or deliveries and reducing obstetrical practice. The Maryland researchers[13] asked questions such as: "Have you cut back on the number of high-risk patients you treat?" "Have you increased the use of tests or monitoring procedures?" The AMA study did not divide respondents into sued/not sued; the ACOG survey reported changes by location but not by sued status; the Maryland study reported differences by

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7 Charles, Wilbert & Kennedy, Physicians' Self-Reports of Reactions to Malpractice Litigation, 41 Am. J. Psychiatry 563-565 (1984)

8 Charles, Wilbert & Franke, Sued and Nonsued Physicians' Self-Reported Reactions to Malpractice Litigation, Am. J. Psychiatry 437-440 (1985)

9 Reynolds, Rizzo & Gonzalez, The Cost of Medical Professional Liability, 257 J.A.M.A. 2776-2781 (1987)

10 American College of Obstetricians and Gynecologists, Professional Liability and Its Effects: Report of a 1987 Survey of ACOG's Membership (ACOG: Washington, D.C., March 1, 1988)

11 Weisman, Morlock, Teitelbaum et al, Practice Changes in Response to the Malpractice Litigation Climate, Med. Care 16-24 (1989)

12 Reynolds et al, note 9 supra, p. 2777

13 Weisman et al, note 11 supra, p. 19

specialty and by suit history.

One difficulty with the AMA and ACOG surveys is that the changes addressed could be responses to many factors in addition to the malpractice environment. The Maryland format allows analysis by specialty and litigation history. Our study adds another, and we believe important, dimension to the analysis. In addition to analyzing responses to practice questions by specialty and suit history, we can analyze how perceived risk of being sued, location, age, or major professional activity affected the probability that a physician reported a practice change.

We realize throughout this inquiry that physician self-reports may be biased toward a socially desirable response. Indeed, if physicians find tort-induced deterrence to be distasteful, they may select responses that they believe minimize the overall value of tort litigation. We present the following results with this caveat in mind.

B. Methods

1. Questionnaire. The questionnaire was developed over a period of several months by a health services researcher, an attorney, and two physicians. It was pretested on approximately a dozen physicians in the fall of 1988 in Boston. Responses from the pretest led to revision of several questions and of the survey format. The questionnaire instrument and the reasons for various questions are shown in General Appendix 9A and Technical Appendix 9.III.1.

2. Sample.

a. Sampling frame. The sampling frame for the mailed survey was the AMA data for New York State (52,764 physicians), minus inactive physicians (2,593) and those with county missing (1 physician). These data were then merged with the data from the Office for Professional Medical Conduct (OPMC), and physicians listed as out-of-state or inactive by OPMC were also deleted. The result was a sampling frame of 46,175 doctors. Addresses for the mailing came from OPMC.

b. Total sample size. We chose a target of 800 responses. Anticipating a 40% response rate,[14] we drew a sample of 2,103 names. We were unable to verify the addresses of 62 individuals, leaving a sample of 2,041 physicians to contact.

c. Stratification. Because data on litigation history were available at the time the sample for the mailed survey was drawn, we stratified by the presence or absence of a claim since 1975.

We also stratified on the following four locations:

Long Island
New York County
Kings, Queens, Richmond, Bronx, and Westchester
Upstate

These locations were chosen to correspond loosely to the geographic premium groupings currently used for setting professional liability insurance premiums.

We further grouped into specialty to distinguish between specialty groups with respect to risk of being sued. The following groupings were used:

Neurosurgery/Orthopedics/Obstetrics and Gynecology[15] (excludin doctors limiting their practice to gynecology only)

General Surgery[16]

Internal Medicine[17]

The sampling process and the characteristics of the sample are described further in Technical Appendix 9.III.2.

d. Survey. Mathematica Policy Research, Inc. (MPR) conducted the survey from Princeton, New Jersey. We worked closely with

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[14] Response rates for physician surveys are typically low. Charles et al. report response rates of 34% an 36% for their two surveys on reactions to litigation. Peters, Nord and Woodson, An Empirical Analysis of the Medical and Legal Professions' Experiences and Perceptions of Medical and Legal Malpractice, J. L. Reform 601-636 (1986) report a response rate of 40%. The ACOG survey (note 10, supra) reported an overall response rate of 48%. The best response rate is reported by the AMA: 65% for their second quarter 1984 survey (Reynolds et al., note 9 supra)

[15] Includes Obstetrics, Gynecology, Gynecological Oncology, Maternal and Fetal Medicine, and Reproductive Endocrinology

[16] Includes Abdominal Surgery, Cardiovascular Survey, General Surgery, Hand Surgery, Head and Neck Surgery Pediatric Surgery, and Traumatic Surgery

[17] Includes Allergy and Immunology, Diabetes, Endocrinology, Geriatrics, Hematology, Immunology, Infectiou Diseases, Internal Medicine, Neoplastic Diseases, Nephrology, Nutrition, Oncology, Rheumatology

Mathematica to design a procedure to assure complete confidentiality of the survey responses. Prior to the first mailing, we sent MPR a data tape with the addresses and demographic characteristics of the entire sample so that they could undertake the mailing. After completing the survey, we received from MPR a data tape of responses merged with the original demographic material with the physician identifying information removed. We were thus able to preserve anonymity from those analyzing the data yet perform comparisons of responders and non-responders.

The survey was mailed to 2,041 physicians on March 20, 1989. A letter from the principal investigator describing the survey and from the New York State Medical Society supporting the survey accompanied each questionnaire (see General Appendix 9B). At the end of the first mailing period, 556 responses (27.3% of the sample) had been received and 258 questionnaires (12% of the sample) were returned as undeliverable. Because OPMC addresses had been used for the first mailing, second mailing addresses for the undeliverable questionnaires were sought from the AMA directory. The second mailing was released on May 5 to all individuals who had not yet responded to the questionnaire.

After the close of the survey period on June 16, 1989, a data tape containing 755 responses was sent to MPS. Of those 755, 7 were duplicates and 9 were missing the sampling weight. Thus the number of usable returns was 739.

e. Response Rate. Of the 2,103 cases sampled, 62 had no address and 218 questionnaires were ultimately returned as undeliverable. Thus the number of physicians located was 1,823. The effective response rate was thus 40.5% (739/1,823).

The tables in Technical Appendix 9.III.3 show differences between responders and non-responders. Responders were significantly more likely (1) to be board certified; (2) to live upstate; (3) to have had a claim filed against them; (4) to have an office-based practice; (5) to be male; and (6) to be a U.S. or Canadian medical school graduate. In fact, the only nonsignificant difference between responders and non-responders was in the area of specialty. The distribution of responders and non-responders was the same across the three specialty groupings, corresponding to

high risk, medium risk, and low risk of a malpractice suit. In light of the non-response, we adjusted our sampling weights as described next.

f. Weights. Each observation was initially assigned a sampling weight, corresponding to the inverse of the probability of selection. Following the receipt of the survey data, we adjusted for non-response.[18] The groups for the adjustment were location an three age groups, less than 40, 40 to 49, 50+. Age was used to adjust for non-response because most of the differences between responders and non-responders were related to age. A disproportionate number of non-responders were residents, which may account for the associations between non-response and board certification status and major professional activity. Moreover, the association between non-response and claim history may reflect the lower likelihood that younger physicians have had a claim filed against them. Location was selected as the other correction variable because non-response was clearly centered in the non-Manhattan boroughs of New York City. Of the non-respondents, 37% were from areas surrounding Manhattan compared with 25% of the respondents.

3. Analysis. All data were grouped into categories based on the responses to various demographic questions regarding specialty, location of practice, and litigation history. The specialty groups were based on the response to question 22: "What is your primary specialty?"[19]

> High Risk: Obstetrics/Gynecology (no Gynecology only), Neurosurgery and Orthopedics (corresponds to insurance premium classes 1, 2 and 3)
>
> Medium Risk: General Surgery, Gynecology only, Otolaryngology, Plastic Surgery, Vascular Surgery, Anesthesiology, Cardiac Surgery, Colo-Rectal Surgery, Pediatric Surgery, Thoracic Surgery, Traumatic Surgery,

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[18] The non-response adjustment was based on Kalton & Kasprzyk, The Treatment of Missing Survey Data, 12 Survey Methodology 1-16 (1986).

[19] Although we had already stratified on specialty (see section II, B), we used self-reported specialty fo analysis. We did not change sample weights. Confidentiality of responses has prevented us from comparing self-reported and AMA-listed specialty.

and Urology (corresponds to insurance premium classes 4 - 8)

Low Risk: Internal Medicine and General Practice (corresponds to insurance premium classes 9 - 14)

The location groups corresponded to MLMIC territories. The group was determined by the answer to the question 23, "Check the COUNTY in which you conduct the majority of your practice or work."

Location 1: Nassau, Suffolk
Location 2: Bronx, Kings, Queens, Richmond, Rockland, Sullivan
Location 3: New York, Orange, Ulster, Westchester
Location 4: Upstate

The sued group included those physicians who had ever been sued in their career, as determined by the response to question 12: "Have you ever been sued for medical malpractice during your career?" All other physicians were placed in the not sued group.

Virtually all major data bases used to examine the malpractice problem present information on claims rather than on suits. A claim can be filed for many reasons, but not all claims lead to suits (see Chapter 7). Although an insurer might pay a claim on behalf of a physician with little participation by the insured, the physician cannot avoid taking note of a civil complaint. Therefore, we asked about suits on both the mailed survey and the interviews.

All the analyses presented in this chapter include contrasts between sued and non-sued physicians. Standard errors of our estimates are calculated taking into account the stratified sample design as well as non-response.[20] Further technical details of the analysis appear in Technical Appendix 9.III.4.

C. Results

Table 9.1 compares presence or absence of a claim with the physician's reporting of the presence or absence of a malpractice suit. The data on claims are those received at OPMC prior to

[20] Shah et al., SUDAAN: Procedures for Descriptive Statistics, Research Triangle Institute (1989)

completion of efforts to enforce reporting regulations and thus are incomplete. The percentages were weighted to adjust for the sampling design. That nearly a quarter of the physicians reported a suit for which the data showed no claim is consistent with substantial prior under-reporting of claims. Two other groups who may account for a modest portion of this quarter are physicians who: 1) were sued in states other than New York; or 2) were indemnified by Health and Hospitals Corporation (such physicians are not in the claims data base).

If one thinks of a claim as an indicator or test of a possible suit, then several terms from epidemiology may be useful in interpreting Table 9.1. The specificity of a negative claim seems to be 90.4% (i.e. claim reports are absent in over 90% of the cases in which no suit was found). Due to the large number of false negatives (claim absent when physician reports suit was filed), however, the negative predictive value of no claim is only 61.8% (i.e., no claim reported means no suit only 62% of the time). The predictive value of a positive claim is much better, 94.1%. Almost 95% of the claims appear to have resulted in suits.

Table 9.1

COMPARISON OF PRESENCE/ABSENCE OF CLAIM TO SUIT

SUIT	CLAIM Present	Absent	Don't Know	Row Totals
SUIT PRESENT				
Frequency (unwtd)	360	136	33	529
Weighted % of Row	54.7%	39.4%	5.9%	100.0%
Weighted % of Col	94.1%	38.1%	64.0%	
Wt'd Overall %	32.1%	23.1%	3.5%	58.7%
SUIT ABSENT				
Frequency (unwtd)	20	172	16	208
Weighted % of Row	4.9%	90.4%	4.7%	100.0%
Weighted % of Col	5.9%	61.8%	36.0%	
Wt'd Overall %	2.0%	37.4%	1.9%	41.3%
TOTAL				
Frequency (unwtd)	380	308	49	737
Row Weighted %	34.1%	60.5%	5.4%	100.0%

Table 9.2 shows the perceived risk of being sued by specialty, location and suit history. Not surprisingly, perceived risk differs substantially among specialty groups. The Wald test rejects the hypothesis that the means are equal. High-risk specialties have a perceived risk of being sued that is almost three times that of a low-risk specialty, and 75% higher than the overall average perceived risk. In contrast, low-risk specialties perceive their risk of being sued as approximately 35% less than the overall average. In addition, all specialty groups substantially overestimate the true chance of being sued. Low-risk groups overestimate the risk of being sued by a factor of 3.0 as compared to the high-risk groups, which overestimate the risk by a factor of 1.6.

In terms of location, the Long Island counties have a high perceived risk of being sued compared to the rest of the state, and the New York City areas along with Westchester have the lowest perceived risk (Table 9.2). These perceptions do not correspond

to the insurance premium structure. Although Long Island carries the highest insurance rates, Location 2 carries the second highest rates, New York County and others in Location 3 carry the third highest rates, and Location 4 carry the lowest. One might hypothesize that differences in premium structure affect perceptions of risk. These data do not seem to support this hypothesis although we have not attempted to test this formally. In addition, all groups overestimate the chance of being sued, with upstate physicians overestimating the risk by a factor of 3.8, while Long Island physicians overestimate the risk by a factor of 2.4. The details of how the actual rate of suit was calculated are contained in Technical Appendix 9.III.4.

As might be expected, the perceived risk of being sued for individuals who have already been sued is significantly higher than for those who have not (Table 9.2).

Table 9.2
PERCEIVED RISK OF SUIT PER 100 SPECIALISTS PER YEAR

"In your opinion, for every 100 physicians in your SPECIALTY in New York State, how many do you think will be sued at least once this year?"

	N	Weighted Average	Std Error	Actual Risk 1986
SPECIALTY GROUP				
Low Risk	300	12.1	0.9	3.8
Medium Risk	182	23.4	1.6	10.9
High Risk	243	34.3	1.7	20.8
GEOGRAPHIC LOCATION				
Location 1: Nassau/Suffolk	141	25.5	2.3	10.8
Location 2: Bronx/Kings/Queens/ Richmond/Rockland/ Sullivan	156	15.7	1.3	5.8
Location 3: New York/Orange/ Ulster/Westchester	210	18.5	1.4	5.9
Location 4: Upstate	214	20.9	1.2	5.5

SUIT STATUS				
Not Sued	207	14.3	1.3	
Sued	523	23.1	0.9	
OVERALL*	732	19.5	0.7	6.6

Specialty Group: WALD TEST: GSQ 151.4, 2 d.f., $p < 0.0001$
All differences are significant at $p < 0.01$, Protected Least Significant Difference (PSD)

Geographic Location: WALD TEST: GSQ 16.5, 3 d.f., $p = 0.0009$
Differences between Locations 1 and 2 and between Locations 2 and 4 are significant at $p < 0.05$, PSD

Suit Status: $t = 5.53$, $p < 0.01$

* Overall N slightly higher than sum of specialties/location/suit categories due to non-responses on specialty/location/suit question. Non-response too small to calculate separate weighted average.

Table 9.3 shows the perceived chance of being sued[21] for malpractice if a patient suffers an unintended adverse outcome that causes a temporary or permanent disability because of non-negligent medical management. The results mirror those for the previous question (9.2) in terms of high-risk groups, physicians on Long Island, and previously sued physicians. All perceive a greater chance of being sued. What is striking is the finding that low- and medium-risk groups perceive a similar (and not significantly different from each other) chance of being sued when the patient has a bad outcome with no negligence involved; high-risk groups perceive a higher chance of suit in such situations. Likewise, physicians on Long Island and in Location 2 have a similar and higher perceived risk of being sued for a bad outcome with no negligence than do physicians in Locations 3 and 4. Physicians who have been sued also perceive a higher chance of being sued for a bad outcome with no negligence.

[21] As with question 9.2, the risk of suit is expressed in terms of numbers of suits per 100 occurrences.

Table 9.3
PERCEIVED CHANCE OF BEING SUED WHEN PATIENT HAS ADVERSE OUTCOME

"In your opinion, if a patient suffers an unintended adverse outcome that causes a temporary or permanent disability because of medical management (NO NEGLIGENCE), what do you think are the chances of the patient filing suit?"

	N	Weighted Mean	Std Error
SPECIALTY GROUP			
Low Risk	298	41.2	1.9
Medium Risk	185	44.0	2.0
High Risk	244	56.6	1.8
GEOGRAPHIC LOCATION			
Location 1: Nassau/Suffolk	141	51.9	2.8
Location 2: Bronx/Kings/Queens/ Richmond/Rockland/ Sullivan	156	49.9	2.5
Location 3: New York/Orange/ Ulster/Westchester	210	41.4	2.2
Location 4: Upstate	216	42.0	2.3
SUIT STATUS			
Not Sued	208	42.3	2.1
Sued	524	47.5	1.5
OVERALL*	734	45.3	1.2

Specialty Group: WALD TEST: GSQ 40.7, d.f. 2, $p < 0.0001$
Differences between high vs. medium and high vs. low are significant at $p < 0.05$, PSD

Geographic Location: WALD TEST: GSQ 14.45, d.f. 3, $p = 0.0023$
Differences between Locations 1 and 3 and between Locations 1 and 4 are significant at $p < 0.05$, PSD

Suit Status: $t = 2.04$, $p < 0.05$

* Overall N slightly higher than sum of specialties/location/suit categories due to non-responses on specialty/location/suit question. Non-response too small to calculate separate weighted average.

Table 9.4 shows the perceived chance of being sued when the medical management was negligent. Although these values are higher than if no negligence is involved, the difference is not enormous (59.5% versus 45.4% overall). Once again, high-risk groups perceive a higher risk of being sued.[22] Nassau/Suffolk physicians once again have the highest perceived risk of being sued for negligence, as do physicians who have already been sued.

In general, physicians feel that the chances of litigation from negligent cases are about 60%, vastly greater than our estimates in Chapter 7 that the actual chance was about 1% to 2%. Nonetheless, even the perceived 60% risk is far from a standard of certain penalty.

[22] In contrast to the previous table, the low and medium risk group's perceptions are now significantly different although the strength of the difference is somewhat weak.

Table 9.4
PERCEIVED CHANCE OF BEING SUED FOR NEGLIGENCE

"In your opinion, if a patient suffers an unintended adverse outcome that causes a temporary or permanent disability because of NEGLIGENT medical management, what do you think are the chances of the patient filing suit, regardless of whether the patient recognizes this negligence?"

	N	Weighted Mean	Std Error
SPECIALTY GROUP			
Low Risk	298	55.2	1.7
Medium Risk	185	60.5	2.0
High Risk	244	69.2	1.5
GEOGRAPHIC LOCATION			
Location 1: Nassau/Suffolk	141	67.0	2.1
Location 2: Bronx/Kings/Queens/ Richmond/Rockland/ Sullivan	156	63.1	2.3
Location 3: New York/Orange/ Ulster/Westchester	210	54.8	2.1
Location 4: Upstate	215	58.1	2.1
SUIT STATUS			
Not Sued	208	56.3	1.9
Sued	524	61.7	1.3
OVERALL*	733	59.5	1.1

Specialty Group: WALD TEST: GSQ 39.4, 2 d.f., $p < 0.0001$
Differences between high vs. medium and between high vs. low are significant at $p < 0.05$, PSD

Geographic Location: WALD TEST: GSQ 19.7, 3 d.f., $p = 0.0002$
Differences between Locations 1 and 3 and Location 1 and 4 are significant at $p < 0.05$, PSD

Suit Status: $t = 2.28$, $p < 0.05$

* Overall N slightly higher than sum of specialties/location/suit categories due to non-responses on specialty/location/suit question. Non-response too small to calculate separate weighted average.

Table 9.5 shows the reported influence of various factors in maintaining standards of care using data aggregated over region, areas, and suit status. The factors appear to fall into four major groups. The first includes continuing medical education and medical journals. The second group is peer relations. Malpractice litigation influence is grouped with "Clinical Care Rules" and "Morbidity and Mortality Conferences." The fourth and least influential group is the Professional Review Organization. Differences between members of one group and members of another are significant. Differences within groups are not. The threat of a malpractice suit ranks about average (2.5) in importance on a scale of 0 to 5. Its importance is similar to morbidity and mortality conferences and hospital clinical care rules.

Differences in results by specialty, location, and suit history are presented in detail in Technical Appendix 9.III.5 and only summarized here. In general, the groups differed little in their perceptions of the importance of various factors in maintaining quality. Sued physicians placed slightly less importance on peer relations and medical journals but gave more importance to the implications of a malpractice suit in maintaining standards of care. New York City physicians placed less emphasis on the PRO than did their immediate neighbors in the four boroughs and on Long Island. This probably reflects the fact that different PROs operate in different parts of the state. The importance of peer relations varied between high-risk and low-risk physicians as did the importance of morbidity and mortality conferences. The latter finding is not surprising as different specialties traditionally place varying degrees of importance on morbidity and mortality conferences.

Table 9.5
INFLUENCE OF VARIOUS FACTORS
IN MAINTAINING STANDARDS OF CARE

"To what extent do each of the following factors help you maintain standards of care in your practice?"

Responses scored 0 to 5 with 0 = not an influence, 5 = important influence

	FACTOR	WEIGHTED MEAN	N	STD ERR
Grp 1	Continuing Medical Education	3.73	656	0.0
	Medical Journals	3.61	654	0.0
Grp 2	Peer Relations	3.27	652	0.0
Grp 3	Implications of a Possible Malpractice Litigation	2.54	654	0.0
	Clinical Care Rules, Guidelines Standard Operating Procedures Developed by Clinical Department and/or Hospital	2.52	654	0.0
	Morbidity/Mortality Conferences and Tumor Boards	2.33	652	0.0
Grp 4	External Organized Peer Review, e.g PRO	1.78	654	0.0

WALD TEXT: GSQ 767.73, 6 d.f., $p < 0.001$

Differences within groups were not significant; differences between members of one group and members of another group were significant $p < 0.05$, PSD

Table 9.6 presents the overall information content of various disciplinary actions. Physicians report that malpractice suits convey less information about the quality of a physician's care than other disciplinary actions about which we asked.
Very few differences in perceived information content of various actions surfaced among the different geographic locations and

specialty groups; there is a difference between sued and not sued physicians. The tables presenting these results are shown in Technical Appendix 9.III.5. Greater New York City physicians differed from Upstate doctors in their view of the importance of the state actions of censure, reprimand, and probation: they attached more importance to these actions than their Upstate counterparts. Doctors practicing in low-risk specialties attached more importance to the supervision of hospital practice and to state censure and reprimand.

Table 9.6
INFORMATION CONTENT OF VARIOUS DISCIPLINARY ACTIONS

"What effect would each of the following actions against a colleague have on your opinion of his or her competence? Assume that each action was undertaken for a case that had some substance."

Scored 0 to 5 where 0 = "Would not cause me to question competence," 5 = "Would definitely cause me to question competence"

ACTION	N	WEIGHTED MEAN	STD ERROR
Medical Malpractice Suit	630	1.29	0.06
Hospital Actions[a)]			
Letter of Reprimand	719	2.67	0.06
Supervision of Practice	725	3.69	0.05
Privilege Restriction	721	4.00	0.05
Privilege Withdrawal	725	4.45	0.05
State Actions[b)]			
Censure and Reprimand	715	3.17	0.07
Probation	714	3.67	0.06
License Suspension	715	4.29	0.06
License Revocation	714	4.47	0.05

a) WALD TEXT: GSQ for Malpractice Suit versus Hospital Actions: 1975.4, d.f. 4, $p < 0.001$

All contrasts are significant at $p < 0.001$, PSD method

b) WALD TEXT: GSQ for Malpractice Suit versus State Actions: 1691.5, d.f. 4, $p < 0.001$

All contrasts are significant at $p < 0.001$, PSD method

Table 9.7 presents the data on reported practice changes within the last 10 years. The results are presented as weighted proportions of individuals reporting a particular practice change. Detailed tables by specialty, zone, and suit history are shown in

Technical Appendix 9.III.5.

The most commonly reported practice change was increased paperwork, including maintenance of the patient record. The least commonly reported change was reducing the number of patients or procedures.

Table 9.7
REPORTED PRACTICE CHANGES MADE IN THE LAST TEN YEARS

Change	N	Weighted Percent Responding Affirmatively	Std.Error
Order more tests and procedures	653	81.2%	2.0%
Take more time to explain risks	654	77.7%	2.0%
Reduced number of patients or procedures	653	39.5%	2.2%
Spend more time on paperwork	655	90.0%	1.5%

To explore the many influences that might affect practice change, we used multiple logistic regressions. The results for the outcomes "order more tests and procedures," "more time to explain risks," "reduced number of patients or procedures," and "increased paperwork" are presented in Table 9.8. The regressions included variables of theoretical interest and as such are not necessarily the best models.

For the outcome "order more tests and procedures," the significant factors influencing the change were age, practice setting, and perceived risk of a suit. Older physicians were more likely to order more tests; a 55-year-old physician is 35% more likely to order more tests than a 45-year-old physician (approximately 1.03^{10}). Non-HMO private practice physicians were more than twice as likely as their colleagues to order more tests. And physicians of a given specialty with a higher perceived risk of

being sued were more likely to order more tests and procedures than their colleagues with a lower perceived risk. For example, a physician with a perceived risk of 25/100 is 45% more likely to order more tests than a colleague with a perceived risk of 15/100.

For the outcome "take more time to explain the risks associated with diagnosis and treatment," only litigation history was a significant influence. None of the other variables had a p-value of less than 0.27. Sued physicians are almost twice as likely as their non-sued colleagues to take more time to explain risks. This finding contrasts sharply with the finding of the interview survey (see below), in which most sued physicians reported that they had <u>always</u> taken the time to explain risks and had not changed their behavior as a result of being sued.

The outcome "reduced patients or procedures" had several factors significantly associated with it. First, and not surprisingly, age was positively associated with a reduction in the scope of practice. A 65-year-old physician was 63% more likely than a 55-year-old physician to have decreased the scope of his or her practice. Non-HMO private practice physicians were twice as likely as their colleagues to have reduced their scope of patients and procedures. This may be due in part to competition, a factor which has received a great deal of attention in the popular medical press. Finally, and most importantly for our purposes, perceived risk of a suit was positively associated with a reduction in practice scope: a physician with a perceived risk of 25/100 is 14% more likely to initiate a practice reduction than is an "MD" with a perceived risk of 15/100.

The final outcome variable "spend more time on paperwork, including the maintenance of the patient record" had no factors significantly associated with it. Practice setting approached significance ($p=0.096$) so an additional model was developed which included two variables for practice setting -- non-HMO private practice and HMO -- and variables for age, location and, specialty. Using this model, only the HMO variable was significant. Practicing in an HMO setting was associated with a relative odds of 0.26 for increased paperwork. Thus HMO physicians <u>reduced</u> the amount of paperwork relative to their colleagues in other settings

(excluding private practice). The relative odds for private practice physicians became 1.44 when the HMO physicians were removed from the referent population.

Table 9.8
RESULTS OF MULTIPLE LOGISTIC REGRESSION
RELATIVE ODDS OF OUTCOME+

	OUTCOME VARIABLE			
EXPLANATORY VARIABLE	Order More Tests/Procs	Explain Risks	Reduce Num Pts/Procs	More Paperwork
Age (years)	1.03*	1.01	1.05*	0.98
Zone	0.78	1.19	0.77	1.49
High-Risk Specialty	1.51	1.25	1.18	0.95
Medium-Risk Specialty	0.91	1.35	1.10	1.85
Sex	0.50	0.70	1.15	0.45
Non-HMO Office Practice	2.19*	1.28	2.10*	1.89
Suit History	0.94	1.89*	0.66	1.44
Perceived Risk of a Suit	1.04*	1.42	1.01*	1.01

* $p < 0.05$

+ e^{β} corresponds to odds of change in the outcome variable for a unit change in explanatory variable

Table 9.9 examines the economic impact of a malpractice suit on a physician in terms of time and dollars. For those physicians who answered the question, most lost 3 to 5 days of time. For the 50 physicians who retained their own attorney, only 31 reported incurring any out-of-pocket expenses. Thus only 6% of all sued physicians had out-of-pocket expenses. Most expenses were in the $1,000 to $4,999 range. Ten physicians reported incurring out-of-pocket settlements to patients, and 4 physicians reported expenses greater than $25,000.

Table 9.9

COSTS OF MALPRACTICE

"For your most recent closed suit (whether the suit was dropped, settled, or paid), how many days did you lose from your practice, including depositions, attorney's meetings, other time spent in preparation of your defense, and court appearances?"

	Frequency	Weighted Percent	
DAYS LOST FROM PRACTICE BECAUSE OF SUIT			
0 days	51		14.4
1-2 days	109	24.2	
3-5 days	156	31.8	
6-10 days	91	17.3	
11-20 days	31	6.4	
20+ days	31	5.9	
OUT-OF-POCKET ATTORNEY EXPENSES			
0	437		93.6
$1 - $999	6	1.1	
$1,000 - $4,999	18	4.1	
$5,000 - $9,999	6	1.0	
greater than $10,000	1	0.2	
OUT-OF-POCKET PAID TO PATIENT			
0	440	97.8	
$1 - $4,999	2	0.3	
$5,000 - $9,999	1	0.5	
$15,000 - $19,999	1	0.2	
$20,000 - $24,999	2	0.4	
greater than $25,000	4	0.9	

D. Discussion

All surveys have their limitations; we note here several for this survey. First, some of the questions may have been confounded by physicians reporting socially desired responses. For example,

the factor "continuing medical education," as an influence on standards of care, may have been overrated by physicians desirous of reflecting support for CME. The factor "medical journals" might also have been similarly biased. Second, the questions on changes in tests and procedures may have been influenced by respondents who wished to portray an environment of extensive defensive medicine. Finally, the question comparing malpractice suits to other disciplinary actions had two problems. The format of the question lent itself to possible underrating of a malpractice suit by those interested in downplaying the influence of the tort system. Also, in retrospect several alternatives should have been offered under the factor "malpractice suit": for example, "one suit: case dropped before trial" and "multiple suits: majority of cases with merit" would make presentation of the question consistent with the format for hospital and state actions.

Some of the substantial differences in perceived risk by specialty, location, and suit history undoubtedly reflect objective differences in the rate of suit among these categories. The perceived risk of suit also reflects the physician's internalization of the signal sent by the environment. Physicians in low-risk categories appear to internalize the environment's signal particularly well. Together with the findings of Chapter 7, our results suggest that their subjective impression of probability of suit far exceeds the actual probability of suit. In part this may be due to the tendency to exaggerate low frequency events such as a malpractice suit.[23]

The differences in perceived risk of suit given that the patient has suffered an adverse event may be partially explained by circumstances unique to different groups. For example, obstetricians interviewed as part of this study (see next section) often reported that they were likely to be sued for any outcome other than a perfect baby. The mailed survey's finding that high-risk specialties perceive a much higher chance of being sued for a bad outcome than do low- and medium-risk specialties confirms the

[23] This is an example of the phenomenon noted by Kahneman and Tversky in which individuals overestimate the probability of low frequency events: Prospect Theory: An Analysis of Decision Under Risk, 47 Econometrica 263-291 (1979).

perception reported in the interviews. For some time now, anecdotal evidence has labeled Long Island as a litigious community, a perception shared by the doctors interviewed. In addition, Long Island physician premiums are the highest in the state. This may explain why doctors practicing on the Island feel they stand a better than 50% chance of being sued if the patient has a bad outcome. Some of this attitude may spill over into Brooklyn and Queens, which are geographically contiguous with Long Island.

Finally, we found that many sued physicians perceived a higher chance of being sued for bad outcomes; they may, of course, actually be at higher risk. Physicians perceive that they will be sued for a bad outcome approximately 45% of the time, irrespective of negligence. They perceive that the chance of being sued increases to only 60% if they act negligently.

Taken together, the findings on the perceived risk are consistent with one or both of two conclusions: either physicians perceive a fairly strong but unfocused deterrent signal from the tort system or physicians find it difficult to judge negligence. The first explanation is as follows: the perceived risk of a suit given negligence is not much higher than the perceived risk of a suit given an adverse event but no negligence. Thus the tort system seems to capture many actions regarded by physicians as non-negligent and misses quite a few negligent ones. Other parts of our study have already provided evidence to corroborate this perception (see Chapter 7). The impressions conveyed to doctors by this strong but unfocused signal is that the consequences of the tort system are visited on any sued physician regardless of whether he or she acted negligently.

With respect to the second explanation, we show in Chapter 6 that our physician reviewers made judgments about negligence less reliably than about causation. By extension, juries also have difficulties. Lack of reliability in judgments of negligence would lead to a similar perceived risk of suit for both negligent and non-negligent actions.

Among the reported practice changes initiated as a result of the general threat of malpractice seems to be increased use of

tests and procedures. (We say "seems to be" because the questionnaire was not designed to ask about specific responses to the upsurge in malpractice litigation.) Increased testing is linked to the traditional defensive medicine argument: namely, the tort system stimulates inefficient and costly increases in test use. However, the detail provided by the interviews (see next section) makes it clear that increased testing is due as much to advances in science, technology, and availability as it is to defensive medicine.

With respect to the debate about the value of tort liability in promoting quality, physicians appear to be influenced more by the general malpractice environment than by knowledge of a specific claim. As shown in Table 9.5, physicians view the general threat of malpractice as inducing them to maintain standards of care in their practice. Table 9.6 suggests that a specific suit is given relatively little weight as an indicator of a colleague's competence or quality of care. In particular, Table 9.6 suggests that hospital or state actions against a physician are given more weight as indicators of quality than tort actions. Although the threat of tort liability may promote quality, hospital or state actions may be more efficient (less diffuse) and less psychologically burdensome (see next section on interviews) than the tort system. The question we asked, however, did not distinguish successful from unsuccessful suits. Possibly one unsuccessful suit would be given little weight, but multiple successful suits would be given more weight.

The following interviews took a closer look at some of the issues raised by the mailed survey. They expand on several themes noted previously in this chapter.

IV. Physician Interviews

A. Introduction

1. Research Questions. The interviews were designed to elicit physicians' perceptions about the incentives inherent in the current tort liability system. A secondary goal was to assess physician attitudes toward regulatory or institutional

alternatives. Physicians were interviewed with regard to their experience with litigation, their understanding of medical causation and negligence, and their views about alternatives to tort litigation.

Specific research questions included:

What are physician perceptions about why they are sued?

What are physician perceptions about the tort litigation system and its impact on their practice?

What are physician perceptions about and attitudes towards hospital quality assurance programs, the PRO, Medical Society and state regulatory activities?

What is a physician's understanding of medical causation and negligence?

2. General Context for Research Questions. The interviews described here supplement the wealth of data provided by other parts of the Study. We realize the methodological limitations inherent in self-reports of behavior. Rather than use our small interview sample to generalize to the population, we used the richness and detail of the interview process to enhance our understanding of how, why, and if the tort system influences physician behavior. Thus, the structured interviews represent a qualitative approach to physician perceptions. We have not taken the responses at face value but rather have used them to interpret the themes developed thus far in the chapter.

As discussed in Part I, the effectiveness of incentives for deterrence may depend on how they are perceived. If physicians are either unaware of the incentives or misinterpret them, then the usefulness of tort incentives may be diluted. Alternatively, the deterrent signals may be strong, but physicians may find it difficult to translate the signal into action. Questions about physician perceptions of the tort system and why they are sued address this issue.

Questions about perceptions regarding hospital quality assurance programs, state requirements, and PRO activities address a different issue. Tort liability is not the only incentive for prevention affecting a physician's practice. How do physicians

perceive the incentives of these other programs and structures? A question about institutional and regulatory alternatives to tort litigation confronts physician perceptions of the usefulness and effectiveness of these programs.

Finally, prevention of medical accidents by reducing or eliminating negligent physician behavior may depend on the ability of physicians to recognize a link between medical management and the patient's outcome (causation). It may also depend on recognition of what constitutes negligence. To the extent that physicians find such determinations difficult, efforts to prevent adverse events may have to rely on other mechanisms.

B. Methods

1. Interview Instrument. The instrument designed for physician interviews was loosely divided into those for physicians who have been sued and those who have not. As an opening, we asked all physicians what they found to be the most difficult thing about practicing medicine today. For those who had been sued, broad questions were

- Why were you sued?
- What was the process of being sued?
- What was the impact of the suit?
- What are your opinions regarding regulatory or institutional controls?

For physicians who had not been sued, the questions were

- What might be the hypothetical impact of a suit?
- What are your opinions regarding regulatory or institutional controls?

Both groups of physicians were then presented with case studies and asked to comment on whether they thought the medical management in the case caused the patient's outcome, whether the management was negligent, whether the victim should be compensated, and how to prevent the episode. The interview instrument is shown in General Appendix 9C.

The interview instrument was pretested in the summer and fall of 1988 in Boston among six physicians. Results of the pretest led to several refinements of the survey instrument. The

interviews for this study began in December of 1988 and were conducted over six months. The interviewers included two medical anthropologists, two physicians, and a health services researcher. The interviews were conducted in the physician's office, were tape recorded to permit transcription, and took approximately one hour to one and one half hours to conduct.

2. Sampling. In the fall of 1988 a sample for the interviews of 102 physicians was drawn. We expected a 50% response rate and therefore drew a sample twice the size of the desired number of completed interviews.

The sampling goals for the physician interview were as follows:

> Size: sample thirty-four physicians in each of three specialties to achieve 17 completed interviews per specialty.
>
> Stratification: have sample stratified by two factors thought to affect attitudes toward malpractice: geographic location[24] and specialty.

The number of total interviews to be conducted (51) was determined primarily by fiscal constraints.

a. Sampling Frame. Physicians were included in the sampling frame if they practiced at one of the 51 study hospitals in 1984. We limited the sampling frame to three specialties: Obstetrics and Gynecology,[25] General Surgery,[26] and Internal Medicine.[27] Internal medicine was selected as a specialty with a low risk of malpractice suit, general surgery as a moderate-risk category, and obstetrics/gynecology as a high-risk group.

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[24] Greenwald, & Mueller, Medical Malpractice and Medical Costs, in The Economics of Medical Malpractice (S Rottenberg ed.), (1978)

[25] Includes Obstetrics, Gynecology, Gynecological Oncology, Maternal and Fetal Medicine, and Reproductive Endocrinology

[26] Includes Abdominal Surgery, General Surgery, Hand Surgery, Head and Neck Surgery, Pediatric Surgery, an Traumatic Surgery

[27] Includes Allergy and Immunology, Diabetes, Diagnostic Laboratory Immunology, Endocrinology, Geriatrics, Hematology, Immunology, Infectious Diseases, Internal Medicine, Nephrology, Nutrition, Oncology, and Rheumatology

b. Stratification. The physicians in the state were divided into four regions:

1. Upstate Metropolitan
2. Other Upstate
3. New York City/Westchester
4. Long Island

Ideally, the sample would also have been stratified by whether the physician had had a claim filed against him or her. At the time the sample was drawn, however, claims data were not available. Technical Appendix 9.IV.1 describes the sampling process and presents the characteristics of the sample.

c. Interview Response. Attempts were made to contact all 102 physicians sampled. Nine physicians were not sent the initial contact letter because we could not locate a telephone number for them. Thus, 93 physicians were mailed a letter of introduction from the principal investigator explaining the nature and purpose of the interviews. The letter was accompanied by a letter of support from the Medical Society of New York (see General Appendix 9D). Of the physicians receiving the letter, we received only six outright refusals. Forty physicians were telephoned multiple times by project interviewers without making contact. These were considered implicit refusals. We completed 47 interviews for a response rate of 51% (47/102-9).

Our comparison of respondents to refusers found no significant differences on several demographic variables (see Technical Appendix 9.IV.2 for tables).

3. Analysis. Because of the qualitative nature of the data, the interviews were analyzed as case studies. Case studies are most useful when the dimensions of interest are complicated and intertwined.[28,29,30] They capture many variables of interest and many

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[28] Kennedy, Generalizing from Single Case Studies, Evaluation Quart. 661-78 (1979)

[29] Weiss & Rein, The Evaluation of Broad-Aim Programs: Difficulties in Experimental Design and an Alternative, in Evaluating Action Programs (C.H. Weiss ed.), Boston: Allyn and Bacon (1972)

[30] Wilson, Explorations of the Usefulness of Case Study Evaluation, 3 Evaluation Quarterly 446-459 (1979)

viewpoints. Cases also usually involve a storytelling style. When case studies are grouped with an eye towards using them as a sample survey, the data collected can reflect the range of attributes that relate to the research questions at hand.[31]

Time constraints did not permit analysis of these interviews by specialty and location. Instead, the analysis focused on the four key themes expressed in the research questions. Using an abstracting form, each completed, transcribed interview was content analyzed and coded. In addition, the case studies were evaluated by senior physician members of the project for causation and negligence. Responses to the case studies were then grouped into "definite causation (negligence)," "probable causation (negligence)" and "no causation (negligence)."

C. Results

The results of interviews point to three major themes:

- Doctors may have difficulty recognizing error and negligence
- Physicians characterize the impact of the tort system as primarily a psychological distraction as opposed to actually affecting the way they practice medicine. They tend to use the tort system as a target
- Doctors believe the tort system, as well as state and PRO activities have little or no role in preventing medical accidents although hospital quality assurance activities may have a role if structured properly

These themes are discussed in greater detail below.

1. Physician judgments of causation, error and negligence: responses to standard cases. In order to elicit how physicians understand the notions of causation, error, and negligence, we used the following standard cases presented in an interview format. Two cases were developed for each specialty: General Surgery (moderate risk), Internal Medicine (low risk), and Obstetrics (high risk). The interview process required physicians to give their reasons for

[31] D.L. Hoaglin et al, Data for Decisions, Cambridge, MA: Abt Books (1982)

making a judgment one way or another and therefore gave us information on what determined these decisions.

a. General surgery

i) Case 1. Mrs. Jones was a 45-year-old woman who underwent cholecystectomy and common duct exploration. She had a bout of transient jaundice and pancreatitis prior to her operation. At the time of surgery two stones were removed from the common duct and a T-tube cholangiogram showed two filling defects in the duct, which were interpreted as air bubbles. Seven days later a cholangiogram demonstrated two defects consistent with calculi. Indeed, three weeks later two stones were removed from the common duct by passing a basket down the T-tube tract.

ii) Case 2. Mr. Smith underwent repair of an abdominal aneurysm. Four hours after surgery his blood pressure dropped from 140 to 90 systolic, urine output from 40 to 10 cc/hour, and pulse went from 80 to 110. 300 cc of parenteral fluid was given over 30 minutes and his pressure and urine output increased and his pulse returned to normal. Since his hematocrit was 23%, two units of blood were given. Two hours later the same changes occurred with a similar response to transfusion of fluid and blood. Eight hours after his operation his abdomen was obviously distended and his hematocrit remained 25% despite receiving eight units of blood. Four hours and two units of blood later he was returned to the operating room where a large retroperitoneal hematoma was found and a bleeding branch of a mesenteric artery ligated.

Following this operation Mr. Smith could not be extubated and required chronic intubation. Over the next five weeks he had several episodes of sepsis and then went into oliguric renal failure requiring hemodialysis. He finally died six weeks after his operation.

iii) Description of cases. Both surgical cases have suboptimal medical management and an undesirable or adverse outcome. In the first case an X ray is misinterpreted, and as a result, stones were left in the patient's bile duct. In the second case, signs of continued bleeding were correctly interpreted (blood

transfusions were continually given), but re-operation to stop the bleeding was inordinately delayed.

The two cases differed in other ways. First, the degree of adversity in the outcome was markedly different. In the first case, the stones were removed without re-operation, and one would not expect any long-term disability. Indeed, the patient's recovery would not be significantly prolonged. The stone extraction was without problems, and this tended to cancel the impact of the misinterpreted X ray. In the second case, however, the patient died and the death could be, at least partially, attributed to persistent bleeding, delayed re-operation, and the attendant effect of hemorrhage on pulmonary, renal, hepatic, and cardiac function. In the second case, the second procedure to correct the initial problem did not lead to a satisfactory outcome.

The time frame was also different in each case. In the first, the X-ray interpretation had to be made promptly, without opportunity for extensive deliberation, consultation, and the possibility of changing the course of action. Everything took place in the frame of minutes. In the second case, repeated episodes of hypovolemia extended over a number of hours. This offered an opportunity for reconsideration and consultation with colleagues. Although a short delay might be reasonable, a more expedient re-operation seemed feasible and desirable.

A third difference concerns the existence of an alternative. In the first case, percutaneous or endoscopic stone extraction meant that misinterpreting an X ray did not mean the patient faced re-operation. Something could be done short of an operation, often with good results. One surgeon reflected this view when he said, "Years ago this would have been a real tragedy. Today it really isn't. . . because there are ways to deal with a retained stone, so I think the end severity of this is not a big event." Moreover, the stones might have passed spontaneously, obviating even the need for a further procedure. But in the second case re-operation was the only option to stop the bleeding. Angiographic control of hemorrhage would be formidable and an unreasonable alternative. Hence, lack of a suitable alternative puts more pressure on making the decision for re-operation in a timely fashion.

Table 9.10

General Surgery Judgments (N = 17)*

JUDGMENT	CASE 1	CASE 2
Caused by Medical Mgmt.	9	12
Possibly Caused	4	2
Not Caused	3	1
No Answer	1	2
Met Standard of Care	10	2
Possibly Met Standard of Care	3	3
Did Not Meet Standard of Care	4	10
No Answer	0	2
Definite Error	9	10
Possible Error	4	4
No Error	4	1
No Answer	0	2
Definite Negligence	0	5
Possible Negligence	5	6
No Negligence	11	4
No Answer	1	1
Compensation Due	0	8
Possible Compensation	2	2
No Compensation	14	7
No Answer	1	0

* Eighteen surgeons were interviewed. We lacked a detailed transcript of the responses of one of the surgeons because they were not captured on tape. Therefore, we did not include his responses in the table.

iv) Surgeon's Judgments. Table 9.10 shows that most reviewers thought an error had been made in both cases. Four (24%) of the surgeons thought no error had occurred in the first case while only one thought no error had occurred in the second case. The comment

of the only surgeon who found no error in the second case reflects the kind of reasoning that diminishes the perception of error. He said, "With re-operative surgery, that can also have its complications . . . so you would prefer not to re-operate on the patient and therein are the delicate decisions that the surgeon has to make . . . Those are difficult judgment decisions . . ." By concentrating on the potential complications of what initially seems like a preferable course of action, he makes the actual negative outcome of the chosen action seem less adverse. This line of reasoning pays heed to the contingencies, the circumstances, the uncertainty and the delicate balance between alternatives. There is also a heightened awareness of the potential of error, no matter what is done, and the ultimate unavoidability of mistake. Thus, while the majority found evidence of error, the minority view shows how difficult it was for clinicians to recognize it.

Although approximately the same number of surgeons found an error in each case, they differed markedly in their other judgments. Regarding the standard of care, for instance, judgments were exactly the opposite. Ten surgeons in the first case felt the care had met the standard, while ten in the second thought the care was substandard. A surgeon who thought the first case had met the standard, even though an error had been made, said: "This particular complication is within the realm of standard of care, the routine standard of care for this type of case." At least at first glance, calling something a complication and at the same time saying that it met the standard of care seems contradictory. It would seem more likely that claiming a complication fits the standard of care is a way of not being too judgmental or disapproving of a certain class of errors.

Only two surgeons felt that the second case met the standard. One of these doctors said, "I don't think there is any surgeon who can guarantee that every single tie he is going to put on for the rest of his life is going to be secure and not come loose." This view seems based on a wide-ranging standard of care. Any possible complication could fall within the standard of care. Most of the surgeons disagreed with this broad-ranging standard and felt: "The standard of care would have been that he should have been explored

to control postoperative bleeding earlier than he was." Thus, in the second case the opinion that the standard had not been met was much stronger. This echoes the correlation in our record review between severity and coincidence in negligence.

The negligence and compensation reports are also different between the two cases. None of the surgeons thought that negligence had occurred in the first case nor felt compensation was in order. These reports are consistent with each other and, as such, consistent with tort theory.

In the second case, however, a third of the surgeons perceived definite negligence and another third found absolutely no negligence. Surgeons who cited definite negligence said: "You can't get around the fact that there was an inordinate delay in re-operating," and "The negligence is that he hadn't been explored earlier." The opposing view is reflected by statements like: "I think if the physician was sitting there and evaluating the patient and making determinations as to whether he was keeping up with the patient hemodynamically and hoping that he would stop bleeding with the appropriate number of blood transfusions and not require operation, that's not malpractice, O.K.?" Thus, despite finding an error and despite agreement on deviation from the standard of care, disagreement on the finding of negligence was relatively strong. In addition to strongly held opposing views, the remaining third of surgeons could not decide on the question of negligence. A surgeon who could not say yes or no to this question said: "Somehow, when you are there, there always seems to be these extenuating sets of circumstances." Thus, judgments of negligence were difficult for these surgeons: disagreements were often deep and many felt unwilling to be committed to such a judgment on the basis of the material presented.

One reason for this difficulty became obvious in the comments of one representative surgeon: "One of these days, I am going to be wrong. So far, I have not, but I will be." Surgeons who identified most easily with the situation had the greatest difficulty deciding about negligence. This natural tendency to identify with colleagues presumably makes judgments of negligence more difficult. All of this tends to highlight the problems that

surgeons, and in fact all physicians, have in judging negligence. They do not equate failure to meet the standard of care with negligence. Rather they seem to believe negligence requires culpability beyond the standard of care threshold. In short, they cannot admit to negligence and so have difficulty labelling care provided by others as negligent.

Compensation judgments almost universally followed the negligence judgment. In case 1, no surgeons found negligence, and no surgeons felt compensation should be awarded. In case 2, all the surgeons who found negligence thought compensation was due, but those who found no negligence denied a need for compensation. Individuals who were equivocal on negligence judgment came down on both sides of the compensation question.

This reiterates a consistent theme. Most physicians believe they are competent. Even so, they realize they can make mistakes. The label of negligence, however, appears to make physicians feel as if they were incompetent. Therefore, they are willing to recognize and admit to mistakes but have difficulty naming and acknowledging such mistakes as negligence. Moreover, physicians are unreceptive to the efforts of others to identify negligence, especially those outside the medical profession. This may explain, at least partially, their attitude towards tort law.

In summary, the second case with the worse outcome had good agreement on judgments of causation, standard of care, and error. Major disagreements emerged on findings of negligence, however, and consequently on the need for compensation. The case producing minimal disability had much better agreement on negligence and compensation findings, but somewhat less agreement on the causation, standard of care, and error findings.

b. Internal medicine

i). Case 1. A 48-year-old white male with a history of hypertension controlled on Dyazide is referred for evaluation of atypical chest pain. He smokes, and has a family history of coronary artery disease. He describes chest pain which is fleeting, lasting at most 3-4 minutes, and which is sharp. He denies any shortness of breath, and is not sure it is associated with exertion. His electrocardiogram shows only normal sinus

rhythm (NSR) and a left bundle branch block (LBBB). He is given nitroglycerin sublingual tabs for use if he has chest pain. An exercise tolerance test is scheduled, which will take place in three weeks.

One week later, and two weeks before he is to have the ETT, he comes to the emergency room with chest pain. He says the pain lasted about 45-60 minutes, and that the nitroglycerine did not seem to help. Again his physical exam is unrevealing, and the EKG shows the NSR and LBBB. He is sent home. He returns 12 hours later with chest pain that is more severe and that has been present for eight hours. The initial CPK-MB is high, and he is admitted. Non-invasive examinations and subsequent CPK's are consistent with a transmural myocardial infarction.

ii). Case 2. The same patient as above presents for evaluation, but this time does not have the episodes of chest pain prompting the E.R. visits, but instead has an ETT which shows poor exercise tolerance and ST segment depressions across the precordium, with a drop in blood pressure during exercise. A catheterization is scheduled.

During the catheterization, a high grade proximal stenosis of the left anterior descending artery (LAD) is found. While attempting to study it, and after repeated efforts to pass the catheter, the LAD is dissected. The patient immediately develops severe myocardial ischemia. An attempt to arrange a cardiac surgery intervention is made, but the patient suffers a ventricular fibrillation arrest. CPR is unsuccessful, and the patient dies.

iii). Description of cases. The cases for internists resemble those presented to surgeons. In both, an adverse outcome and a suboptimal care process occur. In the first case, a myocardial infarction was sustained that might, but not necessarily, have caused long-term disability. The chances of disability would be greater here than for the surgical patient with removal of retained common duct stones. The second case involved the patient's death, identical to the outcome in the second surgical case. Of note is the marked difference in adversity between the outcomes: a myocardial infarction with only a potential for disability versus death.

Analogous to the surgical cases, the time frame for decision making in both cases was much different. In the first case, a different decision could have been made at a number of points. Hours were available for more careful deliberation and considering alternatives. In the second case however, the time frame was much shorter. Here, the person manipulating the catheter had to make a more instantaneous decision as to whether he should continue attempting to cannulate the coronary artery. The opportunity for careful, sustained deliberation was far more limited. The match between time frame and outcome is therefore different in the medical than the surgical cases. The medical case has a longer time frame with a less adverse outcome; the catheterization case has a very short timeframe and is associated with the death.

Alternatives existed for both medical cases. In the first case, the alternative of admission to the hospital was an alternative along with other alternatives after the patient's first physician encounter. In the cardiac catheterization case, a high-grade stenosis was already documented, and the alternative of not persisting to pursue the detailed distal arterial anatomy existed. Catheterization could have been terminated without much loss of information.

Thus, while the medical cases were similar to the surgical ones, some important differences exist which could produce differences in judgments.

Table 9.11
Internal Medicine Judgments (N = 17)

JUDGMENT	CASE 1	CASE 2
Caused by Medical Mgmt.	8	5
Possibly Caused	4	7
Not Caused	4	3
No Answer	1	2
Met Standard of Care	2	8
Possibly Met Standard of Care	4	5
Did Not Meet Standard of Care	9	3
No Answer	2	1
Definite Error	12	2
Possible Error	4	8
No Error	0	6
No Answer	1	1
Definite Negligence	6	0
Possible Negligence	3	8
No Negligence	7	8
No Answer	1	1
Compensation Due	2	3
Possible Compensation	3	4
No Compensation	9	8
No Answer	3	2

iv). Internists' judgments. The most interesting finding here is the lack of strong correlation between the judgments on standard of care and error and the outcome. Case 1, with the least adverse outcome, produced a much larger proportion of internists finding deviation from the standard of care and a definite error.[32] In case 2, in which the patient died, only three internists felt the standard of care had not been met and two cited a definite

[32]Only one of the internists was a cardiologist.

error. Thus the internists seem to be, at least in part, separating their judgments of the care process from that of the outcome.

Another striking finding is that none of the internists perceived definite negligence in the second case, in which the patient died. Internists reacted to this episode by saying, "I think what happened was one of the known complications that could occur," "It's an expectable outcome . . . it's not an unknown occurrence or complication," and "That's an example of bad result rather than negligence or malpractice."

Almost half of the internists were unwilling to make a definite commitment on the negligence judgment. This reluctance was often attributed to inexperience. Note the following statement: "I don't know how often and how hard and how vigorously you poke at the left anterior descending artery . . . there's a level of discretion which is better than valor, and that's an experience level I don't have." And another physician said, "I think only someone trained in invasive cardiology, cardiac caths, who looked at the chart could tell you that."

Internists who felt strongly no negligence occurred said things like: "Assuming that we have a very competent person doing this, and there's an understanding that certainly you can dissect during one of these things, there's nothing wrong with it." Thus, in the second case, internists either had difficulty being sure about negligence or else felt quite confident that no negligence had occurred.

In the first case, in which more than half of the internists thought the physician had deviated from the standard of care and had definitely committed an error, they still differed as to whether care had been negligent. A physician who found no negligence said, "I think it's bad judgment, not negligence; people make wrong decisions after considering. You know -- after careful consideration of the facts you can make what turns out to be a bad decision; that's clearly not negligence." And another physician who found no negligence said, "I don't think I would call this negligence. In fact, luckily, it didn't lead to the guy's death. And probably will not lead to any permanent disability. And so,

no, I would not call it negligence. It's just inappropriate, not up to snuff."

Other physicians felt strongly in the opposite direction. One physician who cited definite negligence said, "I would say it represents negligence, as far as I am concerned, on the part of an emergency room physician who was properly trained, or a primary care physician who was properly trained." And another who judged negligence said, "If the pain was as described, if the pain as it stands [sic], yes, there was negligence."

Thus in case 1, despite relatively good agreement on findings of error and deviations from the standard of care, the physicians markedly disagreed on the presence of negligence. This resembles judgments of surgeons in the case of failing to re-explore a patient for postoperative hemorrhage. Again, the physicians seem to be willing to judge the standard of care but hesitant to find negligence.

In addition to disagreement on the negligence question, the first case elicited fairly marked disagreement on the question of causation. Some internists felt medical management did not cause the outcome. One physician said, "The outcome was caused by the disease process. I don't think medical management would have changed it." A physician who did feel medical management caused the outcome said, "Being sent home from the emergency room is just outrageous to me."

Even in the second case, for which internists agreed on issues of the standard of care and error, the physicians disagreed considerably on the question of causation. A physician who felt medical management had not caused the problem said, "Dissection is not an unknown risk factor . . . it is one of the complications of angioplasty . . . the treatment was appropriate." But another physician who felt the opposite said, "This is medical management. The left entry of the descending artery was dissected. That causes severe myocardial ischemia . . . as a complication of the procedure, the patient dies." Another physician who felt medical management caused the outcome said, "The dissection of the coronary artery, that's certainly caused by the catheter, and the demise of the patient. There's no question this was caused by the

instrumentation that was done." Thus when a complication is a known risk of a procedure, physicians appear to be hesitant to label such complications as due to medical management.

On the compensation judgment, most internists felt compensation was not due to either patient. In cases where compensation was suggested, the compensation judgment followed the negligence finding; physicians who felt there had been negligence were willing to consider compensation. There were some discrepancies, however. In the second case, three internists felt compensation was due even though they were not sure about negligence. One said, "I believe in a no-fault system. Because we know that there are a certain number of adverse events, a no-fault rate that took into consideration the factors of the patient, I think would be better." In general however, physicians appeared to be quite opposed to compensation for medical injury.

In the first case, two internists did not advise compensation despite a finding of negligence. One said, "He clearly took a big infarct, and I'm not sure anyone can say that would not have taken place anyway. If this guy returns perfectly normal to work and has no damages and even if you might have prevented the infarct but didn't, then . . . there's nothing done."

Thus, the response to these cases suggests that internists differentiated, to some extent, between the judgment on the care process and the outcome. The worse outcome did not make them think the care process had been deficient. Just as with the surgical cases, the internists expressed much stronger disagreements on the finding of negligence than on the finding of a deviation from the standard of care or a definite error. The causation question, however, provoked the most controversy amongst internists. A finding of causation was not as clear-cut for these physicians as it was for the surgeons. Again, the physicians were confused about negligence and reluctant to compensate for iatrogenic injury.

c. Obstetrics

i). Case 1. A multiparous 29-year-old white female with an uneventful pregnancy was at 41.5 weeks. A biophysical profile showed 8/10 with severe oligohydramnios. The cervix was long and closed but the head was engaged. She was admitted for induction of labor. A pitocin drip was administered. Ten hours later, the cervix was 2 cm, 50% and the station was -1. Membranes were ruptured; thick meconium was noted. Slow progress was made over the next 15 hours until full dilatation was reached. An internal fetal monitor showed occasional variable decelerations but good reactivity. Two attempts were made to place an internal uterine monitor; both were unsuccessful.

During the second stage of labor, a fetal tachycardia developed along with severe variable decelerations; two attempts at scalp pH were unsuccessful. After three hours in the second stage of labor, the infant's head began to crown. After delivery of the head, nose and mouth were suctioned with a DeLee suction. The infant was handed off to the anesthesiologist and intubation revealed meconium below the vocal cords.

The infant was taken to the intensive care unit, where a severe pneumonia developed. The child's Apgar scores were two and four. Mechanical ventilation over a period of one day was required. The child suffered some neurological deficits, which the neurologist attributed to decreased oxygenation during delivery.

ii). Case 2. The same scenario except that the cervix never dilated. When the mother began to tire, a decision was made to do a cesarean section. The section went smoothly and good hemostasis was noted at time of closing.

The patient was initially stable in the recovery room. However, three hours after the operation, the patient suffered a slow but steady drop in blood pressure. The hematocrit pre-operatively had been 39 but now, 3 1/2 hours after operation, the hematocrit had dropped to 21. The patient was transfused with packed red blood cells, but the hematocrit failed to stabilize. The blood pressure dropped to 80/60 and a decision was made to return the patient to the operating room.

In the operating room re-exploration of the wound revealed profuse oozing from several sites, as well as an arterial bleeder surrounded by a large hematoma. This bleeder was clamped but now the patient had abnormal coagulation values with a PT of 22 and platelets now dropping to 50,000 range. The obstetricians closed the wound, but maintenance of hemostasis was difficult in the face of developing disseminated intravascular coagulation. Over the period of the next 16 hours, the patient was transfused 16 units of blood as well as numerous units of fresh frozen plasma and platelets. The patient's coagulation profile never stabilized and with blood pressure again dropping, exchange transfusion was attempted. This failed to ameliorate the situation and 22 hours after the initial operation, the patient died.

iii). Description of cases. Again, both cases are characterized by suboptimal care and an adverse outcome. In the first, the baby has severe neurological impairment, and in the second, the mother succumbs. The degree of adversity in these cases is quite severe: permanent neurological disability and death. In degree of adversity, the obstetrical cases differ from the first surgical case with no long-term disability and from the first medical case with only a potential for disability.

The time frame for decision is more nearly alike for the two obstetrical cases than it was for the surgical or medical cases: a few hours in the first case and perhaps an hour or two in the second. One of the obstetricians, while considering the importance of timing for management of the second patient, said, "Now if the time between this and re-operating is half an hour or forty-five minutes, then I don't know how much would have occurred differently. If the time span is two to three hours, then I think there's a problem." This obstetrician indicates how important delay in the second case was to him in making a judgment.

Neither of these cases had a good alternative. In the first case, most obstetricians felt that a cesarean section should have been carried out more promptly. Even though monitoring might have been better, the only course that could have avoided the adverse outcome was a more immediate cesarean section. Some obstetricians felt that more thorough hematologic evaluation would have helped in

the second case and that a vascular surgeon might also have been of help. Nevertheless, the re-operation was necessary and should have been more timely.

Both the obstetrical cases, therefore, differ from the surgical and medical cases by having a severe adverse outcome and by presenting much less variation between cases in the time frame for decision or the existence of alternatives.

Table 9.12
Obstetrics Judgments (N = 12)

JUDGMENT	CASE 1	CASE 2
Caused by Medical Mgmt.	5	3
Possibly Caused	6	6
Not Caused	0	2
No Answer	1	1
Met Standard of Care	1	6
Possibly Met Standard of Care	3	3
Did Not Meet Standard of Care	7	2
No Answer	1	1
Definite Error	7	4
Possible Error	3	1
No Error	1	5
No Answer	1	2
Definite Negligence	6	3
Possible Negligence	3	1
No Negligence	2	7
No Answer	1	1
Compensation Due	7	3
Possible Compensation	3	0
No Compensation	1	7
No Answer	1	2

iv) Obstetricians' Judgments. Almost all obstetricians felt that medical management at least contributed to the adverse outcome in both instances. One of the two obstetricians who felt that medical management did not contribute to the outcome commented: "It

seems not [that medical management contributed to the patient's outcome]. . . the patient postoperatively was managed correctly. I think there can be surgical bleeders that are missed or ties that slip or whatever, or even vessels that were tacked and then start to bleed in half an hour, you know, after the surgery. Tragic outcome." Thus the lack of a completely avoidable mistake meant for this obstetrician that medical care did not contribute to the adverse outcome. Such a stringent view of contribution was not shared by the majority of obstetricians. But this reflects how for some individual physicians, unless there is a major, or even perhaps willful blunder, the medical care process is exonerated.

Obstetricians evidenced a greater consistency between their judgments regarding the standard of care, error and negligence. In the first case, only one obstetrician felt the standard of care had been met and there had been no error. In the second case, approximately half of the obstetricians felt the standard of care had been met and that no error had been committed; only four obstetricians felt either possible negligence or definite negligence was present in the second case. In the first case, consistent with the other judgments, a larger proportion felt negligence had occurred.

Despite the consistency between these judgments, strong opinions were held on both sides of the negligence question. In the first case, one obstetrician said, "Because we know that this is a most serious indication of fetal demise or endangerment. So I would think that, since this was ignored, the presence of the oligohydramnios, that this is a severe deviation from established practice. The man did not know. The pregnancy should have been terminated when the oligohydramnios became apparent." (This physician felt there had been definite negligence.) Another obstetrician also felt strongly negligence had occurred, and said, "Yeah, I would say there's negligence. I would say there are significant ways here to avoid what happened. And to me, when you can avoid a problem, you're negligent, yeah."

An opposite view was expressed by two other obstetricians. One said, "Perhaps it's bad judgment, but I don't think it was neglect. On the contrary, this doctor, if he stayed in the

hospital for such a long time, I think he was trying to prevent a C-section. He was trying not to give a C-section. I certainly think that if you were to look at this case, you will say, Well, the guy did every conceivable thing." And another obstetrician ruled out negligence saying, "For the first time people are realizing it is not always the hypoxia during the delivery that causes cerebral palsy. There are probably other events in utero or early in the labor process which causes it. I don't think it was a well managed case. I don't think negligence has any bearing at all."

In the second case opinions were also divided. A physician finding negligence said, "There was obviously some problem of hemostasis right from the beginning. The family should [receive compensation for] the bad outcome as a result of negligence." Another obstetrician, believing no negligence had occurred, said; "That's the error in judgment that I would probably say. Again, I cannot call that negligence. In this day and age you never know. Again, I would like to know the circumstances."

In both cases, the judgment on compensation followed the one on negligence. Generally those physicians who saw negligence also felt that compensation should be awarded. One physician, who differed, recommended compensation even though he thought there had been no negligence, said, "I would say, well, if this case was settled in favor of the patient I will say quite frankly, I think it's justified, to a certain extent. Management could have been dealt with in a very different way." Thus, for this obstetrician the existence of an alternative, which presumably could have produced a more favorable outcome, justifies awarding compensation even though he did not feel the actual care given was defective.

Overall, obstetricians were more critical of the care process that had a much longer time interval and an alternative, cesarean section, with a much greater likelihood of a more favorable outcome. In the second case, the time interval was much shorter and most obstetricians believed that the adverse outcome would have ensued even had re-exploration been carried out more promptly. One might speculate that the severe disability in both cases contributed to the consistency among obstetricians' judgments, but

the second case, with the patient's death, had only a minority of obstetricians finding a definite deviation from standard of care, a definite error, and the possibility of negligence. Thus the obstetricians apparently were judging the care process independently, at least in part, of the adverse outcome.

2. Tort System as a Psychological Distraction. One third of the interview was devoted to questions on why the physician had been sued (if applicable) and the effect of the suit on the physician's practice. If the physician had not been sued, we asked for speculation regarding their reactions to a suit.

Physicians report the impact of the tort system as primarily a psychological distraction rather than an influence on their practice of medicine. They reveal great emotional distress over suits. They tend also to fold their reactions to the tort system into their sense of a general malaise hanging over medicine. The tort system serves as a target responsible for this malaise.

Doctors who have been sued tend to speak of their experience primarily in affective terms. This typical response was from a physician who was sued after a patient under his care died. "I've spent a lot of time myself worrying about it, thinking about it and chewing it over. I've probably spent much more, many more hours doing that than I did in the actual official paperwork. I felt, you know, very upset about the situation in very personal terms. I felt as though I'd done something bad, when all I had done was try my best." At one extreme were doctors who reported that being sued "was a devastating experience. I felt anguish and mental discomfort." An upstate physician expressed the problem as follows: "The malpractice suit strikes at the whole core of your competence, at the core of your effectiveness, of your honesty. It's a very personal thing to physicians." On the other hand, some physicians reported "It really wasn't so bad." Physicians whose cases had gone to trial or were reported in the media generally reported more severe reactions.

This range of reported psychological reactions to individual suits was not matched by a wide range of specific modifications in medical practice. Almost all physicians interviewed reported no

change in their use of specific tests, procedures, referrals to specialists, or their enrollment in continuing medical education. Nor did a change occur in their attitudes and relations towards patients, or the time taken to explain risks to patients. When sued physicians were queried whether they took more time to explain risks to patients now that they had been sued, most replied as did this upstate obstetrician: "I would say no -- because I have always taken the time to explain things." Many reported a short-term feeling of caution about approaching new situations and patients. Two or three physicians reported significant modifications as a result of being sued: increased use of cesarean section or, in one case, obtaining a particular test on all patients undergoing cholecystectomy.

Although the actual experience of being sued appeared to have minimal effect on a physician's practice, most doctors reported behavioral changes in response to the malpractice environment. The language they employ to describe the tort system was very similar to that used to describe their suits: anger and frustration. For example, a physician whose case went to trial commented that the trial was a "very insulting experience to go through. The lawyer's whole aim is to try to show me as an incompetent fool...it's extremely frustrating thing to hear these statements made and not be able to refute them." Another doctor reported that the lawyer's attitude was, "It's all business...nothing personal, it's all business. Well it <u>is</u> personal, and to physicians it is <u>not</u> business." Others expressed frustration that in court, "you cannot answer the question the way you want. The answer must be just 'yes' or 'no'."

Many doctors step back from the personal and put the tort system into an impersonal framework. They seek refuge in arguments that physicians are sued for reasons other than negligence. Many physicians report, "What patients sue for these days is not malpractice in most of the cases...they're suing for mal-result." Or, "Patients sue because they try to get easy money, even better than the lottery. The lottery, you have to spend one dollar. But this, you don't have to spend money at all." Or, patients sue

because "as soon as something's wrong, the gold mine. The treasure chest of the future is there. And they want to sue."

The way the tort system is administered also provoked negative reactions. Most sued physicians would agree with the comment of one upstate general surgeon that the court system "appears to be inordinately slow and inefficient." A New York City obstetrician reported, "The most unbelievable delays I've ever seen are in the trial system. The most wasted time and money I see is in the trial system."

Many physicians interviewed perceive that being sued is a fact of life. As one obstetrician noted, "Within the last two years, I cannot find a chart, a folder with an obstetrician that is clear, I mean, without any lawsuit pending." "The only thing you are not going to get sued for is not to practice."

This overall threat of suit has provoked doctors to report that they practice defensively. That is, they order more tests than they used to, or they order procedures that they feel are not strictly necessary. When queried, all stated that they instituted changes in response to the general malpractice environment rather than in response to a particular suit, although most were unable to give specific examples of how they had altered their practice. In one exception, an upstate physician reported that his hospital seriously considered instituting a protocol requiring pregnancy tests on all surgical patients over the age of twelve because they nearly operated on a patient who was only a few weeks pregnant. While physicians often report increased testing because of the malpractice environment, they also mention, "There are many more tests that are now considered standard."

Physicians also report an upsurge of documentation efforts. "We're spending more time in thinking what to write rather than thinking what to do." For example, a physician recounted his conversation with a patient who had phlebitis: "'Doctor, did you examine the leg?' I said, 'Yes.' He replied, 'Doctor, if you did examine the leg, how come you didn't write it?' I don't say the practice has changed, I'm saying the writing has changed because five years ago, I was definitely still checking the leg, but I

didn't write it down. But now, I have to write down negative findings."

The language doctors use to describe the tort system and the malpractice environment is very similar to the language they use to describe the general milieu in which they work and practice. When asked about the "most difficult thing about practicing medicine today," physicians rarely report concerns with malpractice. Foremost in their minds are government and insurance regulations, the "bureaucracy" ("people who are telling you how soon your patients should be out of the hospital, and having to call insurance companies to verify that you really need to do a particular procedure" or "Nowadays you have to justify, you know, things that you do to some bureaucrat who may have been delegated to look over charts"); the PRO point system ("we are constantly evaluated by we don't even know whom"); fiscal constraints due to limits on Medicare reimbursement; burgeoning paperwork; and changing patient attitudes towards doctors. For example, one physician reported, "the media has sort of dissolved whatever confidence the public has had in the medical profession to a great extent. Many, many patients look at you as an adversary." Or, "Patients have unrealistic expectations fostered by miracle cures they see on TV shows." Many doctors report feeling bitter about the environment. "Everybody is trying to curtail us, in every way."

Many physicians perceive that their profession is being unfairly singled out not only by the tort system but by the government, the insurance industry and the general public. Whatever concerns they have about the tort system seem to reflect their dissatisfaction with the constraints under which they must practice as much as dissatisfaction with the tort system. For example, it is unclear how their concerns about defensive medicine and the increased need for documentation relate to the tort system. While physicians report almost no practice changes in response to actually being sued, they do report practicing what they characterize as <u>defensive medicine</u> in response to the general malpractice environment. Of course, there are competing explanations as to why they perceive testing as having increased.

As some physicians noted, the range of tests available today is much more extensive than in the past. Advances in the art and science of medicine have increased physician options for treating patients. These factors can increase the use of tests and procedures. Therefore, it is not clear how much of the increased use of tests and procedures is really in response to the perceived threat of litigation.

Documentation can also increase in response to factors other than the tort system. Quality assurance actions by hospitals and PRO citations must be addressed and can stimulate the physician to improve documentation of his actions so that he can better respond to quality assurance and PRO complaints.

3. Hospital Quality Assurance Activities are Preferred Prevention Mechanism. One third of the interview was devoted to questions regarding physician perceptions of various injury prevention programs. We also solicited physicians' views on the best way to maintain quality.

In general, physicians were highly critical of the standard mechanisms for quality assurance. Doctors believe the tort system, state regulations and PRO activities have little or no role in preventing medical accidents although hospital quality assurance activities may have a role if structured properly. What was notable, however, was that the comments about each injury prevention system were so similar that they are nearly indistinguishable when presented out of the context of the interview.

Doctors rarely link the tort system to quality assurance activities. The typical response to the question "Can the tort system play a role in preventing medical accidents?" was an unqualified "no." Probing for the reasons behind for this answer, we elicited the following justifications. First, the tort system's response to the action causing the suit is severely delayed. Almost all sued doctors report a minimum of 3 to 4 years from the initiation of a suit to settlement, with some suits spanning as much as 7 years. Second, doctors perceive patients as suing for circumstances beyond the physician's control. This may imply a

belief that their actions had little bearing on the circumstances that led to the suit. When asked why they were sued, a physician's typical response was that the patient needed money or was unhappy over a poor or unexpected outcome. One physician relates the story of caring for a girl with a crushed finger whose father was a malpractice attorney. After the surgeon gave the parents the consent form to read, the father quickly signed the document and handed it back to the physician. "Aren't you going to read it?" queried the mother. "What's the difference? If I'm going to sue him, none of this is going to hold me back," responded the father.

Finally, physicians often liken the actions of the tort system to a lottery. "There's a lot of variability, I think, in this whole system which isn't standardized, so it's a problem." Physicians perceive lawyers as taking any case, regardless of the presence of negligence, simply to try to win an award.

Three factors appear to separate the tort system from efforts to maintain standards of care according to our sample of physicians: (1) the delay between the deviation from the standard of care and the sanction; (2) doctors' perception that patients' motivation for suing is not deviation from the standard of care; and (3) variable enforcement of the tort system (i.e., some deviations are punished, others are not).

In these physicians' views, PROs and state regulations are not much better at promoting quality. Throughout the interview process doctors consistently confused state regulatory actions with PRO actions, indicating that perhaps they do not appreciate the distinction. Most physicians view the PRO's activities as ineffective quality control mechanisms for several reasons. First, the PRO's goal is viewed as one of saving money for the government rather than promoting quality care. As one obstetrician phrased it, "The PRO has a financial incentive to find something wrong" because reimbursement can be denied on the basis of the finding. Or, in the words of an internal medicine physician, "I don't think they're interested in quality. They really seem to be interested in sanctions. They're really out to try to see who they can nail."

Second, many doctors complained about the qualifications of the PRO reviewers. Either the reviewers were inadequate because

they were not physicians ("They need to have another specialist in the field look at the problem, not a nurse") or if they were physicians, they were practicing outside their specialty. Individuals doing the reviews "are not always in the specialty that they are reviewing so they may not actually interpret the data the same way that someone might interpret it if they were actually in the specialty."

Third, physicians criticized the retrospective nature of the reviews as introducing too much lag time between the hospitalization and the review. "They react instead of act. By the time the PRO picks it up, it has already gone to [hospital] quality assurance and the state is aware of it." Finally, the reviews were often viewed as focusing on petty details: "They write letters to you about small details like an elevated white count at discharge. These letters must be responded to. You see, once they write the words on the paper, it's very difficult to erase."

Thus the physicians perceive the PRO as providing poor quality assurance mechanisms because: (1) they see the goal of the PRO as one of saving the government money, not promoting quality; (2) they believe the PRO reviewers are poorly qualified to make judgments about quality; (3) the PRO review is retrospective rather than concurrent; and (4) the PRO review focuses on issues that many physicians find relatively unimportant.

Physicians had a great deal to say about state surveillance and monitoring activities although the interviewers clearly perceived that most physicians had a poor understanding of what the state does in terms of monitoring. This gap in understanding led to a number of complaints about the state, which were really complaints about the PRO. Unlike the almost unanimously negative comments about the PRO, however, a number of physicians grudgingly admitted that the state can play a role in preventing medical accidents. "The state has removed the license of some people who are unqualified to practice medicine, so they must be doing a good job." "Filling out forms for each C-section is a pain, but it helps develop a base of information." The grudging acknowledgement of a positive state role is tempered by a number of comments along

the lines of, "You have to do something outlandish before you get disciplined."

Complaints about state actions centered on the coercive nature of state authority or on paperwork. "The state should be in a corrective, assisting position, not coercive. They come in with a club instead of a recommendation." "Every little thing that goes on has to be reported to the state. State regulations that I see, many of them are pure, oppressive nonsense."

Thus the perceived effectiveness of the state seems to lie in its authority to remove licenses. State incident reporting systems and routine surveillance systems are regarded as ineffective and intrusive.

Physicians were most positive about hospital quality assurance activities. "It has changed the way one treats patients. It makes everyone aware of problems." "Hospital quality assurance points out problems that do arise which, even though a satisfactory outcome was achieved, the management really was not the way it should have been." The most successful programs were viewed as ones in which the Department Chief was a strong individual. For example, one obstetrician noted: "When the Chief of the Department calls you in to discuss the results of your chart audit, I'm sure not -- not one of us-- wants to be called by the chairman more than maybe once every six months. So that alone, it has to do with your own ego, will make you conform to the hospital protocol. So I think that is one of the best things that could have happened."

Other programmatic features that were perceived as successful included development of standards and guidelines; a strong educational component; concurrent review, and a data base that would permit monitoring. "The best way to promote quality is to have standards in hospitals and to make doctors accountable. This requires a good regional data base which starts at the hospital level."

Certain aspects of hospital programs activities were perceived as burdensome but effective. For example, a patient complaint system generated many invalid complaints but nonetheless was perceived as changing physician behavior at one hospital.

Approval of hospital quality assurance efforts was far from unanimous. Some physicians reported, "I feel very jaundiced about that. Most of these quality assurance programs, I think, produce a great deal of paper and very little else." "The more it becomes a paper trail, the less effective it becomes." Too much paperwork was the same complaint leveled against state and PRO actions. Others cited the impression that hospital quality assurance can only prevent recurring problems. Finally, some physicians objected to "Big Brotherism" where "You have people who may review your performance in a, from a -- who don't have the expertise to make intelligent comments."

In the view of the physicians interviewed, the ideal system for promoting quality care incorporated the following factors: concurrent review, guidelines, procedures for reviewing indications and appropriateness, guidelines for reviewing the competence of the physician, recognition of complicating or unusual factors, and follow-up. Most important was peer review by a physician in the same specialty.

D. Summary of Interviews

The litany of complaints we elicited about the tort system, the PRO, the state regulations and hospital activities is not new. Our context, however, is somewhat different from a mere catalog of concerns. We used the interviews to shed some light on the question of whether the tort system provides deterrence through nonfinancial incentives. Although the research design cannot provide definitive empirical evidence on the question, it does suggest several possible conclusions.

Traditional deterrence theory suggests the effectiveness of deterrent incentives is related to the severity, swiftness, and perceived certainty of punishment. From the evidence of the interviews, the tort system's signal to physicians appears mixed. For example, the <u>severity</u> of the punishment seemed to depend on whether the case went to trial and whether the media publicized the case. The evidence is not clear, however, on whether the severity of the punishment and the actual transgression are usually related: most physicians perceive their suits as arising from circumstances

beyond their control. Many physicians report that they are being unfairly and unjustly punished, a situation which might detract from the deterrent effects of the tort system. The long delays reported here (and confirmed by DOH data[33]) indicate that physicians recount that the so-called punishment is not particularly swift. Finally, as discussed in connection with the mailed survey, the reported certainty of punishment for negligence was only about 60%. All three findings explain why physicians seem to believe that the net of the tort system is cast too broadly and lacks specificity. The diffuse nature of the perceived tort incentives may mean that physicians have a difficult time identifying what actions should be taken to prevent accidents.

In addition, physicians do not indicate that the tort system provides unique incentives to prevent patient injuries. First, the language used to describe the tort system, PRO, state, and hospital is very similar, sometimes indistinguishable. For example, a commonly perceived deficiency of all four incentive systems is the reliance on non-physician personnel to perform reviews. Physicians by and large prefer to be reviewed by a peer (defined as another physician from their own specialty).

Second, although physicians believe they practice medicine defensively, they do not report long-term changes in their practice patterns as the result of a specific suit. Thus it is unclear the extent to which defensive medicine results from the malpractice environment or from other factors such as advances in the science and technology of medicine, changes in societal expectations as to what constitutes an appropriate level of medical care, or changes in PRO, state, and hospital requirements.

Our other important finding concerns physicians' attitudes towards iatrogenic injury and negligence. As noted, aspects of medical training suggest that physicians are poorly equipped to address these concepts. Moreover, physicians may tend to equate findings of single episodes of negligence as tantamount to judgments of incompetence. Thus, although willing to admit that all physicians make mistakes and that physician error is possible,

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[33] Monitoring Health Care Quality, New York State Department of Health (March 1988)

physicians are often unwilling to label substandard care as negligent and are also often opposed to compensation for iatrogenic injury. These professional attitudes lead to significant disagreement about issues of causation and negligence when physicians are asked to judge case studies. In addition, physicians clearly prefer their judges to be other physicians rather than health care administrators at the state or federal level or judges, lawyers and juries in common law courts.

Given this set of professional attitudes, physicians are quite likely to downplay the specific deterrent effect of malpractice litigation. They tend to characterize malpractice litigation as an irritating nuisance rather than something that affects the way they practice medicine. Results of the mailed survey indicate, however, that the tort system may have a deterrent effect as evidenced by physicians overestimating the risk of being sued. This means that several methods must be used to attempt to estimate the deterrent effect of malpractice litigation.

REASONS FOR SPECIFIC SURVEY QUESTIONS

The questions in the survey instrument are loosely divided into five categories: (1) the perceived risk of being sued; (2) the perceived informational content of a malpractice suit; (3) changes in practice; (4) the costs of being sued in time and money, and (5) the respondent's demographics.

The perceived risk of being sued may be important in shaping physician behavior since perceptions may influence behavior. The mailed questionnaire assessed the subjective probability of being sued,which was then compared to the objective risk of being sued, based on New York State Office of Professional Medical Conduct data.

In addition to asking physicians for their estimate of the overall probability of being sued, we also ask for the likelihood, or possibility, of being sued in cases where there was no negligence. If physicians feel they are being sued in cases for which there is no negligence or wrongdoing on their part but rather for some other reason, then the tort system's signal to the physician may be suboptimal. In the course of practicing medicine, occasional bad outcomes are an unavoidable fact of medicine. Doctors who are sued for these outcomes may discount the deterrent incentives of the tort system.

Finally, we ask for the subjective certainty of being sued where negligence is present. A number of studies in the criminal justice field indicate that the certainty of punishment is more important than the severity of the punishment as a deterrent force.

Questions regarding the informational content of a malpractice suit approach the signal provided by the tort system from a slightly different perspective. How do doctors view colleagues who have had a malpractice suit? Who have been disciplined by a hospital committee? By the state? Do they look at a sued or disciplined peer and say, "There is an

incompetent doctor"?

Since part of the debate about the tort system centers on the value of tort liability in promoting quality care, we asked physicians about their perceptions regarding various measures to maintain standards of care. How important is the threat of malpractice litigation in promoting quality as compared to peer relations or continuing medical education?

Questions about the time and dollar costs associated with a malpractice suit speak to the issue of the economic costs of malpractice liability. What out-of-pocket costs does a physician have to pay for defending a suit? How much time does s/he lose from his/her practice?

The final set of questions physician demographics to be compared with responses to the above questions.

SAMPLING FOR MAILED SURVEY

To achieve roughly equal sample sizes in each cell, an over/under sampling strategy was pursued. All non-sued, internal medicine physicians were sampled at approximately one-half of the overall sampling rate of 1 in 9, excepting IMs on Long Island who were sampled at almost 60% of the overall sampling rate. Long Island high-risk specialties, general surgeons and New York City general surgeons were oversampled at almost twice the overall sampling rates. All other specialties and locations were sampled at approximately 80% of the overall rate.

The sampling proceeded by cell. A random start in each cell was selected and the sample drawn systematically according to the cell-specific sampling rate.

The following tables detail the characteristics of the sample.

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
AGE88	2099	48.05	13.58	28	92

SEX	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
Male	1828	86.9	1828	86.9
Female	275	13.1	2103	100.0

Major Professional Activity

MPA	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
Administration	39	1.9	39	1.9
Full-Time Staff	175	8.3	214	10.2
Resident	508	24.2	722	34.3
Medical Teaching	19	0.9	741	35.2
Not Classified	50	2.4	791	37.6
Office Based	1212	57.6	2003	95.2
Other	5	0.2	2008	95.5
Research	95	4.5	2103	100.0

BDCERT	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
No Boards	1065	50.6	1065	50.6
Board cert	1038	49.4	2103	100.0

TECHNICAL APPENDIX 9.III.2

FMG	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
US or Canadian G	1362	64.8	1362	64.8
Foreign Med Grad	741	35.2	2103	100.0

	Specialty											
	High Risk				Med Risk				Low Risk			
	CLAIM				CLAIM				CLAIM			
	No claim	Claim	Dont Know	ALL	No claim	Claim	Dont Know	ALL	No claim	CLAIM	Dont Know	ALL
	N	N	N	N	N	N	N	N	N	N	N	N
Sampling Zone												
Upstate	66	102	19	187	65	67	20	152	96	70	36	202
NYC	63	53	16	132	76	45	18	139	109	53	42	204
Boros/West	68	85	24	177	95	48	34	177	147	86	85	318
Long Island	47	91	16	154	47	51	11	109	65	64	23	152
ALL	244	331	75	650	283	211	83	577	417	273	186	876

	ALL			
	CLAIM			
	No claim	Claim	Dont Know	ALL
	N	N	N	N
Sampling Zone				
Upstate	227	239	75	541
NYC	248	151	76	475
Boros/West	310	219	143	672
Long Island	159	206	50	415
ALL	944	815	344	2103

COMPARISON OF RESPONDERS AND NON-RESPONDERS FOR THE MAILED SURVEY

TABLE OF AGE FOR RESPONDERS AND NON-RESPONDERS

VARIABLE	N	MEAN	STANDARD DEVIATION	STD ERROR OF MEAN
STATUS=Non-Respondent				
AGE88	1080	47.67	13.63	0.41
STATUS=Respondent				
AGE88	739	50.63	12.73	0.47

STATISTIC	VALUE	PROB
t STATISTIC	4.67	< 0.05

TABLE OF STATUS BY BOARD CERTIFICATION

STATUS BOARD CERTIFICATION

FREQUENCY / PERCENT / ROW PCT / COL PCT	No Boards	Board Certif'd	TOTAL
Non-Respon	597	487	1084
	32.75	26.71	59.46
	55.07	44.93	
	69.82	50.31	
Respondent	258	481	739
	14.15	26.39	40.54
	34.91	65.09	
	30.18	49.69	
TOTAL	855	968	1823
	46.90	53.10	100.00

STATISTICS FOR TABLE OF STATUS BY BDCERT

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	71.726	0.000

TABLE OF STATUS BY ZONE

STATUS ZONE

FREQUENCY / PERCENT / ROW PCT / COL PCT	Upstate	NYC	Boros/ Westchs	Long Island	TOTAL
Non-Respondent	233	233	400	218	1084
	12.78	12.78	21.94	11.96	59.46
	21.49	21.49	36.90	20.11	
	49.36	59.14	68.49	58.45	
Respondent	239	161	184	155	739
	13.11	8.83	10.09	8.50	40.54
	32.34	21.79	24.90	20.97	
	50.64	40.86	31.51	41.55	
TOTAL	472	394	584	373	1823
	25.89	21.61	32.04	20.46	100.00

STATISTICS FOR TABLE OF STATUS BY ZONE

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	39.903	0.000

TABLE OF STATUS BY CLAIM

STATUS CLAIM

FREQUENCY / PERCENT / ROW PCT / COL PCT	No claim	Claim	Dont Know	TOTAL
Non-Respondent	523	395	166	1084
	28.69	21.67	9.11	59.46
	48.25	36.44	15.31	
	62.86	50.97	76.85	
Respondent	309	380	50	739
	16.95	20.84	2.74	40.54
	41.81	51.42	6.77	
	37.14	49.03	23.15	
TOTAL	832	775	216	1823
	45.64	42.51	11.85	100.00

STATISTICS FOR TABLE OF STATUS BY CLAIM

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	54.283	0.000

TABLE OF STATUS BY AGE88

STATUS AGE88

FREQUENCY / PERCENT / ROW PCT / COL PCT	lt 29	30-39	40-49	50-59	60-69	70+	TOTAL
Non-Respondent	26	358	271	193	142	90	1080
	1.43	19.68	14.90	10.61	7.81	4.95	59.37
	2.41	33.15	25.09	17.87	13.15	8.33	
	96.30	66.54	60.90	51.06	50.71	59.60	
Respondent	1	180	174	185	138	61	739
	0.05	9.90	9.57	10.17	7.59	3.35	40.63
	0.14	24.36	23.55	25.03	18.67	8.25	
	3.70	33.46	39.10	48.94	49.29	40.40	
TOTAL	27	538	445	378	280	151	1819
	1.48	29.58	24.46	20.78	15.39	8.30	100.00

FREQUENCY MISSING = 4

STATISTICS FOR TABLE OF STATUS BY AGE88

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	5	46.695	0.000

TABLE OF STATUS BY SPEC

STATUS SPEC(Specialty Grouping)

FREQUENCY PERCENT ROW PCT COL PCT	High Risk	Med Risk	Low Risk	TOTAL
Non-Respondent	320 17.55 29.52 55.75	293 16.07 27.03 59.67	471 25.84 43.45 62.14	1084 59.46
Respondent	254 13.93 34.37 44.25	198 10.86 26.79 40.33	287 15.74 38.84 37.86	739 40.54
TOTAL	574 31.49	491 26.93	758 41.58	1823 100.00

STATISTICS FOR TABLE OF STATUS BY SPEC

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	5.542	0.063

TABLE OF STATUS BY MPA

STATUS MPA(Major Professional Activity)

FREQUENCY / PERCENT / ROW PCT / COL PCT	Administration	Full-Time Staff	Resident	Medical Teaching	Not Classifd	Office Based	Other	Research	TOTAL
Non-Respondent	16	100	275	9	34	601	1	48	1084
	0.88	5.49	15.09	0.49	1.87	32.97	0.05	2.63	59.46
	1.48	9.23	25.37	0.83	3.14	55.44	0.09	4.43	
	45.71	64.94	75.55	52.94	80.95	53.28	25.00	60.76	
Respondent	19	54	89	8	8	527	3	31	739
	1.04	2.96	4.88	0.44	0.44	28.91	0.16	1.70	40.54
	2.57	7.31	12.04	1.08	1.08	71.31	0.41	4.19	
	54.29	35.06	24.45	47.06	19.05	46.72	75.00	39.24	
TOTAL	35	154	364	17	42	1128	4	79	1823
	1.92	8.45	19.97	0.93	2.30	61.88	0.22	4.33	100.00

STATISTICS FOR TABLE OF STATUS BY MPA

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	7	71.996	0.000

TABLE OF STATUS BY MPA1

STATUS MPA (Major Professional Activity)

FREQUENCY / PERCENT / ROW PCT / COL PCT	Office Based	Other	TOTAL
Non	601	483	1084
	32.97	26.49	59.46
	55.44	44.56	
	53.28	69.50	
Respondent	527	212	739
	28.91	11.63	40.54
	71.31	28.69	
	46.72	30.50	
TOTAL	1128	695	1823
	61.88	38.12	100.00

STATISTICS FOR TABLE OF STATUS BY MPA1

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	46.915	0.000

TABLE OF STATUS BY SEX

STATUS SEX

FREQUENCY PERCENT ROW PCT COL PCT	Male	Female	TOTAL
Non-Respondent	928 50.91 85.61 57.71	156 8.56 14.39 72.56	1084 59.46
Respondent	680 37.30 92.02 42.29	59 3.24 7.98 27.44	739 40.54
TOTAL	1608 88.21	215 11.79	1823 100.00

STATISTICS FOR TABLE OF STATUS BY SEX

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	17.342	0.000

TABLE OF STATUS BY FMG

STATUS FMG (Foreign Medical Graduate)

FREQUENCY PERCENT ROW PCT COL PCT	US or Canada	Foreign Med Grad	TOTAL
Non-Respondent	660 36.20 60.89 55.05	424 23.26 39.11 67.95	1084 59.46
Respondent	539 29.57 72.94 44.95	200 10.97 27.06 32.05	739 40.54
TOTAL	1199 65.77	624 34.23	1823 100.00

STATISTICS FOR TABLE OF STATUS BY FMG

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	28.346	0.000

Methods of Analysis of Survey Responses

This appendix provides several technical details on our methods of analyzing of survey responses. Our initial analysis contrasted the response to the question about malpractice suit history with the claims indicator used for stratification (claim present, absent, don't know). The purpose of the comparison was to examine the possibility that substantial under-reporting of claims existed in New York State prior to the efforts of this Study to improve reporting.

The risk of suit question was analyzed first by converting the 10 category response variables into a continuous variable using the midpoint of the category.[1] The weighted average perceived risk of suit was then calculated for three specialty groups (high risk, medium risk, low risk), four zones (Upstate, Long Island, N.Y. County, and the Boroughs), and two sued groups (sued versus not). The corrected standard errors were computed using the statistical package from RTI.[2] Wald tests based on corrected standard errors tested the equality of the means for comparisons involving more than two groups.[3] Comparisons where there were only two groups were made using a t-test. Occasionally, we tested for pairwise differences that appeared striking, after confirming overall significant differences using the Wald test. To compensate for the classic problem of multiple comparisons, we used a least-significant-difference method for these latter comparisons. Using

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[1] The categories were as follows: In your opinion, for every 100 physicians in your SPECIALTY in New York State, how many do you think will be sued at least once this year? 1) less than 1; 2) 1 - 5; 3) 6 - 10; 4) 11-20; 5) 21-30; 6) 31-40; 7) 41-50; 8) 51-60; 9) 61-75; 10) 76-100.

[2] BU Shah et al, SUDAAN: Procedures for Descriptive Statistics, Research Triangle Institute (1989).

[3] A. Wald, Ann. Math. Statis 16: 117-186 (1945)

this method, we found significant differences between means at a significance level of $\alpha/{}_kC_c$ where ${}_kC_c$ is all possible pairwise comparisons.[4] This is also known as the protected least-significant-difference method when, as with our analyses, the overall differences between means has already been confirmed.[5]

For the perceived chance of being sued in the presence of either a non-negligent or negligent adverse event, the 10 group categorical variables were again converted to continuous variables using the midpoint. Comparisons were made by specialty, zone and suit history.

The actual risk of being sued was based on 1986 claims data from the Department of Health and on 1986 American Medical Association data from the publication Physician Characteristics and Distribution in the U.S., Chicago: AMA, 1987. The year 1986 was chosen for the analysis as being both far enough in the past to have reasonably complete reporting of claims and yet near enough to the date of the survey (1989) to bear some relation to the current risk of being sued. Open claims were used for the numerator since the mailed survey question asked about the chance of being sued in a 12-month period. Physician claims for the year 1986 were matched to physicians in our data base by license number.[6] Frequencies by specialty group and location were calculated. Approximately 19% of the claims could not be linked

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[4] See D.G. Kleinbaum, L.L. Kupper, and K.E. Muller, Applied Regression Analysis and Other Multivariate Methods, Boston: PWS-Kent Publishing Co., 362-365 (1988)

[5] See G.W. Snedecor and W.G. Cochran, Statistical Methods, Ames Iowa: Iowa State University Press, 233-237 (1980)

[6] AMA Masterfile data contained name, specialty and location. Data from the Department of Health contained license number, name and address. The two data sets were linked to give us a matched data set with name, license number and demographic characteristics. We were able to link 86% of the AMA Masterfile members to the DOH license number data.

to the demographic data base by license number: these were distributed proportionally over the other categories. Denominator information was derived directly from the AMA publication on physician characteristics. Only active patient care physicians were included in the denominator. The denominator was by specialty and location.

Question 6, the "influence of various factors in maintaining standards of care" was scaled 0 to 5, with 0 equalling "not an influence" and 5 equalling "important influence." The question was analyzed by calculating the average perceived influence of each factor by specialty, zone and suit history. Comparisons were made, by factor, between the two analysis groups (e.g. sued/not sued). The problem of comparing one factor to another presented a special challenge. Since the data represent multiple responses by a single individual and as such may be correlated, we calculated differences between pairs of factors for each individual and then computed the mean of the differences. We used the Wald test to test for the equality of these means. If the Wald test rejected the hypothesis of equal means, then a least-significant-difference method was used for selected comparisons.

Question 11, the "information content of disciplinary actions" was also scaled 0 to 5. It was analyzed in a fashion similar to question 6.

Questions 2 through 4 deal with practice changes undertaken in the last ten years. First, comparisons were made by specialty, zone and litigation history. The suit question was redefined to include only those physicians who reported a suit in the last ten years because the practice change question also referred to a ten year time span. Secondly, to accommodate multiple influences on practice changes, multiple logistic regressions were run with the practice change as the dependent variable. The regressions were run using the Research Triangle Institute procedure LOGIST to adjust for the sampling design. The outcome variables were the four practice changes presented in Table 9.7: ordering more tests

and procedures; explaining risks; reducing the number of patients or procedures, and spending more time on paperwork, including maintenance of the patient record. The independent variables included age, sex, the perceived risk of being sued from the questionnaire, a categorical variable for suit history (1 = sued, 0 = not sued), two categorical variables for specialty (high risk and medium risk), one categorical variable for zone (1 = Greater New York City, 0 = Upstate), and one categorical variable for practice setting (1 = Non-HMO Private Practice, 0 = All Others).

The final piece of data from the questionnaire that we analyzed was the cost of malpractice. We prepared simple weighted frequency distributions of the questions concerning time and dollar expenses.

COMPARISONS BY SPECIALTY, ZONE AND SUIT HISTORY FOR FACTORS AFFECTING QUALITY OF CARE INFLUENCE OF VARIOUS DISCIPLINARY ACTIONS CHANGES IN PRACTICE

COMPARISON OF SUED AND NON-SUED PHYSICIAN WITH RESPECT TO PERCEPTION OF FACTORS TO MAINTAIN STANDARDS OF CARE

	FACTOR		Total	Sued	Not Sued
*	Peer Relations	N	651	482	169
		MEAN	3.269	3.152	3.463
		SEMEAN	0.072	0.086	0.124
	M/M Conferences Tumor Boards	N	651	482	169
		MEAN	2.333	2.376	2.262
		SEMEAN	0.074	0.086	0.140
*	Medical Journals	N	653	484	169
		MEAN	3.611	3.514	3.770
		SEMEAN	0.054	0.062	0.097
	Continuing Medical Education	N	655	486	169
		MEAN	4.727	3.694	3.782
		SEMEAN	0.052	0.064	0.091
	Implications of Malprac. Suit	N	653	484	169
		MEAN	2.547	2.675	2.337
		SEMEAN	0.078	0.088	0.147
	PRO	N	653	484	169
		MEAN	1.778	1.822	1.705
		SEMEAN	0.073	0.086	0.131
	Clinical Care Guidelines	N	653	484	169
		MEAN	2.519	2.612	2.366
		SEMEAN	0.077	0.087	0.145

* $P < 0.05$ for t-test of means

TECHNICAL APPENDIX 9.III.5

COMPARISON BY GEOGRAPHIC LOCATION WITH RESPECT TO
PERCEPTION OF FACTORS TO MAINTAIN STANDARDS OF CARE

	ACTION		NYC/O/U/W	BOROS/R/S	NASSAU/SUFF	UPSTATE
	Peer Relations	N	186	140	132	187
		MEAN	3.424	3.080	3.307	3.224
		SEMEAN	0.124	0.154	0.171	0.129
	M/M Conferences Tumor Bds	N	186	139	132	188
		MEAN	2.289	2.404	2.267	2.375
		SEMEAN	0.127	0.161	0.210	0.127
	Medical Journals	N	186	141	132	188
		MEAN	3.705	3.584	3.521	3.619
		SEMEAN	0.092	0.122	0.146	0.086
	Continuing Medical Education	N	186	141	134	188
		MEAN	3.580	3.863	3.701	3.805
		SEMEAN	0.098	0.104	0.145	0.083
	Implications of Mal. Prac. Suit	N	186	140	133	188
		MEAN	2.176	2.737	2.776	2.632
		SEMEAN	0.140	0.159	0.207	0.136
*	PRO	N	186	140	133	188
		MEAN	1.389	2.020	2.000	1.839
		SEMEAN	0.109	0.159	0.208	0.125
	Clinical Care Guidelines	N	186	140	133	188
		MEAN	2.262	2.565	2.565	2.484
		SEMEAN	0.124	0.205	0.205	0.133

* $p < 0.05$ for contrast between NYC and Boros, using least-significant-difference test

COMPARISON OF BY SPECIALTY WITH RESPECT TO
PERCEPTION OF FACTORS TO MAINTAIN STANDARDS OF CARE

	ACTION		High Risk	Medium Risk	Low Risk
*	Peer Relations	N	218	169	263
		MEAN	2.956	3.280	3.394
		SEMEAN	0.118	0.126	0.107
+	M/M Conferences Tumor Boards	N	219	169	262
		MEAN	2.356	3.180	2.046
		SEMEAN	0.108	0.112	0.116
	Medical Journals	N	220	170	262
		MEAN	3.557	3.665	3.626
		SEMEAN	0.077	0.091	0.084
	Continuing Medical Education	N	220	170	264
		MEAN	3.769	3.788	3.699
		SEMEAN	0.073	0.092	0.081
	Implications of Malprac Suit	N	219	169	264
		MEAN	2.755	2.512	2.467
		SEMEAN	0.106	0.140	0.122
	PRO	N	220	169	263
		MEAN	1.794	1.841	1.755
		SEMEAN	0.101	0.124	0.114
	Clinical Care Guidelines	N	220	169	263
		MEAN	2.723	2.543	2.415
		SEMEAN	0.101	0.129	0.122

* $p < 0.05$ for contrast between high and low risk, least-significant-difference test

\+ $p < 0.05$ for contrasts between high vs medium risk and medium vs low risk, least-significant difference test

COMPARISON OF SUED AND NON-SUED PHYSICIAN WITH RESPECT TO PERCEPTION OF INFORMATION CONTENT OF VARIOUS DISCIPLINARY ACTIONS

	ACTION		Total	Sued	Not Sued
*	Medical Malpractice Suit	N	630	448	182
		MEAN	1.286	1.035	1.627
		SEMEAN	0.060	0.061	0.110
	Hospital Letter of Reprimand	N	719	514	205
		MEAN	2.673	2.593	2.785
		SEMEAN	0.061	0.069	0.110
	Supervision of Hospital Practice	N	725	519	206
		MEAN	3.692	3.669	3.724
		SEMEAN	0.053	0.060	0.096
	Hospital Privilege Restriction	N	721	515	206
		MEAN	4.001	3.969	4.046
		SEMEAN	0.051	0.059	0.092
	Hospital Privilege Withdrawal	N	725	519	206
		MEAN	4.449	4.462	4.430
		SEMEAN	0.048	0.049	0.090
	State Censure and Reprimand	N	715	511	204
		MEAN	3.172	3.148	3.205
		SEMEAN	0.069	0.080	0.120
	State Probation	N	714	510	204
		MEAN	3.671	3.657	3.691
		SEMEAN	0.059	0.070	0.103
	License Suspension	N	715	510	205
		MEAN	4.291	4.313	4.260
		SEMEAN	0.056	0.058	0.104
	License Revocation	N	714	509	205
		MEAN	4.474	4.485	4.458
		SEMEAN	0.053	0.055	0.100

* $P < 0.01$ for contrast between sued and not sued on importance of malpractice suit

COMPARISON BY GEOGRAPHIC LOCATION WITH RESPECT TO
PERCEPTION OF INFORMATION CONTENT OF VARIOUS DISCIPLINARY ACTIONS

	ACTION		NYC/O/U/W	BOROS/R/S	NASSAU/SUFF	UPSTATE
	Medical Malpractice Suit	N	185	132	122	180
		MEAN	1.203	1.321	1.181	1.435
		SEMEAN	0.108	0.126	0.126	0.116
	Hospital Letter of Reprimand	N	203	151	141	213
		MEAN	2.708	2.796	2.532	2.547
		SEMEAN	0.122	0.122	0.122	0.107
	Supervision of Hospital Practice	N	206	154	141	213
		MEAN	3.757	3.653	3.576	3.719
		SEMEAN	0.098	0.118	0.128	0.087
	Hospital Privilege Restriction	N	207	152	140	211
		MEAN	4.104	3.976	3.878	3.996
		SEMEAN	0.099	0.112	0.118	0.085
	Hospital Privilege Withdrawal	N	205	154	140	215
		MEAN	4.503	4.402	4.282	4.522
		SEMEAN	0.093	0.101	0.119	0.067
*	State Censure and Reprimand	N	204	151	204	209
		MEAN	3.303	3.331	3.205	2.805
		SEMEAN	0.132	0.139	0.120	0.124
#	State Probation	N	704	150	204	209
		MEAN	3.843	3.701	3.691	3.384
		SEMEAN	0.113	0.116	0.103	0.110
	License Suspension	N	204	151	205	210
		MEAN	4.345	4.300	4.458	4.196
		SEMEAN	0.112	0.113	0.100	0.090
	License Revocation	N	203	150	205	211
		MEAN	4.500	4.424	4.458	4.421
		SEMEAN	0.110	0.112	0.100	0.080

* $p < 0.05$ for contrast between NYC vs Upstate and Boros vs. Upstate
# $p < 0.05$ for contrast between NYC and Upstate

TECHNICAL APPENDIX 9.III.5

COMPARISON OF BY SPECIALTY WITH RESPECT TO
PERCEPTION OF INFORMATION CONTENT OF VARIOUS DISCIPLINARY ACTIONS

	ACTION		High Risk	Medium Risk	Low Risk
	Medical Malpractice Suit	N	213	155	255
		MEAN	1.118	1.109	1.40
		SEMEAN	0.083	0.100	0.110
	Hospital Letter of Reprimand	N	237	182	293
		MEAN	2.470	2.492	2.818
		SEMEAN	0.096	0.113	0.091
*	Supervision of Hospital Practice	N	238	183	297
		MEAN	3.488	3.601	3.816
		SEMEAN	0.090	0.101	0.076
	Hospital Privilege Restriction	N	238	181	295
		MEAN	3.890	3.885	4.096
		SEMEAN	0.091	0.104	0.072
	Hospital Privilege Withdrawal	N	237	184	297
		MEAN	4.385	4.320	4.531
		SEMEAN	0.082	0.098	0.066
+	State Censure and Reprimand	N	234	181	293
		MEAN	2.956	2.880	3.352
		SEMEAN	0.106	0.127	0.101
	State Probation	N	234	179	294
		MEAN	3.474	3.446	3.818
		SEMEAN	0.093	0.120	0.087
	License Suspension	N	234	180	294
		MEAN	4.245	4.118	4.372
		SEMEAN	0.082	0.113	0.081
	License Revocation	N	233	180	294
		MEAN	4.417	4.304	4.561
		SEMEAN	0.081	0.113	0.076

* $P < 0.05$ for contrast between high risk and low risk
\+ $P < 0.05$ for contrast between medium risk and low risk

EFFECT OF VARIOUS FACTORS ON PRACTICE CHANGES

SPECM	Variable	Label	N	Weighted Proportion	Std Error
High Risk	Q2	Order more tests and procedures	219	0.901	0.02
	Q3	Take more time to explain risks	220	0.827	0.02
	Q4	Reduced patients or procedures	219	0.470	0.03
	Q5	Spend more time on paperwork	219	0.912	0.01
Medium Risk	Q2	Order more tests and procedures	168	0.826	0.03
	Q3	Take more time to explain risks	169	0.828	0.03
	Q4	Reduced patients or procedures	169	0.416	0.04
	Q5	Spend more time on paperwork	170	0.948	0.02
Low Risk	Q2	Order more tests and procedures	264	0.766	0.03
	Q3	Take more time to explain risks	263	0.736	0.03
	Q4	Reduced patients or procedures	263	0.352	0.03
	Q5	Spend more time on paperwork	264	0.881	0.02

ZONEM	Variable	Label	N	Weighted Proportion	Std Error
NYC/O/U/W	Q2	Order more tests and procedures	184	0.7689	0.04
	Q3	Take more time to explain risks	185	0.7730	0.04
	Q4	Reduced patients or procedures	185	0.3829	0.04
	Q5	Spend more time on paperwork	186	0.9204	0.03
Boros/R/S	Q2	Order more tests and procedures	141	0.8131	0.04
	Q3	Take more time to explain risks	141	0.7994	0.04
	Q4	Reduced patients or procedures	141	0.3315	0.04
	Q5	Spend more time on paperwork	141	0.8932	0.03
Nassau/Suf	Q2	Order more tests and procedures	133	0.8265	0.05
	Q3	Take more time to explain risks	132	0.7926	0.04
	Q4	Reduced patients or procedures	131	0.4271	0.05
	Q5	Spend more time on paperwork	133	0.8932	0.03
Upstate	Q2	Order more tests and procedures	188	0.8575	0.03
	Q3	Take more time to explain risks	189	0.7360	0.04
	Q4	Reduced patients or procedures	189	0.4719	0.04
	Q5	Spend more time on paperwork	188	0.8789	0.03

SUIT HISTORY	Variable	Label	N	Weighted Proportion	Std. Error
Not Sued in Last 10 Years	Q2	Order more tests and procedures	201	0.7779	0.04
	Q3	Take more time to explain risks	200	0.6859	0.04
	Q4	Reduced patients or procedures	199	0.3713	0.04
	Q5	Spend more time on paperwork	200	0.8704	0.03
Sued in Last 10 Years	Q2	Order more tests and procedures	452	0.8365	0.02
	Q3	Take more time to explain risks	454	0.8424	0.02
	Q4	Reduced patients or procedures	454	0.4117	0.03
	Q5	Spend more time on paperwork	455	0.9209	0.01

SAMPLING INTERVIEW SURVEY

Sampling was accomplished by stratifying by specialty and zone and by then systematically selecting cases within each cell using a probability proportional to size. In this case, the size measure was "exposure." Exposure was measured by calculating a weighted frequency that a particular physician was associated with cases in our sample. Take as an example a physician associated with five sample cases: two elderly, one orthopedic and two general surgery cases. The relative sample weights associated with the five cases were 2, 2, 0.33, 1 and 1. Therefore the adjusted exposure figure for the five cases was 6.33.

Although exposure does not control directly for claims experience, we believed that we would garner an adequate number and balance of sued and not-sued physicians simply as a matter of random selection. When the claims data became available, however, we discovered that over 70% of the interview sample had had a claim filed against them.

The first step in the sampling process grouped the 51 sample hospitals into four zones. The Other Upstate zone was modified to eliminate the difficult to reach sites (greater than one hour travel from an airport).

Physicians were identified from the admitting, operating and other physician fields on the SPARCS data base and then grouped into zones based on their sample hospital affiliation. In the New York City zone, it was possible for a single physician to appear in both zones 2 and 3 because of multiple affiliations. Almost 9% of the 5,810 physicians in the sample were associated with cases in more than one sample hospital.

Specialty groupings within zones were based on AMA self-reported primary specialty data. Subsequent steps were performed separately on each of the 12 groupings: 3 specialties in four zones.

A weighted exposure for each physician in each group was then calculated by summing the relative sampling weights (e.g., 2, 1 or 0.33) for the type of cases the physician was associated with in our sample. Beginning with the first physician in the group, each doctor was assigned a cumulative measure of exposure that equalled his/her exposure plus the sum of all the previous exposures on the list. This cumulative measure was called the selection total.

The sample goal was to choose ten physicians per specialty in zones 1 - 3 and four physicians per specialty in zone 4. Within each specialty and zone, physicians were sampled systematically with a probability proportional to size. In this instance, the physician's probability of selection was directly proportional to exposure at a sample hospital. A random start within a group was selected and the sampling interval was equal to:

$$\text{Sampling Interval} = \frac{\Sigma \text{ Exposures in Group}}{\text{Desired Number of MDs per Group}}$$

The first physician sampled was one whose selection total was greater than or equal to the random start. After the first physician was selected, the sampling interval was added to the random start to yield a selection number. The next physician to be sampled was one whose selection total was greater than or equal to the selection number. The process continued with the sampling interval being added to the selection total.

The following tables present the characteristics of the sample. The claims categorization was made after the claims data became available.

Table One
Distribution of Interview Sample

	Specialty											
	Gen Surg			Int Med			OB			ALL		
	Claims			Claims			Claims			Claims		
	No Claim	Claim	ALL	No Claim	Claim	ALL	No Claim	Claim	ALL	No Claim	Claim	ALL
	N	N	N	N	N	N	N	N	N	N	N	N
ZONE												
Upstate Urban	3	7	10	9	1	10	3	7	10	15	15	30
NYC	1	9	10	4	6	10	2	8	10	7	23	30
Long Island	.	10	10	4	6	10	2	8	10	6	24	30
Other Upstate	.	4	4	1	3	4	1	3	4	2	10	12
ALL	4	30	34	18	16	34	8	26	34	30	72	102

Table Two
Age as of December 31, 1988

AGE	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
35-39	12	11.8	12	11.8
40-44	15	14.7	27	26.5
45-49	17	16.7	44	43.1
50-54	12	11.8	56	54.9
55-59	23	22.5	79	77.5
60-64	10	9.8	89	87.3
65-69	10	9.8	99	97.1
70+	3	2.9	102	100.0

Table Three
Sex Distribution of Doctors Sampled for Interview Survey

SEX	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
Male	101	99.0	101	99.0
Female	1	1.0	102	100.0

Table Four
Foreign Medical Graduate Distribution
of Doctors Sampled for the Interview Survey

FMG	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
US or Canadian Grad	70	68.6	70	68.6
Foreign Med Grad	32	31.4	102	100.0

COMPARISON OF RESPONDENTS TO NON-RESPONDENTS
FOR THE INTERVIEW SURVEY

TABLE OF STATUS BY BDCERT

STATUS	BDCERT		
FREQUENCY PERCENT ROW PCT COL PCT	No Board Certif'n	Board Certif'd	TOTAL
Interviewed	11 11.83 23.40 47.83	36 38.71 76.60 51.43	47 50.54
Refused	12 12.90 26.09 52.17	34 36.56 73.91 48.57	46 49.46
TOTAL	23 24.73	70 75.27	93 100.00

STATISTICS FOR TABLE OF STATUS BY BDCERT

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	0.090	0.764

TABLE OF STATUS BY ZONE

STATUS ZONE

FREQUENCY PERCENT ROW PCT COL PCT	Upstate Urban	NYC	Long Island	Other Upstate	TOTAL
Interviewed	15 16.13 31.91 55.56	16 17.20 34.04 57.14	12 12.90 25.53 46.15	4 4.30 8.51 33.33	47 50.54
Refused	12 12.90 26.09 44.44	12 12.90 26.09 42.86	14 15.05 30.43 53.85	8 8.60 17.39 66.67	46 49.46
TOTAL	27 29.03	28 30.11	26 27.96	12 12.90	93 100.00

STATISTICS FOR TABLE OF STATUS BY ZONE

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	3	2.381	0.497

TABLE OF STATUS BY CLAIM

STATUS	CLAIM		
FREQUENCY PERCENT ROW PCT COL PCT	No Claim	Claim	TOTAL
Interviewed	12 12.90 25.53 44.44	35 37.63 74.47 53.03	47 50.54
Refused	15 16.13 32.61 55.56	31 33.33 67.39 46.97	46 49.46
TOTAL	27 29.03	66 70.97	93 100.00

STATISTICS FOR TABLE OF STATUS BY SUED

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	0.565	0.452

TABLE OF STATUS BY AGE

STATUS AGE(Age as of December 31, 1988)

FREQUENCY / PERCENT / ROW PCT / COL PCT	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70+	TOTAL
Interviewed	5 5.38 10.64 45.45	9 9.68 19.15 64.29	4 4.30 8.51 26.67	8 8.60 17.02 80.00	10 10.75 21.28 43.48	5 5.38 10.64 62.50	5 5.38 10.64 55.56	1 1.08 2.13 33.33	47 50.54
Refused	6 6.45 13.04 54.55	5 5.38 10.87 35.71	11 11.83 23.91 73.33	2 2.15 4.35 20.00	13 13.98 28.26 56.52	3 3.23 6.52 37.50	4 4.30 8.70 44.44	2 2.15 4.35 66.67	46 49.46
TOTAL	11 11.83	14 15.05	15 16.13	10 10.75	23 24.73	8 8.60	9 9.68	3 3.23	93 100.00

STATISTICS FOR TABLE OF STATUS BY AGE

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	7	9.427	0.223

MEAN AGE	N	MEAN	STD DEV	STD ERROR
INTERVIEWED	47	52.17	10.21	1.49
REFUSED	46	52.11	10.22	1.51

STATISTIC	VALUE	PROB	
T	0.028	>0.05	

TABLE OF STATUS BY SPECIALTY

STATUS SPECIALTY

FREQUENCY / PERCENT / ROW PCT / COL PCT	Gen Surg	Int Med	OB	TOTAL
Interviewed	18	17	12	47
	19.35	18.28	12.90	50.54
	38.30	36.17	25.53	
	54.55	54.84	41.38	
Refused	15	14	17	46
	16.13	15.05	18.28	49.46
	32.61	30.43	36.96	
	45.45	45.16	58.62	
TOTAL	33	31	29	93
	35.48	33.33	31.18	100.00

STATISTICS FOR TABLE OF STATUS BY SPEC

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	2	1.415	0.493

TABLE OF STATUS BY MPA1

STATUS MPA1

FREQUENCY / PERCENT / ROW PCT / COL PCT	Office Based	Other	TOTAL
Interviewed	38	9	47
	40.86	9.68	50.54
	80.85	19.15	
	51.35	47.37	
Refused	36	10	46
	38.71	10.75	49.46
	78.26	21.74	
	48.65	52.63	
TOTAL	74	19	93
	79.57	20.43	100.00

STATISTICS FOR TABLE OF STATUS BY MPA1

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	0.096	0.757

TABLE OF STATUS BY FMG

STATUS	FMG		
FREQUENCY PERCENT ROW PCT COL PCT	US or Canadian Grad	Foreign Med Grad	TOTAL
Interviewed	37 39.78 78.72 55.22	10 10.75 21.28 38.46	47 50.54
Refused	30 32.26 65.22 44.78	16 17.20 34.78 61.54	46 49.46
TOTAL	67 72.04	26 27.96	93 100.00

STATISTICS FOR TABLE OF STATUS BY FMG

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	1	2.105	0.147

Chapter 10

DETERRENCE: AN EMPIRICAL STUDY

SUMMARY

This Chapter describes our inquiry into whether there is any relationship between the malpractice claims rate and either cost per discharge or adverse event or negligent adverse event rates. The pure theory of deterrence suggests that where the threat of a claim is greater, there will be fewer negligent adverse events. This may be in part because more is spent to prevent them; such is one reason to expect a positive relationship between costs and claims rates.

For several reasons one may fail to observe a relationship between claims and negligent adverse events. First, negligence may often result from unpreventable momentary lapses in concentration; if so, there would be little response to variation in claims rates. Second, physicians and many hospitals are insured against malpractice claims, and the premium for that insurance is in general not tied to experience; this insurance dulls the incentive from the tort system to prevent injuries. Third, for purely statistical reasons such as too small a sample, one may fail to detect a true relationship between the variation in claims and injury rates.

On the other hand, we saw in the last chapter that physicians who view themselves at greater risk of a claim are more likely to be ordering more tests and procedures or to have changed their scope of practice. Moreover, even if malpractice insurance covers the cost of any award, claims impose uninsurable costs on physicians. There may well be time taken away from the practice of medicine to defend a claim. Furthermore, there may be damage to the physician's reputation, thereby diminishing demand for his or her services, including diminished referrals. Finally, there is anxiety and stress from defending a claim. For all these reasons one might expect to see a relationship between claims rates and injury rates.

There are several possible measures of claims, including

closed claims, open claims, and paid claims, and two methods for converting the claims to claim rates, namely deflating by the number of discharges at the hospital and by the number of physicians at the hospital. We have explored several of these alternatives. To date, our conclusions are not sensitive to the measure of claims that we use. In this chapter we present results using open claims from 1983 per discharge .

We find some evidence of a positive relationship between hospital cost per discharge in 1984 and the claims rate in 1983. In particular, for our sample of hospitals, the logarithm of cost per discharge is related to the logarithm of open claims per discharge, controlling for several other variables. The relationship is statistically significant for our full sample of hospitals (omitting hospitals with implausible reported values or missing values), but exhibits a very large response. The large response is sensitive to a few outlier hospitals; when these are omitted, the response becomes more reasonable, is still positive, but is insignificantly different from zero at conventional levels. A linear as opposed to logarithmic relationship actually exhibits a negative relationship; a test of specification rejects the hypothesis that the linear specification is correct, but does not reject the hypothesis that the logarithmic specification is correct. In sum, the estimated positive relationship between the claims rate and cost is not robust.

A positive relationship between the claims rate and cost could be consistent with more resources being devoted to preventing injury or with wasteful defensive medicine or both. The acid test would be whether adverse events or negligent adverse events are lower where claims rates are higher.

We find no evidence that higher claim rates reduce adverse events; indeed most of our estimates actually show a positive relationship between claims rates and injury rates, but the precision of our estimates is not good. In particular, a 95% confidence interval around our estimates includes values that

that would demonstrate substantial deterrence. To illustrate the imprecision, we selected the coefficient of open claims per discharge in a regression explaining negligent adverse events and we reduced the point estimate of the coefficient by approximately one standard error. In that case, we would estimate that moving from the average claims rate in the lowest quartile of hospitals to the average in the highest quartile would reduce the negligent adverse events (conditional upon an adverse event) by 24%. Thus, we cannot rule out the possibility that our sample was too small to detect an important deterrent effect.

Moreover, our attempts to estimate the size of any deterrent effect could be masked by a bias; although deterrence presumes that causality flows from claims threat to injuries, causality may also flow from injuries to claims. That is, hospitals with high injury rates may also have high claim rates. Because we used values on claims from a prior year, causality cannot literally be from injuries to claims in our sample. But if the same factors that produced high injury rates in one year existed in a subsequent year, the bias could be affecting our estimates. We have tested for the possibility of bias and fail to detect any; the test, however, may not be powerful enough to detect the bias. In sum, we found no relationship between claims rates and injury rates, that is, no evidence of a deterrent effect. The data, however, are compatible with a wide range of possible relationships, including a substantial deterrent effect.

Even if there were no deterrent effect over the range of claims that we studied, one could not conclude that abolishing the tort system would have no effect on injury rates. That would, in effect, require extrapolating our findings outside the range of observed data, for even at the hospitals in our sample with the lowest threat of a claim, there was some positive probability of a claim. Our study by its nature could not reveal what experience would be if there were no threat of a claim; such evidence could only be produced by actually observing behavior if

the tort system were replaced by some other system.

I. Introduction

Among the most important issues in the debate about malpractice law is whether the tort process actually deters substandard medical care on the part of providers and thus reduces the incidence of iatrogenic injuries. Unless we have reason to believe that tort law has some such preventive impact within the health care system, its inadequacies as a mode of patient compensation, as depicted in Chapters 7 and 8, would raise serious questions about the desirability of retaining such an expensive insurance system.

The findings from our analysis of litigation rates and patterns are not immediately encouraging. In the aggregate, only a small fraction of the acts of physician negligence that inflict disabling injuries precipitate a tort claim, and no more than half of patient-claimants are paid any damages at all. In addition to the huge gap between the risk of negligent injuries to patients and the chance of successful tort litigation against doctors, there appears to be some mismatch between those cases where negligence actually occurs and those where claims are made, thus blurring even further the signal and the incentives sent by the tort system.

The findings of our physician surveys point in contrasting directions. On the one hand, doctors report that they experience personal consequences from becoming embroiled in tort litigation. Moreover, there does not have to be a successful suit against a doctor in every case of negligent injury in order to maintain meaningful deterrence against careless treatment. As long as physicians know that they face a risk of real sanctions for at least some instances of negligent behavior (and they cannot predict which ones), they will have substantial incentive to adopt safer patterns of care: indeed, the doctors we interviewed sharply overestimated the true risks they face of being sued at

the present time. Furthermore, physicians who felt themselves to be at greater risk were more likely to report that they modified their practices; not only were they more likely to order more tests and procedures, they were also more likely to reduce the number of patients seen or procedures performed.[1]

On the other hand, the physicians also asserted that tort litigation was not, in their minds, a particularly valuable signal nor a strong inducement to avoid substandard care, at least by comparison with the variety of other measures and incentives working towards that goal. But as we observed at the end of Chapter 9, however genuine may be such feelings, one must not place undue weight on such self-reports by a group of doctors, many of whom are skeptical of the value of tort litigation in improving the quality of medical care. The acid test of the efficacy of tort deterrence is whether more tort claims and payments do in fact produce fewer instances of doctor negligence and patient injuries.

The material we have assembled from the earlier parts of this project led us to attempt an empirical test of that hypothesis. As described in Chapter 6, we have an extensive body of data about the incidence and distribution of both adverse events (AEs) and negligent adverse events in different hospitals and specialties across the state. We have also gathered as complete a collection as possible of all malpractice claims and payments within the state, which presents a picture of markedly different claims rates in the hospitals of the state. We have put these two data sets together to investigate whether the larger risk of tort litigation faced by the doctors in certain hospitals in the early 1980s led them to adopt modes of medical intervention that secured an observably lower rate of patient

[1] The apparently contradictory results from Chapter 9 with respect to procedures may both be correct. Physicians who feel themselves at greater risk may order more diagnostic procedures (e.g., endoscopies) and also perform fewer therapeutic procedures (e.g., limit the range of surgical procedures that they undertake).

injuries during 1984, our study year, by comparison with injuries in hospitals facing a less litigious environment.

We should state at the outset the precise nature and limitations of such a mode of inquiry. We were not able to contrast the experiences of one set of doctors and hospitals that were subject to tort liability to a different group that was not. Instead we used measures of the varying intensity of the tort system in the hope of shedding light on what one might expect from markedly changing or even abolishing the system. That research strategy accords with the approach used in studies of the effect of analogous programs of occupational safety regulation and workers compensation liability in reducing the incidence of workplace injuries.[2]

Such an analysis can give direct measures of whether variation in the intensity of tort litigation over a given range does or does not produce appreciable differences in iatrogenic injuries. One cannot automatically extrapolate from those estimates to what would happen if one eliminated the tort system entirely and substituted an alternative liability regime. Thus, for example, suppose we were unable to detect any effect on injury rates from the current variation in tort litigation across the state: one would not immediately infer that no such effect would be discernible if the threat of tort litigation were removed entirely. Alternatively, suppose we were to find some such payoff from the present-day tort system in reducing medical injuries: one could well argue that a similar (perhaps even a larger) effect would be obtainable from an alternative liability regime (e.g., a no-fault, experience-rated compensation plan).[3]

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[2] Viscusi K. The Impact of Occupational Safety and Health Regulation, 1973-1983. **17 RAND Journal of Economics 567**, 1986; Viscusi K, Moore. Compensation Mechanisms for Job Risks: Wages, Workers Compensation, and Product Liability. 1989. Robertson LS and Keeve. Worker Injuries: The Effects of Workers Compensation and OSHA Inspections. **8 Journal of Health Politics, Policy, and Law, 581**, 1983.

[3] Shavell, S, "A Model of the Optimal Use of Liability and Safety Regulation," **RAND Journal of Economics**, 15:2, Summer 1984, 271-280

But even granted these varying policy interpretations that may be placed on our empirical findings, this chapter presents an econometric study - the first in our knowledge - of the deterrent impact of medical malpractice law.

Before turning to our empirical work, however, we set out in more detail the theory that lies behind it. Readers principally concerned with our quantitative results may wish to omit the following two sections or read them after reading the material in later sections.

II. The Theory of Deterrence

At its most fundamental level the idea of deterrence is easily understood; actions that are penalized will usually be undertaken less frequently. At another level, however, the idea of deterrence can be made more precise by recognizing that there is an optimal level of resources for preventing injuries; some adverse events are not worth preventing.[4] The notion of an optimal level of resources for prevention is uninteresting if the incidence of negligent injuries cannot be reduced by preventive efforts. Thus, the theory of deterrence presumes that negligent injuries do respond to preventive efforts.[5]

If the physician or hospital must pay for every negligent adverse event, deterrence theory implies that the physician or hospital will take actions to prevent those incidents that are worth preventing and will simply pay the costs of the remainder.[6] Under these circumstances there will be what economists term an

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[4] Schwartz WB and Komesar N. Doctors, Damages, and Deterrence. **298 New England Journal of Medicine:** 1282 1978.

[5] Lest this be thought a straw man, one might argue that technical errors in operations are the result of unpreventable lapses of concentration. Even if such errors were unpreventable, however, if physicians differ in their likelihood of a lapse, those with a higher likelihood may alter their practice so that the consequence of a lapse is less severe (e.g., give up obstetrics and practice only gynecology), or protocols may be developed that make lapses less likely or their consequences less damaging for the patient.

[6] This assumes that customary practice is to prevent those accidents that are worth preventing and not others. In fact, as discussed in Technical Appendix 10.III.1, this condition in all likelihood does not obtain.

efficient quantity of resources devoted to prevention.[7] If more resources were devoted to prevention, society would overspend on prevention; conversely, if fewer resources were devoted to prevention, society would underspend on prevention. In the remainder of this discussion we will use the standard of economic efficiency as a measure of a desirable outcome.[8]

Although the above discussion was couched in terms of preventing injuries, the physician or hospital may also be able to take actions that ameliorate the consequences of an injury should one occur. The same logic applies to such actions; it is economically efficient to take those actions in which the costs that will be saved exceed the costs of the action. For ease of exposition, we will speak in this chapter of preventing AEs and negligent AEs, and the empirical work will relate to preventing AEs and negligent AEs, but the theory of deterrence suggests that there may also be an effect on the severity of AEs that occur. We have not attempted to measure, however, any effect of deterrence on severity.

In this section we try to work through a simple, stylized example to elaborate the logic of the previous paragraphs and to explain the hypotheses that we test. There are numerous objections to the example precisely because it is so simple, so the next section takes up those objections and gives some answers to them. However, we thought it better for expository purposes to begin by keeping the example simple, even if we paid a price in lack of realism. The example -- and indeed the presumption of deterrence --- assumes that physicians, or other parties such as hospital administrators, can make decisions that affect the

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[7] The logic we are about to describe also applies in theory to a no-fault or strict liability system in which the physician or hospital must pay for all adverse events; indeed, in that setting one does not need the assumption we come to below that customary practice represents cost-effective practice with respect to accident prevention.

[8] Economic efficiency implies that no one can be made better off without making someone worse off. It also implies that resources are directed toward ends that consumers value most highly.

likelihood of injury.

Suppose a medical test uses resources that cost $10. If the results of the test are positive, a treatment can be undertaken immediately that uses resources that cost $5 and will save $100. That is, going untreated will lead to "sickness" that will cost $100; the $100 includes the costs of treatment of the disease at its more advanced stage plus the monetary value of any cost of pain or suffering from being sick. Either treatment now or treatment later will cure the disease. If the results of the test are negative, no action need be taken; the person is not sick and no downstream costs will eventuate.[9]

If 100 people are tested, $1,000 will be spent in testing (100 x $10). Suppose the likelihood of a positive result in each person is 20%. Then one can expect to spend another $100 (20 x $5) on treating the 20 people who test positive, but $2,000 (20 x $100) will be saved because 20 people will not become "sick." As a result, testing everyone minimizes total cost (it saves $900 relative to testing no one); it is economically efficient.

But the conclusion is reversed if the likelihood of a positive result is only 10% instead of 20%. The reader can calculate that in this case it is $50 more expensive to test everyone and treat those who test positive than not to test anyone and incur the $1,000 of costs among the 10 people who will become "sick." Hence, it is economically efficient not to test anyone. (This conclusion becomes stronger as the likelihood of a positive result falls below 10%.)

The economically efficient level of resources in prevention thus depends upon the probability of a positive result; it is efficient to test everyone if the probability is 20% and inefficient to test anyone if the probability is 10% or less.

If no one is tested, 10 people will become "sick," and each will incur treatment costs of $100. The issue then arises of who

[9] Assume that there are no false positive and no false negative test results.

should bear the resulting $1,000 of costs (compensation for costs of illness). This is, however, a separable, though related issue from whether it is wise to test everyone or no one (the efficient level of prevention or deterrence).

One method for bearing the cost of illness is to have the patient who becomes "sick" bear the cost. Such a method has consequences not only for compensation, but also for deterrence.

With respect to deterrence, if the patient is to bear the cost it may well be important that he or she be knowledgeable about the facts and request the test. For example, suppose the physician is misinformed and believes the test will waste the patient's time and money. If, believing this, the physician tells a knowledgeable patient that the test should not be performed, the patient may threaten to seek care from another physician.[10] The physician may, under such circumstances, give in to the patient's wishes, administer the test, and the outcome is efficient.

If the patient does not know the facts, however, there is no implied threat to change physicians, with the result that the physician has less pecuniary incentive to perform the test, even in the case where it is efficient to perform the test (i.e., the case with a 20% likelihood of a positive result).[11] In sum, if the patient bears the cost, well-functioning deterrence may require knowledgeable patients.

With respect to compensation, even if the patient who becomes sick bears the cost, patients could in principle insure against the costs, so that all or part of the $1,000 in costs might be spread out among all 100 patients.[12]

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[10] Technically, the threat to seek care elsewhere is credible if the patient is knowledgeable.

[11] If the physician makes money on the test, for example, if the test costs the physician $1 but insurers will reimburse the physician $5, the physician may still have a pecuniary incentive to perform the test. See the next section.

[12] Such so-called first party insurance is widespread against medical and disability costs, although not against costs of pain and suffering.

An alternative to the patient's bearing the cost of the sickness is for the physician or hospital to bear the cost. From the point of view of deterrence, this has the desirable property of placing liability with the presumptively more knowledgeable party, thereby contributing to an economically efficient outcome. Put another way, it avoids the strained assumption that the patient knows as much as, or more than, the physician.

To continue the example, suppose the physician knows that people over 55 have a 20% likelihood of a positive result, and others have a 10% likelihood. If the physician is liable for the costs of all sickness, the physician will perform the test on those patients over 55 and, in the world of the example, no sickness will result among those patients. But the physician will not perform the test on the patients 55 and under. Because the physician has to bear the cost of the accidents among those 55 and under, the physician can be expected to raise prices to cover those costs (by $10 per patient 55 and under in the example). Placing the liability with the physician means it does not matter whether patients over 55 know that a test will on average save patients money; the physician will recommend the test. This assignment of liability also means that those under 55 have a compulsory insurance policy for which their premium is an additional $10.[13].

III. Deterrence in Practice

In the theoretical example, placing liability with the physician leads to an economically efficient quantity of resources in prevention. The physician will test when that is efficient and will not test when not to do so is efficient. But in practice many factors arise that interfere with the simple conclusion that placing liability with the physician leads to

[13]This discussion assumes that the physician seeks to minimize the cost of treating patients, including the cost of testing and sickness.

efficiency. Four such factors are:

1) the likelihood of a claim's being brought if the physician is negligent;

2) the widespread use of liability or malpractice insurance;

3) the prices at which the physician is reimbursed for his or her services; and

4) the efficiency or optimality of the customary standard of practice.

The first two of these are more relevant to interpreting our empirical results; we therefore discuss those two points in the text and the last two points in Technical Appendix 10.III.1.

A. Rate of Claim Filing

As shown in Chapter 7, only a small fraction of negligent actions results in claims. The effect on deterrence of not bringing all claims can be illustrated with the example of the test that we have been using. Suppose there is a 20% likelihood of a positive result from the test, so that if no tests are performed, there are $2,000 of sickness costs. Suppose further that the physician is liable for such costs. But patients who do not file a claim will not be reimbursed for their costs. If only 10% of negligent actions result in claims, a physician might reason that it would only cost him or her personally $200 (10% of $2,000) not to test anyone. The remaining $1,800 of treatment costs would in actuality be borne by patients, even though the physician is in principle liable. A physician heavily influenced by financial factors or an ignorant physician might choose not to test everyone.[14]

The physician might still choose to test everyone; for example, the physician might decide that testing everyone would be good for patients and good medicine. Suppose, however, that

[14] If all patients who became sick filed claims, there would be a strong incentive for the ignorant physician to become educated.

some patients resisted paying for a test that they mistakenly perceived as not in their interests and that their unhappiness was so great that they threatened to seek care from another physician if the test were administered.[15] If sufficient numbers of patients changed physicians and if few claims for damages are filed, the physician might well lose financially by testing everyone and so choose to test no one. But that would be inefficient; that is, there would be too few resources devoted to prevention.

For our empirical study, however, the important point is that variation in the threat of litigation may affect the rate of adverse events or negligent adverse events. (Henceforth, when we mean both types of adverse events, we shall use the terminology (negligent) adverse events.) In the example, more physicians might choose not to test anyone, with correspondingly more "sickness" as the likelihood of a patient claim falls.

B. Malpractice Insurance

That most physicians are insured against damages resulting from a malpractice claim further modifies the theoretical example. As shown in the previous chapter, insurance generally covers all the monetary damages requested by the claimant and will frequently cover all the out-of-pocket costs of the physician's defense as well.

Nonetheless, insurance will not cover two types of costs. First are costs that arise simply from being sued. There is time taken in depositions, retrieving documents, and trial if the suit proceeds that far; the modal physician we surveyed reported losing three to five days of time away from practice to defend against a claim. Such time might easily represent $5,000 of foregone practice revenues. In addition, there may be anxiety

[15] Remember that if patients are informed, there is no need for the liability to be placed with physicians because patients will demand the test irrespective of who is liable.

over a possible adverse outcome of the suit, and most people find a lawsuit stressful. The physician incurs such costs whether or not the suit is successful. Second, a successful suit -- and perhaps even an unsuccessful suit -- may impose additional costs from loss of reputation and possibly fewer referrals.

These two types of costs that the physician bears need not correspond to the damages suffered by the patient; indeed, they generally will not correspond to the damages. This stands in marked contrast to the situation in the simple example, in which the monetary sanction imposed on the physician, $100 per patient who became sick, exactly equalled the damage caused. Indeed, this equality was necessary to reach the conclusion that placing liability with the physician would lead to an economically efficient outcome. If the costs actually borne (or perceived) by the physician from a claim are more than the damage caused, we would expect to observe defensive medicine; that is, too many resources devoted to prevention when compared with the standard of economic efficiency, and conversely.

The empirical effects of the two types of costs differ in that the first type, those that accrue simply from being sued, means that our measure of tort threat should be the rate of claims, whereas the second type, those that accrue from being successfully sued, implies that our measure should be paid claims. We will use both types of variables. The first type of cost has not been analyzed in the literature as much as the second type, and we therefore present more detail about it in Technical Appendix 10.III.1.

IV. An Empirical Study of Deterrence

In the remainder of this chapter we attempt to determine whether tort law, as it operates in New York State, provides any deterrence that is measurable by econometric methods, as well as whether tort law adds to hospital costs. As explained in the first section of Technical Appendix 10.III.1, the necessary conditions for deterrence exist because: 1) the probability of a claim if negligence exists exceeds the probability of a claim if negligence does not exist (Chapter 7); and 2) there are non-trivial uninsurable costs associated with a claim (Chapter 9). Theory, however, cannot tell us whether any actual deterrent effect is small or large; that is an empirical question.

The ideal empirical study of deterrence, as noted above, would observe areas of New York State that were otherwise similar except that tort law applied in some and not in others, and would compare rates of negligence and adverse events between such areas. Of course, we do not observe any jurisdiction in the state -- or for that matter in the country -- where tort law does not apply and therefore cannot carry out such an ideal study.

The closest we can come to this ideal design is to exploit variation in the threat of a claim across different parts of New York State, and this is the general approach we have taken. Specifically, we have asked whether adverse event rates and negligent adverse event rates in 1984 were lower in hospitals with more claims per discharge or per physician in 1983 and whether costs were higher in such hospitals.

The implications of the theory just described are that we would observe such findings because a greater likelihood of a claim means more preventive measures are worthwhile. In the simple example this is analogous to greater incentives for testing everyone when all claims are brought than when only 10% of possible claims are brought; testing everyone, of course, in the simple example means that no one becomes "sick" (no adverse

events). And although testing everyone minimizes total social cost when the likelihood of a positive result is 20%, doing so could well raise medical costs in the short run because the costs of testing (prevention) are incurred immediately, but the savings from preventing AEs are often deferred (see the discussion in Chapter 8 of continuing medical costs for AEs) and are not composed entirely of medical care costs (see, for example, the discussion in Chapter 8 of time lost from work). Hence, hospital costs could be higher in hospitals facing a higher claims rate because of an appropriate (efficient) response to a higher threat of tort claim; alternatively, they could be higher because too many resources are being devoted to prevention relative to an efficient amount (defensive medicine).

At the outset we should alert the reader to an issue in measuring the deterrence effect that we describe in more detail below. Although our discussion of deterrence has emphasized how a higher threat of a claim may reduce adverse events, it is also the case that substandard medical care may be the source of a positive association between claims and adverse events. For example, a concentration of less competent physicians in an area may generate higher rates of both claims and adverse events in that area. This positive association may mask an actual deterrent effect.

The following sections describe the variables we have analyzed, our statistical methods, and our results.

A. Dependent Variables

1. Adverse Events and Negligent Adverse Events.

We have analyzed variation in both adverse events and negligent adverse events, although the simple model described above may seem to imply that variation in the threat of litigation should affect only negligent adverse events. Indeed, in the world of the simple model, analyzing all (negligent and non-negligent) adverse events together would only add imprecision

or noise to the results of analyzing negligent adverse events. There is, nonetheless, good reason to analyze the effect of variation in claims on non-negligent adverse events.

As discussed above, there are important uninsurable costs of defense that a claim for a non-negligent AE imposes on a hospital or a physician. If a non-negligent AE may lead to a claim, a hospital or physician with fewer such AEs will obviously incur fewer such uninsurable costs. We showed in Chapter 6 that many non-negligent AEs arise from operative procedures. Thus, to avoid the uninsurable costs of a claim, a physician with a choice of treatments may opt for one that does not involve an operation, even if the operation would have been medically appropriate (i.e., it would have on expectation benefited the patient).[16]

The incentive to opt for less aggressive treatment assumes that the failure to realize benefits of the operation will not result in a claim; i.e., that a sin of omission is less likely to result in a claim than a sin of commission. This is likely not to be the case if aggressive treatment will arrest a deteriorating situation, but may well be the case if aggressive treatment will promote quality of life in an otherwise reasonably stable situation. Consider for example, the replacement of a hip or knee joint to relieve the pain of arthritis and improve functioning. If the operation is performed, there is some chance of death or complications that could generate a claim. If the operation is not performed, perhaps because the physician stressed the complications that might arise and recommended that the patient live with the problem, our data will not show an AE (indeed, the prospective patient may well never have entered a hospital and therefore not have entered our data system). More importantly, there might not be a claim because the patient would have decided on his or her own to simply live with the pain. In

[16]This discussion abstracts from the physician's pecuniary incentive to do the procedure, although the alternative treatment may be as financially attractive.

sum, a greater threat of a claim may prompt less aggressive treatment (even if aggressive treatment is warranted), which in turn may be reflected in lower observed AE rates; thus, non-negligent AE rates may respond to variation in claims rates.

Counts of (negligent) adverse events come from the sample of 30,121 records described in Chapters 4 through 6.[17] Because our measure of claim intensity is by hospital, we have used only those AEs that could be associated with a particular hospital in the sample; thus, we began with the 792 AEs in categories 1 to 3 (see Table 6.1), in which the AE occurred during the index hospitalization. The AEs in categories 4 and 5 occurred prior to the index hospitalization; however, for the purposes of this chapter we have conducted a special tabulation of the 319 AEs in category 5. We were able to ascertain that 130 of these 319 AEs occurred in hospitalizations at the sample hospital in 1984, and we have therefore included these 130 AEs in our sample as well. We thus have a sample of 922 (792 + 130) AEs. Our task is to determine whether the likelihood of an (negligent) adverse event in a particular hospital case is affected by the likelihood of a claim.

We present two types of statistical analyses below. In the descriptive cross-tabulations that we present first, the variables of interest are the adverse event rate and negligent adverse event rate as a percentage of discharges and claims rates. We then proceed to a multivariate analysis of the effect of variation in claims rates on AE rates. The methods for this multivariate analysis are based upon a two stage process. This process begins with a logistic regression to predict the likelihood of an AE in the sample of 30,121 cases; these predictions are then aggregated to the hospital level. Our methods are more fully described in Technical Appendix 10.IV.1.

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[17] We use the notation (negligent) adverse events to mean negligent adverse events and total adverse events.

The analysis of negligence is based on a logistic regression of the 922 cases with AEs; thus, it is the likelihood of a negligent AE conditional upon an AE occurring, the analogue of the percent of AEs that are negligent that was presented in Chapter 6.

Conditioning the likelihood of negligence upon the likelihood of an adverse event is a form of casemix control. If there was an injury during the hospital stay that neither prolonged the stay nor left any disability, it is not an adverse event. Healthier patients are more likely to recover from any injury, whether negligently caused or not; hence, conditioning on the group that suffered an adverse injury will condition on the group that is more likely to have suffered a negligently caused adverse injury that had future consequences.

2. Costs

Our measure of costs is based on all cases treated at each of the 51 hospitals in 1984, not just the costs for those cases in our sample of 30,121 cases. We begin with charges for all cases as reported on the SPARCS file; these charges are converted to costs using a hospital-specific cost/charge ratio.[18] Using all cases has two advantages relative to using the 30,121 cases in the sample of adverse events. The obvious advantage is that the cost measures are more precise because they are based on all cases. Additionally, using all cases eliminates the need to weight the data.

Table 10.1 provides additional information on the dependent variables.

[18] Unpublished data from the Office of Health Systems Management, NYS Department of Health.

Table 10.1

DEPENDENT VARIABLES
VARIABLE DEFINITIONS AND SOURCES

Variable	Definition/Construction	Source
Total Cost Per per discharge	Patient-level total charges were aggregated to the hospital level. Hospital-specific inpatient cost to charge ratios were used to estimate cost per discharge. All cost data are from 1984.	Statewide Planning Research Cooperative System (SPARCS) and unpublished data from the Office of Health Systems Management, NYS Department of Health
Ancillary Cost Per Discharge	Ancillary charges per patient discharge at the hospital level. Hospital-specific cost to charge ratios were used to estimate ancillary costs per discharge, 1984.	SPARCS and Office of Health Systems Management
Adverse Events	Whether the case was an adverse event (events were deemed as adverse when average score on question 4.8 exceeded 3.5).	Adverse Event Analysis Form
Medically Negligent Adverse Events	Includes only those adverse events where the average score on question 9 exceeds 3.5.	Adverse Event Analysis Form

B. Explanatory Variables

1. Measures of Claims.

The key explanatory variable, of course, is the threat of a claim. For both theoretical and statistical reasons we measure this threat based on claims against the hospital and its medical staff from a prior period. The theoretical reason for using a prior rate is that when the hospital and its medical staff make decisions that will affect the (negligent) adverse event rate, they will only know about and be reacting to the rate of claims in the past, not the contemporaneous (1984) rate of claims. The statistical reason is that use of past claims helps with respect to establishing causality, as described in more detail in Technical Appendix 10.IV.1.

A decision to base a measure of the threat on past claims,

however, leaves open the issues of whether to use measures of closed claims or open claims, which year's claims experience to use, whether to use all closed claims or only claims closed with payment, how to associate claims with hospitals and whether to use discharges or the number of physicians on the hospital staff as a deflator. Recall also that we will test paid claims and all claims.

a. Open Claims versus Closed Claims. Open claims reflect more recent experience, and one might argue that more recent experience is more relevant to the hospital's and medical staff's decisions about prevention. On the other hand, larger claims take longer to close, so closed claims give more weight to larger claims. If larger claims are more salient in the hospital's and medical staff's decisions, closed claims may be the more relevant explanatory variable. Because theory does not provide a clear answer to the question of whether closed or open claims are the more relevant measure, we have adopted the empirical approach of using each measure as an explanatory variables and determining whether our results are sensitive to that choice. The variables are too closely related to include both simultaneously.

b. Year of Claims. We have used claims opened and claims closed in 1983. We deflate these claims in two different ways, by numbers of discharges and physicians at the hospital. In the case of closed claims and discharges as a deflator, there is an incompatibility of the years in the numerator and denominator because the claims reflect discharges from several different years; for example, a closed claim in 1983 may reflect a discharge in 1975. In light of the stability in year-to-year discharge rates, little error is introduced by using discharges from 1983 to arrive at a closed claims rate (i.e., to deflate the absolute number of closed claims). Our measure of claims per

physician also has an incompatibility because the measure of the medical staff is from 1984, but the size of the medical staff is even more stable than discharge rates.

c. Total Claims versus Claims Closed with Payment. As explained in the theoretical section, all claims, not just claims closed with payment, is the relevant variable if the fixed costs from defending a claim are substantial. On the other hand, there may be an additional effect from being sued successfully because of the effect on reputation. The question of whether all claims or claims closed with payment is the more relevant variable is therefore an empirical one.

d. Association of Claims with Hospitals When Physicians Have Multiple Privileges. We have added together all claims against a hospital or physicians on the staff of that hospital to arrive at the numerator of the claims rate. For example, if a hospital and a physician were sued for the same incident, we allocated two claims to the hospital. If a physician were on multiple staffs, we allocated a claim to each hospital with which he or she was affiliated.

Some might think it wrong to associate claims with a hospital when nothing inappropriate has occurred at that hospital. According to the theory of general deterrence, however, a physician who changes behavior at one hospital may not only change his or her behavior (e.g., decide not to attempt certain procedures) at that hospital, but may change behavior at all hospitals with which he or she is affiliated. For example, consider a physician who is sued for an action at hospital A and who is also on the staff of hospital B. If other physicians on the staff of B are influenced by the knowledge that a member of their staff has been sued at another hospital, or if the physician who is sued has some influence over hospital actions, our method for associating claims with hospitals is appropriate.

A related concern might be that our measure of claims is over the entire hospital and is not specialty specific. Under a theory of general deterrence, this appears to be appropriate; a suit against an orthopedic surgeon, for example, may be taken by a neurosurgeon as a signal that he or she might be sued. Moreover, although the threat of litigation varies from area to area (indeed that is the basis of our study), it is not clear that the relative threat of litigation (i.e, the probability of litigation conditional upon the existence of a negligent event) varies by specialty across areas. In principle, that hypothesis is testable, but we lack hospital- and specialty-specific data with which to test it. Moreover, there are two other reasons why use of hospital level claims data rather than hospital-and specialty-specific data appears appropriate. First, there will be less random noise in hospital level claims data than in specialty-level data; such noise would either complicate the analysis or bias the estimated effects toward zero. Second, there is less of a problem of endogeneity at the hospital level than at the hospital-specialty level (see Technical Appendix 10.IV.1).

A different concern is the nature of reported claims counts. In the case of a few hospitals the reported claims are those of incidents; that is, claims against the hospital and physician for the same incident have been combined. In these cases we have estimated the number of claims per incident using data from other hospitals and imputed the number of claims that would have been reported had claims not been combined. The imputation factor we used is 1.21, which was derived from a sample of seven hospitals we thought comparable to the hospitals for which we needed an imputation factor.[19]

[19] The factor of 1.21 differs from the factor of 1.49 used in Chapter 7 for two reasons: 1) This factor is computed for cases in which a hospital is named as a plaintiff; the factor in Chapter 7 was computed for all cases with multiple plaintiffs, including only physicians; 2) The factor in Chapter 7 was computed for the entire state; this factor is computed for hospitals that are thought to be comparable to the hospitals that reported claims by patient rather than by defendant.

e. The Deflator of the Number of Claims. There are two possibilities for establishing a claims rate at a hospital (or county)-- the rate per discharge and per physician. Obviously if each physician admits the same number of patients and if the distribution of physicians on multiple staffs is the same, the deflators are equivalent.

Because physicians are not equally active and do not admit the same number of patients, however, discharges may seem to be the more attractive variable. If discharges are used to deflate claims, however, more weight is given to physicians with claims against them who have multiple affiliations. Consider the case of two physicians and three hospitals. The first physician admits 100 patients to the first hospital. The second admits 50 patients to each of the other hospitals. Each physician has one claim against him. Deflating by discharges, the claims rate in the first hospital is 0.01, and in the other two hospitals (given our counting rules for claims) is 0.02. Deflating by physicians, each hospital has a claims rate of 1.0. Thus, the measures are different. Which is the better measure of the perceived threat is, in our view, an empirical question. We have therefore tested both measures.

2. Other Covariates

In the analyses we have attempted to control for the effects of other variables. Our intent is to be as certain as possible that any association we observe between claim rates and (negligent) adverse event rates or cost is causally related to the claims rates and does not reflect a spurious association because of another omitted variable.

The issue about what to include and not to include is, however, not clearcut. Consider the age of the patient. We saw in Chapter 6 that the proportion of negligent AEs among elderly patients is higher than among other patients. Danzon, using data

from the California Medical Association study, argues that the elderly are less likely to bring a claim for an injury because the fixed costs of bringing a claim are less likely to be covered by the court award.[20]

Hence, it might be argued that the higher negligence rate among the elderly is a reflection of a deterrent effect and to include age in the regression robs the claims variable of some of its true effect. We have therefore used several alternative specifications, the simplest of which is to include only the claims variable.

The explanatory variables that we will consider are listed in Table 10.2.

[20] Danzon, Medical Malpractice, 1985, infra, Table 2.5

TABLE 10.2
EXPLANATORY VARIABLES

Closed Claims 1983, by Hospital, per Discharge, and per Physician	Hospital level measures include all claims against hospitals plus physicians. Claims were counted for each hospital where a physician had admitting privileges. Approximately 16 percent of the physicians at the sample hospitals had privileges at more than one sample hospital. Physician claims were assigned to each hospital used by the physician. In cases where hospital and physician claims were combined, claims were multiplied by 1.21 which represents the ratio of hospital and physician claims to hospital claims for a sample of 7 large hospitals in New York City.	NAIC, Form 787, SPARCS
Open or Paid Claims per Hospital, per Discharge, and per Physician	Similar to closed claims per discharge. Open claims are those claims that were opened in 1983.	
Wage Index	The wage equalization factor is a hospital specific index of wage rates paid to professional, and medical staff within each hospital. A detailed definition appears in New York State Department of Health, New York Prospective Hospital Reimbursement Methodology, 1983, Albany, NY, 1883.	Office of Health Systems Management, NYS Department of Health
Beds	Certified hospital beds in facility, 1984.	NYS Department of Health, Health Facilities Directory, July, 1984. NYS Dept. of Health, Albany, NY
Payer Mix	Proportion of discharges within each specialty with expected primary payer to be Blue Cross, Medicaid, Medicare, self-pay, or other, 1984.	Sample, SPARCS data
Patient Age	Patient age	Sample, SPARCS data

TABLE 10.2
(cont.)

Teaching Status	Hospitals were sorted into three categories: primary teaching, other teaching and non-teaching. Primary teaching hospitals included those designated as the primary teaching hospital for the state's medical schools. This measure was designated by the medical school. Other teaching included all other hospitals with five or more approved residency programs. See Chapters 4-6.	NYS Department of Health
Discharges	Total discharges by specialty and hospital, 1984.	Sample, SPARCS data
Casemix Index	Casemix index based on diagnosis-related group (DRG) measure developed by NYS Department of Health.	NYS Department of Health
DRG Scale of Difficulty	Rating of 1 through 4 assigned by physicians associated with the Study defining the likelihood of an adverse event for the DRG of the patient; see Chapter 6.	
Location: In New York City or Long Island or Westchester	Indicator variable designating whether hospital is located in downstate New York.	NYS Department of Health, Health Facilities Index, 1984.
Average Years of Education (By County)	County average years of education, 1984	Area Resource File
Population Density	County Population Density, 1984	Area Resource File
Per Capita Income	County per capita income, 1984	Area Resource File
Proportion of County Population Urban	1984	Area Resource File

C. Statistical Methods

The inferences we draw about deterrence come from the regression equations that we have estimated. These determine the influence of claims rates on the likelihood of an adverse event and the likelihood of a negligent adverse event conditional upon an adverse event occurring, at first holding no other variables constant and then holding several other variables constant. Our methods are further explained in Appendix 10.IV.1.

V. RESULTS

A. Description of Data

We begin with showing simple descriptive statistics. Table 10.3 shows the average open claims rate per discharge and per physician and the range of claims rates for hospitals grouped into quartiles by open claims rate.[21] To take an example, the twelve hospitals with the lowest claims rates per discharge have a range of no claims at all to 2 per thousand discharges, with an average rate of 0.0012 per discharge.[22] These 12 hospitals had 134,004 discharges, or somewhat less than one-quarter of the total. We will show results for open claims rates; the results that we have thus far for closed claims and paid claims lead to the same conclusions.

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[21] Hospitals are divided into quartiles simply by the number of hospitals; in other words, the quartiles are not weighted by the number of discharges.

[22] Thus, the hospital at approximately the 25th percentile had a claims rate of 0.002. The word approximately allows for there only being 12 hospitals in the first quartile and 13 in each of the others.

Table 10.3

CLAIMS RATES

ADVERSE EVENT AND NEGLIGENCE RATES
BY QUARTILE OF OPEN CLAIMS PER DISCHARGE

Quartile	Average Open Claims (per discharge)	Range	Number of Hospitals[a]	Discharges[b]
Lowest	.0012	0-.0020	12	134,004
Second	.0027	.0020-.0030	13	174,917
Third	.0057	.0031-.0045	13	152,369
Fourth	.0063	.0046-.0098	13	182,520

Quartile	Average Open Claims Rate (per physician)			
	Mean	Range		
Lowest	.082	0-.125	12	121,172
Second	.139	.129-.156	12	178,352
Third	.174	.156-.208	12	220,565
Fourth	.257	.202-.303	13	176,087

[a]There are 51 hospitals in the sample using open claims per discharge and 49 in the sample using open claims per physician because we could not determine the number of physicians at two hospitals.
[b]Total number of discharges at the hospitals in the quartile as reported on the SPARCS data. Discharges are not weighted.

The data show a considerable spread of claims rates across the quartiles. In the case of claims per discharge, the average rate within the highest quartile is five times the average within the lowest quartile.

Table 10.4 shows the means and standard deviations of the variables used in the regression analysis.

Table 10.4

MEANS AND STANDARD DEVIATIONS OF VARIABLES USED IN HOSPITAL COST FUNCTION ANALYSIS

Variable	Mean	Standard Deviation
Ancillary cost per discharge	$1196	$ 668
Total cost per discharge	$2485	$1204
Open claims per discharge	.0033	.0018
Proportion Medicare discharges	.31	.12
Proportion Medicaid discharges	.14	.14
Proportion Blue Cross discharges	.32	.10
Proportion commercial insurance discharges	.13	.12
Proportion self-pay discharges	.06	.05
Wage index	.98	.20
Casemix index	.97	.18
Beds	369	263
Downstate Location[a]	.59	.50
Teaching affiliate	.41	.50
Academic/university teaching hospital	.07	.26
Open claims per discharge	.003	.002
Open claims per physician	.163	.066

[a]New York City, Long Island, Westchester.

B. Results for Cost

Table 10.5 shows the average total cost and ancillary cost per discharge in the four quartiles and the range of costs within that quartile. There is no compelling pattern, although hospitals facing the highest claims rates per discharge do in general have the highest cost. The within-quartile range, however, is large. The numbers in this table do not hold other factors constant; that is, the values are simply the average costs per discharge for the hospitals that happen to fall in that quartile. We know from Table 10.3 that hospitals in the first quartile are, for example, smaller hospitals that probably have a less complicated casemix; that would, of course, affect the costs. To sort out the effect of the claims rate on cost from other factors we must turn to multiple regression analysis.

Table 10.5

AVERAGE INPATIENT TOTAL AND ANCILLARY COSTS PER DISCHARGE BY OPEN CLAIMS PER DISCHARGE AND OPEN CLAIMS PER PHYSICIAN[a]

	Open Claims per Discharge		Open Claims per Physician	
Quartile[b]	Total Costs	Range	Total Costs	Range
Lowest	$2566	$1277-6983	$2562	$1035-5633
Second	2492	1035-6829	5793	1199-4476
Third	2497	1642-4476	5726	1258-6983
Fourth	3314	1258-5633	3380	1845-6289

	Ancillary Costs	Range	Ancillary Costs	Range
Lowest	$1301	$659-3905	$1155	$659-2271
Second	1365	362-3822	1276	632-2466
Third	1211	112-2466	1248	470-3905
Fourth	1474	470-2886	1690	112-3822

[a]Standard errors of these values have not yet been calculated. Values are unweighted averages across the hospitals within the quartile.

[b]Quartile ranking of hospitals by claims rate.

The regression results are sensitive to the manner in which the regression is specified and the observations that are included, but tend to suggest that there is an effect of the claims rate on cost. The strongest evidence that cost per discharge is positively associated with claims comes when the logarithm of cost per discharge is regressed upon the logarithm of the claims rate for all hospitals for which we have complete data (Table 10.6) These results show very large effects that are statistically significant at conventional levels. There are, however, a number of influential or outlier observations. When these observations are removed and the results weighted by discharges, the sign remains positive, but the results are not significant at conventional levels (Table 10.7).[23] (If the observations are not weighted by discharges, the coefficient on claims is 0.84 with a t-statistics of 1.32.) Finally, when cost per discharge is simply regressed upon the claims rate (i.e., a linear specification), there is a strong negative effect among Medicare patients, and no strong effect among other patients (Table 10.8).

[23] To define an outlier observation, we used the criterion that the DFFITS value (Belsley, Kuh, and Welsch, **Regression Diagnostics**. New York: Wiley and Sons, 1980) was greater in absolute value than 2*sqrt(p/n). where p is the number of explanatory variables and n is the number of observations.

Table 10.6

TOTAL COST REGRESSION
Dependent Variable is the Logarithm of Total Cost per Discharge

Explanatory Variable	Coefficient	t-statistic	Probability[b]
Intercept	16.8	7.30	.01
Ln Claims/Discharge	1.37	3.57	.01
Ln Medicaid[a]	0.56	1.26	.22
Ln Other Payer[a]	0.48	1.29	.21
Ln Blue Cross[a]	1.88	2.49	.02
Ln Self Pay[a]	1.46	4.15	.01
Ln Commercial[a]	-0.37	-0.93	.36
Ln Claims x Medicaid[a]	0.07	0.92	.37
Ln Claims x Blue Cross[a]	0.30	2.44	.02
Ln Claims x Other Payer[a]	0.10	1.60	.12
Ln Claims x Self Pay[a]	0.25	4.00	.01
Ln Claims x Commercial[a]	-0.06	-0.96	.34
Ln Wage Index	-0.11	-0.30	.76
Ln Beds	-0.19	-3.34	.01
Ln Casemix	1.73	11.14	.01
Downstate Location	0.48	3.34	.01
Teaching Affiliate	0.31	5.47	.01
Academic/University Teaching Hospital	0.42	4.03	.01

$R^2 = 0.95$
N = 45. Hospitals with missing values and three hospitals with questionable data (ancillary costs per discharge of under one dollar) have been omitted. Data are unweighted by the number of discharges.
[a]Payer is proportion of discharges paid for by payer.
[b]Two tail test.

Table 10.7

TOTAL COST REGRESSION, OUTLIERS OMITTED
Dependent Variable is the Logarithm of Total Cost per Discharge

Explanatory Variable	Coefficient	t-statistic	Probability[b]
Intercept	12.6	3.92	.01
Ln Claims/Discharge	0.61	1.11	.28
Ln Medicaid[a]	-0.19	-0.28	.78
Ln Other Payer[a]	0.30	0.66	.52
Ln Blue Cross[a]	0.93	0.71	.49
Ln Self Pay[a]	1.69	2.24	.04
Ln Commercial[a]	-1.22	-1.65	.12
Ln Claims x Medicaid[a]	-0.07	-0.55	.59
Ln Claims x Blue Cross[a]	0.16	0.71	.49
Ln Claims x Other Payer[a]	0.07	0.92	.37
Ln Claims x Self Pay[a]	0.28	2.14	.05
Ln Claims x Commercial[a]	-0.22	-1.69	.11
Ln Wage Index	-0.00	-0.00	.99
Ln Beds	-0.19	-3.29	.01
Ln Casemix	1.88	9.02	.01
Downstate Location	0.45	2.51	.01
Teaching Affiliate	0.27	3.96	.01
Academic/University Teaching Hospital	0.39	3.38	.01

$R^2 = 0.97$
N = 37. The sample is that of Table 10.6, deleting seven outlier observations.
[a]Payer is proportion of discharges paid for by payer.
[b]Two tail test.

Table 10.8
TOTAL COST REGRESSION
Dependent Variable is Total Cost per Discharge

Explanatory Variable	Coefficient	t-statistic	Probability[b]
Intercept	1147	.48	.64
Claims/Discharge	-1,527,000	-2.52	.02
Medicaid[a]	-5455	-1.72	.10
Other Payer[a]	-9555	-1.93	.06
Blue Cross[a]	-6281	-1.59	.12
Self Pay[a]	-14,476	-1.74	.09
Commercial[a]	-3,157	-.81	.43
Claims x Medicaid[a]	1,627,000	1.90	.07
Claims x Blue Cross[a]	1,644,000	1.42	.17
Claims x Other Payer[a]	2,037,000	1.70	.10
Claims x Self Pay[a]	4,265,000	2.24	.03
Claims x Commercial[a]	856,000	.58	.56
Wage Index	2688	1.71	.10
Beds	-3.67	-1.88	.07
Beds-Squared	.0021	1.28	.21
Casemix	4595	7.13	.01
Downstate Location	454	.74	.47
Teaching Affiliate	1105	3.19	.01
Academic/University Teaching Hospital	1260	1.77	.09

R^2 = 0.88
N = 44
[a]Payer is proportion of discharges paid for by payer.
[b]Two tail test.

Thus, these results are sensitive to the specification of the functional form and to some degree to whether outlier observations are included in the sample. They are not sensitive to whether hospitals are weighted according to the number of discharges (results not shown).

To distinguish among these results we have run the following specification test. We regressed the dependent variable of the regression on its predicted value and the square of the predicted value, as well as an intercept term. If the specification is correct, the coefficient of the predicted value should be insignificantly different from one, and the intercept and the coefficient of the predicted value squared should be insignificantly different from zero.

The two regressions in logarithms that show a positive effect (Tables 10.6 and 10.7) both pass this test, whereas the regression in linear form does not.[24] Nonetheless, the logarithmic specification with all observations shows in our view an implausibly large effect. For example, the predicted value for total cost setting all values to their mean (in logarithms) is $2,198.[25] Using the coefficient of responsiveness derived from Medicare patients and predicting at a claims rate of 0.0012, the mean of the lowest quartile, would lower the $2,198 figure to $694. On the other hand, raising claims to 0.0063, the mean of the highest quartile, would raise the value to $6,734. The finding from the sample that omits outliers (Table 10.7) varies from $1,316 at the mean of the lowest quartile to $3,618 at the mean of the highest quartile, a still large but more plausible range of variation.

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[24] Indeed, in the linear form the intercept has a t-statistic against the null of zero of 2.73 and the squared term has a t-statistic against the null of zero of 3.1, whereas the linear term is three standard errors from 1.0.

[25] This value is arrived at by exponentiating the mean of the logarithms plus half the root mean square error squared. It differs from the arithmetic mean shown in Table 10.3 because the logarithm of the mean does not equal the mean of the logarithm.

We have also attempted to find if there are cost effects on only ancillary costs. The analogous linear functional form fails the specification test just described. Although the logarithmic form technically passes the test, the results are not statistically significant at conventional levels, and many of the alternatives examined failed specification tests. Therefore, these results are not shown.

In sum, there is some evidence that an increase in claims leads to higher hospital costs, but the result is not as robust as we would like. Even if there were a robust result showing positive effects on cost, one should not necessarily interpret the difference in cost as representing "defensive medicine;" additional costs with more claims could represent additional investments in injury prevention that have benefits for patients. Put another way, the term defensive medicine generally connotes procedures induced by the tort system that have no benefit for patients, or at a minimum whose benefits do not justify their costs. Because we have not yet presented results on the prevention of medical injury, it would be wrong to conclude that these costs represent waste or needless tests.

C. Results for Adverse Event Rates and Negligent Adverse Event Rates

Unfortunately, our study is able to shed little light on the key question of whether higher claims rates reduce medical injury. Tables 10.9 shows the simple AE rates and negligent AE proportions by claims quartile. This table displays no evident relation between claims rates and AE rates. Tables 10.10 and 10.11 show the coefficients of the claims variable from a regression with nothing else in the equation and a number of other covariates. The results with respect to claims are not sensitive to specification. The claims variable in almost all cases generally has a positive sign, meaning additional claims are associated with more adverse events and a higher proportion

of negligent adverse events. The standard errors that are shown are somewhat understated, probably about 10%; nonetheless, they are large. A 95% confidence interval based on these standard errors could include important deterrent effects.

Table 10.9

ADVERSE EVENT RATES, CLAIMS RATES, AND NEGLIGENT ADVERSE EVENT RATES, BY QUARTILE

Open Claims per Discharge

Open Claims Rate by Quartile Average[a]	AE Rate (per discharge)	Range	Proportion Negligent[b]	Range
.0012	.041	.003-.097	.268	.076-.472
.0027	.031	.012-.086	.248	.107-.459
.0057	.031	.001-.073	.230	.053-.504
.0063	.041	.012-.120	.262	.113-.404

Open Claims per Physician

Open Claims Rate by Quartile Average[a]	AE Rate (per physician)	Range	Proportion Negligent[b]	Range
.082	.030	.003-.061	.225	.076-.460
.139	.038	.017-.090	.266	.053-.504
.174	.039	.016-.097	.244	.087-.472

Errata

* Chapter 10, page 10-41, Table 10.9, "AE Rate per discharge" column: the third figure should be .031 not .001

March 28, 1990

Table 10.10

COEFFICIENTS, AND STANDARD ERRORS OF CLAIMS VARIABLES IN ADVERSE EVENT EQUATIONS

The Dependent Variable is the logit of the probability of an adverse event[a]

Claims as the Only Explanatory Variable

Explanatory Variable	Coefficient	Standard Error[b]	t-Statistic[b]
Logarithm of open claims per discharge			
All observations	.156	.167	0.94
Omitting outliers	.223	.133	1.67
Logarithm of open claims per physician			
All observations	.026	.195	0.13
Omitting outliers	-.149	.306	-0.49

Multivariate Specification[c]

Logarithm of open claims per discharge			
All observations	.169	.175	.96
Omitting outliers	.200	.179	1.11
Logarithm of open claims per physician			
All observations	.110	.194	.97
Omitting outliers	.074	.281	.26

[a] The logit is log (p/(1-p)), where p is the probability of the event.

[b] Standard errors are somewhat understated, probably on the order of 10 percent, and t-statistics are somewhat overstated. Exact standard errors remain to be calculated.

[c] Other explanatory variables include: % in age ranges 17-44, 45-69, 70+; DRG level (see chapter 6); whether hospital is public; % discharges Medicaid; % discharges self pay; % discharges black; % discharges Hispanic.

Table 10.11

COEFFICIENTS AND STANDARD ERRORS OF CLAIMS VARIABLES IN EQUATIONS TO EXPLAIN PROPORTION OF ADVERSE EVENTS THAT ARE NEGLIGENT

The Dependent Variable is the logit of the probability of a negligent adverse event conditional upon an adverse event[a]

Claims as the Only Explanatory Variable

Explanatory Variable	Coefficient	Standard Error[b]	t-Statistic[b]
Logarithm of open claims per discharge			
All observations	.031	.199	.16
Omitting outliers	.159	.201	.79
Logarithm of open claims per physician			
All observations	.085	.248	.34
Omitting outliers	.201	.340	.59
Multivariate Specification[c]			
Logarithm of open claims per discharge			
All observations	.095	.207	.46
Omitting outliers	.032	.247	.13
Logarithm of open claims per physician			
All observations	.115	.256	.45
Omitting outliers	.023	.301	.08

[a] The logit is log(p/(1-p)), where p is the probability of the event.

[b] Standard errors are somewhat understated, probably on the order of 10 percent, and t-statistics are somewhat overstated. Exact standard errors remain to be calculated.

[c] Other explanatory variables include: % in age ranges 17-44, 45-69, 70+; DRG level (see Chapter 6); whether hospital is public; % discharges Medicaid; % discharges self pay; % discharges black; % discharges Hispanic.

For example, if we took the coefficient for open claims per discharge of 0.032, the multivariate specification for negligent adverse events omitting outliers (Table 10.11, sixth row), and reduced it by one standard error, we would obtain a coefficient of -0.215. Using this coefficient and letting the claims value rise from approximately its mean of 0.0027 to the mean of the highest quartile 0.0063, the predicted probability of a negligent adverse event conditional upon an adverse event would be reduced by 13%. If we instead let the claims rate vary from the mean of the first quartile (0.0012) to the mean of the fourth quartile (0.0063), the probability of a negligent adverse event conditional upon an adverse event would be reduced by almost a quarter (24.3%). And we emphasize that this comes from reducing the coefficient by approximately only one standard error; reducing the coefficient to the extreme lower end of the 95% confidence interval would result in a substantially larger effect.

Thus, our findings are at best weak evidence of no deterrence. First, the confidence intervals around the finding are large; they do not rule out the existence of an important deterrent effect. Second, as noted earlier, there is a bias toward a positive effect.

This bias occurs if high negligence (or AE) rates precipitate more claims and there is stability over time. We have run Hausman tests[26] to test for the existence of a bias (i.e., for endogeneity). To implement the test, we used the average income and education levels of the county in which the hospital was located, as well as the proportion of the county's population that is urban and the county's population density, as instrumental variables. That is, we assumed these variables did cause variation in the claims rate but not in the injury rate.

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[26] Hausman, J, "Specification Tests in Econometrics," **Econometrica** 46 (1978): 1251-1272.

These tests failed to reject the null hypothesis of no bias (i.e., of exogeneity). That could have been because the claims rate is virtually exogenous (i.e., conditional upon an AE or a negligent AE, whether a claim is filed is close to random) or because the test lacked the power to pick up a true effect. It could also mean that one or more of these variables is causally related to the injury rate.

VI. DISCUSSION

We have shown in this chapter some evidence that variation in the rate of tort claims leads to increases in total costs per discharge, but this finding is not as robust as we would like. We have also shown no evidence that the threefold variation in tort claims across hospitals is associated with the tenfold difference in AE rates across those same hospitals. Indeed, the association between claims rates and both AEs and negligent AEs, even controlling for certain other characteristics of the hospitals, is positive, although precision is not good and confidence intervals are large.

There are two ways of thinking about this latter finding. The first is for those who believe the tort system provides little or no deterrent effect. One may believe this for several reasons: many adverse events may result from momentary lapses in concentration which may not be preventable at the level of the individual physician; that is, there may in fact be little deterrent effect. Moreover, even if there were a potentially large deterrent effect, the deterrent effect of the tort system in theory may not translate into practice because of the ubiquitous nature of malpractice insurance that is not experience rated at the level of the individual physician and because relatively few claims are brought (Chapter 7).

The second interpretation is for those who believe the tort system provides a substantial deterrent effect. Although our findings provide no positive support for that position, they also

provide little or no evidence against it for three reasons. First, as pointed out above, the confidence intervals associated with our estimated effect size are large and include within them the possibility of substantial deterrent effects. Put another way, our sample size of 51 hospitals in New York State is not sufficiently large to rule out the possibility that there is a substantial deterrent effect. Second, not only is there a large confidence interval around the coefficient of the claims variable, there is a positive bias in it; that is, there could be a true effect that is masked by high injury hospitals or physicians generating claims. Third, even if there were no deterrence over the range of claim rates that we observed in our sample, it does not follow that abolishing the tort system would leave injury rates unaffected. That is, even if one is on the flat of a hypothetical curve relating claims to injury rates, it does not follow that extrapolating the curve to zero would leave one remaining on the flat of the curve.

Thus, our study of the empirical relationship between claims rates and injury rates cannot directly determine the magnitude of any deterrence. One might ask whether any study could determine this magnitude. Another way to put the question is to ask what guidance we have for those who might be contemplating future studies that attempt to determine the deterrent effect of the tort system and who are constrained to study data from the current system; i.e., cannot conduct the ideal study alluded to above of an experiment in which the tort system is suspended or replaced with something else in some jurisdictions.[27]

There are two ways of expanding the type of study we have carried out that would improve one's ability to determine the magnitude of any deterrence. First, our confidence intervals would have been smaller had we been able to sample from more hospitals. Second, the range of variation in the threat of a

[27] If New York were to adopt a no fault system, of course, a quasi-experiment would occur.

claim would undoubtedly have been greater had one been able to sample hospitals from a broader area than the State of New York; broadening the range of variation would also permit more precise estimation of the effect of claims on injuries.

Simply expanding the number of hospitals and broadening the range of claims, however, would do nothing to address the possible upward bias in the coefficient of the claims variable. This issue could be addressed in one of two ways. The better way would be to measure the likelihood of a claim conditional on an adverse event or negligent adverse event. This would convert the explanatory variable to one that measured purely the threat of a claim rather than, as in our case, the product of an injury rate (per discharge or per physician) times the likelihood of a claim's being filed conditional upon an injury. We could not implement such a measure because of the small number of claims that we could match to patients (chapter 7).

An alternative method in principle is to find one or more variables that are (highly) correlated with the likelihood of a claim's being filed but not with the injury rate (an instrumental variable). The difficulty is finding such variables. We have used the per capita income and education level of the county in which the hospital is located, as well as the population density and proportion urban in the county. Using these variables we did not reject the null hypothesis that there was no bias (i.e. that the claims variable was exogenous); we may, however, may have failed to reject the hypothesis because the test lacked sufficient power. Another possibility is that some of these variables are not really independent of the injury rate; we know, for example, that the proportion of specialists to all physicians is much higher in more urban areas and that the casemix index of hospitals in these areas is higher. If so, the metropolitan variable is not independent of the injury rate. The test would tend not to reject the null hypothesis.

The more immediate question is what lessons one can draw

from our study with respect to deterrence. If one believed that the bias we have just been describing were small, then one would conclude it was more likely than not that the deterrence effect was small. On the other hand, we did find in Chapter 9 that physicians who perceived themselves to be at greater risk were more likely to undertake changes in their practice, and in this chapter we did find some evidence that higher claims rates were associated with higher costs. These findings both suggest that there are behavioral effects of the tort system, and it seems likely to us that some of these effects will tend to reduce medical injury. For example, an elderly surgeon whose technical skills have deteriorated may be more likely to give up surgery sooner if the threat of litigation is higher than if it is not. Similarly, a hospital may be more likely to set up a protocol for administering anesthesia if the threat of litigation is higher. Or, in a classic case, a nurse may be assigned to count sponges placed in a patient undergoing surgery if the threat of litigation is higher.

Even if it were more likely than not that the deterrence effect over the range we observed is small, however, there is a substantial possibility that it is not. Moreover, it may well not be small if the tort system were abolished. In sum, it would be imprudent to conclude on the basis of these findings that there would be no change in medical injuries if the tort system were abolished and no comparable incentive structure put in its place.

MODIFICATIONS TO THE SIMPLE EXAMPLE: COSTS THAT ARISE FROM SUIT, PRICING IN MEDICAL CARE, AND THE CUSTOMARY STANDARD OF PRACTICE

I. Costs that Arise from Suit

Although in practice there may be additional costs of a successful suit such as loss of referrals, assume that all costs the physician bears arise simply from a claim's being filed and that any additional costs from a successful claim are insurable.

Consider the probability of a suit if the physician is negligent and the probability if he or she is not. A necessary but not sufficient condition for deterrence of negligence under these conditions is that the probability of a suit and the associated costs given negligence exceeds the probability of a suit given non-negligence. (If a successful suit imposes additional costs, for example, loss of future referrals, such a condition is not necessary for deterrence; the necessary condition must then account for the probability of a successful suit given negligence relative to the probability of a successful suit given non-negligence.) We showed in chapter 7 (Table 7.8) that such a condition in fact holds; the probability of a claim given an AE and negligence is greater than the probability given an AE and no negligence, which in turn is greater than the probability given no adverse event, although some of the latter cases may have an adverse event of failure to diagnose.

That the condition is necessary for deterrence is straightforward to prove. Assume the opposite, for example, that the probability of suit given negligence equals the probability of suit given non-negligence. Then, assuming that being non-negligent is costly, there is no reason because of tort law to be not negligent. The costs of being sued will be incurred either way. Of course, a physician may be not negligent for other reasons, such as concern for his or her patients, but we assume that would not

change if the tort law sanctions changed or were non-existent.

That the condition is not sufficient for deterrence results from the cost of not being negligent. If not being negligent is sufficiently costly, the physician will be negligent and will incur the uninsured costs if found negligent.[1]

Two implications come out of this reasoning, the first of which seems of more practical importance. First, the probability of a claim with associated uninsurable costs given no negligence acts like a tax on the practice of medicine and if large enough may induce physicians not to practice (i.e., to retire). Moreover, some procedures may be more likely to generate claims than others. In that case, instead of giving up medicine, physicians may simply give up that procedure or "product line" (e.g., give up obstetrics and practice only gynecology).[2]

The magnitude of the probability of a claim with no negligence is therefore important; a sufficiently high probability (or sufficiently high uninsurable costs from the fact of a claim) could impose societal costs such as rural obstetricians not delivering babies (assuming for the sake of argument that it would be socially desirable for them to do so) that must be netted against any benefits of deterrence, i.e., the provision of an economically efficient quantity of resources in prevention.

An analogy might make the point clearer. If one drives through a red light, there is some probability of a traffic ticket (as well as an accident!). The probability of a ticket given that one drove through a red light is like the probability of a claim given negligence. The higher the probability of a ticket or the higher the fine (the more the uninsured costs), the less likely one is to drive through a red light.

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[1] Technically, this is a corner solution.

[2] Tort law can have the beneficial effect of inducing physicians who are not very good at a certain procedure to give it up. In the idealized case of the example, this would happen if the expected costs they imposed exceeded their rewards from delivering the procedure.

The probability of a ticket given that one drove through a green light is like the probability of a claim given no negligence.[3] If the probability of a ticket given that one drove through a green light is as high as the probability of a ticket given that one drove through a red light, the fact that traffic tickets are given out for going through a red light will not induce drivers to stop at a red light.[4] Moreover, the probability of a ticket for driving through a green light is like a tax on driving; there will be less driving, the higher is this probability.[5]

Second, as we just noted, the probability of a claim given an adverse event but no negligence exceeds the probability of a claim given no adverse event. If there are uninsurable costs of a suit, this condition means there is an incentive to avoid patients who are likely to generate adverse events. In principle, this could cause access problems for such patients. Whether this is of any practical importance is not clear.

II. Pricing

The conclusion that imposing liability on the physician for accidents leads to an economically efficient outcome depends upon consumers paying and physicians or hospitals receiving prices that reflect the true resource costs of the services and procedures.

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[3] In a no-fault system, the analogy would be to the likelihood of a claim with no adverse event. In fact, one of the issues with respect to a no-fault system is whether there would be a larger number of claims with no adverse events than there are claims with no negligence under a tort standard and what the costs of those respective claims would be. (These are the uninsured costs of suit in the tort system; such costs per claim may be less under a no-fault system.) Our data do not shed light on this issue, because they only show claims that are thought worthwhile to bring under a negligence standard. If there were to be compensation for any adverse event, it would pay to bring claims if there is a sufficiently high probability of establishing that medical management rather than the underlying disease process caused the injury. This is clearly a different calculus than the current system.

[4] That the probability of an accident is higher if one drives through a red light, however, may well induce drivers to stop at red lights. In a no-fault or strict liability system, the analogy is different; the ticket for going through a green light is like a claim when there was no causation (assuming that there are uninsurable costs from a claim in a no-fault system).

[5] That the costs of a suit tend to be uninsurable only adds to the point, assuming risk aversion. Even if the costs were insurable, the insurance premiums would act like a tax on the activity.

In the example in the text the test cost $5, but potentially prevented illness that cost $100. Suppose these dollar figures included a substantial markup. Suppose, for example, that the $100 in "sickness" costs reflected a procedure to treat the sickness that was charged at $100 but really only used $20 of resources (in terms of foregone opportunities to produce other goods and services). The calculations of an economically efficient action would change; efficiency would require not testing anyone in more instances. Or if the test were priced at $5 but really used $1 of resources, it would be efficient to test everyone in more instances. The point is that in any calculations of efficiency one would want to use actual costs (technically marginal social cost); because of the numerous cross subsidies in the pricing of medical services, actual prices may not be close to such costs. Thus, the calculations that would minimize the cost to the physician might not minimize the cost to society.[6]

III. Efficiency and the Standard of Customary Practice

The discussion in the example in the text was consistent with either a regime of strict liability or a regime of a negligence standard if negligence is imposed when economic efficiency is violated. In actuality however, negligence is imposed when the customary standard of practice is violated. The issue is then how closely the customary standard of practice approximates a standard of economic efficiency.

In fact, there is reason to believe that the customary standard is skewed toward more resources in deterrence than would be consistent with economic efficiency because of the widespread nature of health insurance. Such insurance has been shown to raise

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[6] A related point is that the physician may be inclined to recommend or induce demand for services that carry a markup. For example, if there is a substantial markup on laboratory tests, the physician may be inclined to order tests more frequently than economic efficiency would dictate. See Pauly 1980.

the utilization of medical services[7], and the usual presumption in welfare economics is that a subsidy like health insurance causes too many resources to be employed in the subsidized industry[8]. In the theoretical example in the text, if the physician were liable for sickness costs (including the uninsurable costs of suit) but the patient were insured for the test, the physician might well recommend the test even though there were only a 10% probability of a positive finding.

IV. Summary of Theoretical Considerations About Deterrence

Our results from chapter 7 imply that claims are more likely to be brought when negligence has occurred. As a result, tort law may function to prevent or deter injuries and accidents, but the relatively few suits filed given negligence, the widespread nature of malpractice insurance, the cross subsidies in the prices of health care services, and the widespread nature of health insurance and the resulting potential lack of equivalence between the customary standard of practice and an economically efficient standard all mean that tort law does not necessarily lead to an economically efficient quantity of resources devoted to prevention. Both the small number of suits (relative to negligent actions) and widespread malpractice insurance lead to too few resources devoted to prevention, but uninsurable costs of time, stress, and reputation may offset this and may even lead to too many resources devoted to prevention (defensive medicine). If because of health insurance the patient does not pay out-of-pocket, defensive medicine becomes more likely. Defensive medicine may also be exacerbated by markups of price over cost and induced demand.

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[7] Newhouse et al. **New England Journal of Medicine 305:** 1501-1507, 1981; Manning et al., **American Economic Review** 77: 251-277, 1987.

[8] Pauly, **American Economic Review 58:** 531-537, 1968.

STATISTICAL AND ECONOMETRIC ISSUES

Our approach has been to estimate various regression equations, focusing on the coefficient of different measures of the claims rate. We have estimated the effect of variation in claims on AEs and on negligent AEs conditional upon an AE and combined the estimates from the two equations. In our work we have considered the following problems: 1) the weighting of the sample and the sparseness of the data, especially the data on AEs; and 2) the possible endogeneity of the claims variables.

I. The Weighting of the Sample and the Sparseness of the Data

As explained in Chapter 4, a variety of DRGs groupings were over- and undersampled in order to increase the number of AEs that would be observed for a given budget for drawing hospital charts. In addition, those over 70 of age were undersampled because they contribute less to the variance of the estimate of the costs of an alternative compensation plan (see Chapter 8).[1] Thus, the sample is not a proportionate sample of discharges in the state of New York.

The measures of claims used in the analysis, however, are not from the sample, but rather from all claims filed.[2] Thus, the claims measure is effectively from a 100% sample of discharges. Because the measure of claims is based on one population and the measure of adverse events is based on another, it is necessary to correct for the disproportionate sampling of adverse events. Over and beyond the corrections for the disproportionate sampling, we have the statistical problem that the data are sparse; i.e., there are rather few adverse events.

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[1] Individuals over 70 typically do not have lost earnings, which form the largest component of a compensation plan.

[2] The small number of claims found in the sample (see Chapter 7) would not permit a reliable estimate of the threat of a claim from the data in the sample alone.

We have proceeded as follows. First, we estimated an unweighted logistic regression at the patient level to predict the likelihood of an adverse event, in which all the variables that define the disproportionate sampling strategy are used as explanatory variables as well as other variables including the major interactions involving the sampling strategy variables (see below). A similar equation is run for the likelihood of a negligent adverse event conditional upon an adverse event; i.e., using the subset of units with an AE.

Because of the sparseness of the data, especially the adverse event data, a flattening constant, k/c, has been added to each dependent variable, where k is the number of parameters to be estimated (242 in this case) and c is the number of cells in the design, i.e., the fully interacted model not including the AE/not AE split (95,472 in this case). Thus, in each cell defined by specific values of the explanatory variables patients, if any, are split into those with and without an AE. In each cell the constant k/c, which equals .002535 in this case, is apportioned to adverse events and non-adverse events in the proportion with which they appear in the sample (922/30121 and 1 - (922/30121)). Without adding such a constant, unique maximum likelihood estimates would likely not exist, and if they did exist, they would certainly be unstable. The k/c formula is due to Rubin,[3] is explored in simple cases in Rubin and Schenker[4] and is studied in more detail for logistic regression in Clogg et al.[5] The method can be treated as an Empirical Bayes procedure. Use of this particular constant

[3] Donald B. Rubin, "Progress Report on Project for Multiple Imputation of 1980 Codes," mimeo, University of Chicago Department of Statistics, 1983

[4] Donald B. Rubin and Nathaniel Schenker, "Logit-Based Interval Estimation for Binomial Data Using the Jeffreys Prior," Sociological Methodology, 17, 1987, pp. 131-144

[5] Clifford C. Clogg, Donald B. Rubin, Nathaniel Schenker, Bradley Schultz, and Lynn Weidman, "Simple Bayesian Methods for Logistic Regression, with Application to a Study of Inter-Census Comparability of Industry and Occupation Classification Systems," mimeo, August 1989

yields the same average prior variance for any design or model and shrinks toward a model in which only an intercept appears.

These first-stage regressions (one for the likelihood of an AE, one for the likelihood of a negligent AE conditional upon an AE) make use the of the following explanatory variables (the complete enumeration is listed, although one category is absorbed in the intercept (i.e., omitted) in order to avoid singularity):

13 DRG clusters as defined in Appendix Table 1 (neurosurgery, orthopedic surgery, thoracic surgery, vascular surgery, cardiac surgery, urology, high risk newborns, low risk newborns, high risk obstetrics, low risk obstetrics, general surgery, internal medicine, other (includes ophthalmology and otorhinolaryngology);

51 hospital dummy variables;

3 race categories (black, hispanic, other);

3 payer categories (Medicaid; self-pay; other)[6]; and

4 age categories (0-17; 17-44; 45-69; 70+)[7].

Including an intercept and omitting one group from each category to avoid singularity yields 1 + 12 + 50 + 2 + 2 + 3 = 70 parameters.

Additionally, to smooth the model, the four DRG levels of the likelihood of an AE have been used as interaction terms to reduce the dimensionality of the 13 specialty dummy variables (see Chapter 6 for a definition of the 4 DRG levels). The following first-order interactions have been included:

Age 70+,interacted with the following other variables: specialty less the four obstetric and newborn specialties, hospital, payer, race (8 + 50 + 2 + 2 = 62 variables);

DRG level x interacted with hospital, payer, race and age other than age 70+ (50 + 2 + 2 + 2 = 56 variables).

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[6] Medicare is not included as a separate category because of the collinearity with the age variable and the need to keep the dimensionality of the problem at a computationally tractable level.

[7] 70+ is used as the upper category rather than the more usual 65+ because the 70+ group was undersampled.

The second order interactions of age 70+ x DRG level x hospital, payer, and race (50 + 2 + 2 = 54 variables) have also been included. Thus, the coefficient vector has 242 (70 + 62 + 56 + 54) elements.

These two regressions produce two estimated posterior distributions of coefficient vectors. Any vector sampled from this distribution can be used to estimate a probability of an adverse event for each observation and the probability of a negligent adverse event for each adverse event. Especially in the case of adverse events, where the relative sparseness of the data is more acute, the posterior distribution of the coefficient vector is highly non-normal. To make the distribution more nearly normal, Sampling Importance Resampling[8] was used after applying a new method of approximating a high-dimensional normal distribution by a sequence of conditional normals.

To implement Sampling Importance Resampling we drew 1000 values from each of the posterior distributions of the two coefficient vectors (one for AEs, one for negligent AEs conditional upon AE's) and then sampled 15 values of the vector for negligent AEs and four for AEs with probability proportional to p/h, where p is the likelihood of the coefficient vector under the flattened likelihood function used to calculate the logistic regression that was described above and h is the likelihood of the coefficient vector under the normal with a mean equal to the mode of the posterior and a variance-covariance matrix estimated from the second derivative of the information matrix evaluated at the mean.

For each of the vectors of coefficients in the adverse event equation, we now calculate a probability of an adverse event for each of the 30,121 observations. Similarly for each of the vectors of coefficients in the negligent adverse event equation we

[8]Donald B. Rubin, "A Noniterative Sampling/Importance Resampling Alternative to the Data Augmentation Algorithm for Creating a Few Imputations When Fractions of Missing Information Are Modest: The SIR Algorithm," JASA, 82, June 1987, pp. 543-546

calculate the probability of a negligent adverse event for each of the 922 adverse events.

These values are then weighted by the inverse probability of the observation's appearing in the sample. This inverse probability is based on the sampling weights as described in chapter 4; observations in neurosurgery, orthopedic surgery, thoracic surgery; peripheral vascular surgery; cardiac surgery; urology; high risk obstetrics; and high risk neonates have been weighted by one-third. Low-risk obstetrics, low-risk neonates, and those over 70 have been weighted by two.

No correction has been made for the records that were missing or not reviewed on the assumption that they are missing at random and thus will not affect the rate of AEs in any cell. Although this assumption may not be exactly correct, the overall rate of missing, 4%, is so low that any plausible degree of non-randomness cannot much affect the estimates.

In order to calculate standard errors that account for the clustering of the sample at the hospital level, we have aggregated the weighted values to the hospital level and used the multiply-imputed data at each hospital to draw inferences as described in Rubin.[9]

To summarize, we have estimated two second stage regression equations in which the dependent variables are the logit of the probability of an AE and negligent AE conditional upon an AE. These equations produce estimated coefficient vectors at the hospital level and associated variance-covariance matrices for each of the vectors of first stage coefficients described above. We have then used the average of these vectors as our estimate of the effect on claims of the probability of an AE and on negligence conditional upon an AE. One component of the variance-covariance matrix of this average is the average of the variance-covariance matrices. A second component accounts for the uncertainty from the

[9]Donald B. Rubin, Multiple Imputation for Nonresponse in Surveys; New York: John Wiley and Sons, 1987.

first-stage estimated probabilities, by adding to the variance of each element the standard deviation of that element across the coefficient vectors. Precise descriptions and justifications for this procedure for drawing inferences are given in Rubin (1987).

Interest in the second stage is focused on the coefficient of the claims variables. As mentioned in the text, we have estimated equations with solely a claims variable included (a sort of reduced form), as well as equations that include other covariates. The other covariates used in the second stage include age specified as the proportion of sample admissions in each of the four age categories used in the first stage regression; payer status as defined in the first stage regressions; race as defined in the first stage regressions; the DRG category variable as defined in the first stage regressions; and whether the hospital is a public hospital.

II. Endogeneity of the Claims Variable

In this chapter we have been discussing causality as flowing from claims to negligence (i.e., deterrence). Such a relationship should produce a negative sign on the claims variable; the higher the claims (or threat of suit), the lower the adverse or negligent adverse event rate. But causality also might flow from negligence to claims. We would expect that the more negligence was present in any year, the more claims would subsequently be filed. Hence, a simple correlation between claims rates and negligence rates might be positive or negative. More importantly for our purposes, regressing negligence rates on claims rates using Ordinary Least Squares (OLS) could produce a result on the coefficient of the deterrence variable that is biased toward finding no effect or even a positive effect.

We have taken two measures to deal with this problem. The first, as explained in the text, is to use lagged claims as an explanatory variable; that is, claims closed or opened in 1983.

It is clear that adverse events in 1984, the dependent variable, cannot cause claims in 1983, so there is no direct dependence that flows from the dependent variable to our explanatory variables. Nonetheless, there could be a bias in the coefficient if there is some factor not controlled for in our regression equation that is stable over time and that affects claims. Thus, if our explanatory variables do not adequately control for the cause of adverse events and the cause is stable over time, there would be correlation between claims in past years and the residual term in the regression we estimate. An example would be a substandard physician who continues to practice, generating both claims and negligent adverse events.

To test for this we have used an instrumental variables approach, and we have tested whether our measure of lagged claims is endogenous as explained in the text. Our instruments were the per capita income and average education level of the county in which the hospital was located, the proportion of the county's population that was urban, and the county's population density. We do not reject the null hypothesis.

Technical Appendix Table 1

DRG GROUPING FOR 13 SPECIALTIES

1	ORTHOPEDICS	209-241, 248-255
2	UROLOGY	302-315, 323-324, 328-330, 334-343, 348-352
3	NEUROSURGERY	1-8, 27-30
4	THORACIC	75-77, 83, 84, 94, 95,
5	CARDIAC	103-109
6	VASCULAR SURGERY	110-114, 119-120
7	NORMAL OB	371, 373-374, 379-382,
8	HIGH RISK OBSTETRICS	370, 372, 375-378, 383-384
9	NORMAL NEWBORNS	391
10	NEWBORNS WITH PROBLEMS	385-390
11	GENERAL SURGERY	146-167, 170-171, 191-201, 257-270, 276-282, 285-293, 344-345, 392-394, 400-402, 406-408, 415, 424, 439-446, 456-460, 461
12	GENERAL MEDICINE,	416-423, 447-455, 462-467,
	DERMATOLOGY,	271-273, 283-284,
	NEUROLOGY	9, 12-26, 31-35,
	CARDIOLOGY	115-118, 121-145
	RHEUMATOLOGY	242, 244-247, 256,
	ONCOLOGY	10-11, 64, 82, 172-173, 203, 274-275, 346-347, 366-367, 403-405, 409-414,
	NEPHROLOGY	316-322, 325-327, 331-333,
	HEMATOLOGY	395-399,
	ENDOCRINOLOGY	294-301,
	GASTROENTEROLOGY	174-184, 188-190, 202, 204-208,
	PULMONARY	78-81, 85-93, 96-102,
	MEDICAL BACK	243
13	ALL OTHERS	(INCLUDES GYNECOLOGY, OPHTHALMOLOGY, OTOLARYNGOLOGY, CARDIOLOGY, ENDOCRINE, GASTROENTEROLOGY, NEPHROLOGY, ONCOLOGY, PULMONARY, RHEUMATOLOGY, ETC.)

Chapter 11

CONCLUSIONS AND REFLECTIONS

In this chapter we present our conclusions concerning the incidence of medical injury in New York, the response of the tort litigation system to that injury, and the losses suffered and compensation received by its victims. In addition, we offer some impressions concerning the deterrent effects of the tort system. Finally, we consider some implications of our findings.

The Nature and Incidence of Medical Injury

Of the 2.7 million patients hospitalized in New York in 1984, 98,609, or 3.7%, experienced injury that was the result of medical intervention, and not of the underlying disease. In that group, 27.6%, or 27,179 injuries resulted from negligence. That means that 1% of all hospitalized patients experienced negligent injury that led to some prolongation of the hospitalization and/or disability at the time of discharge.

More than 70% of the injuries led to minimal or moderate disability of less than six months in duration. In 9%, or 9,000 patients, however, the resultant disability lasted longer than six months. Further, 14%, or more than 13,000 patients, died at least in part as a result of their injuries. More than half of the latter group suffered negligent injuries. But it should be emphasized that many deaths occurred in patients who already had a shortened life expectancy as a result of their underlying illnesses, and it was not possible to quantify the contribution of the adverse events to their deaths.

The risks of adverse events and of injuries caused by negligence were greater in the elderly. Blacks had higher rates than whites of both adverse events and adverse events resulting from negligence, but we believe these higher rates were likely due to the kind of care provided in many hospitals with a high proportion of minority patients. In hospitals that care for

large numbers of people of different races, blacks and whites had nearly identical adverse event rates and percent of adverse events due to negligence.

Adverse event rates varied 10-fold between individual hospitals, when standardized for age and diagnostic related group (DRG) level. Although standardized adverse event and negligence rates for small hospitals (fewer than 8,000 discharges/year) were less than for larger hospitals, these differences were not significant. Hospital ownership (private, nonprofit, or government) also was not associated with significantly different rates of adverse events. The fraction of adverse events due to negligence in government hospitals was 50% higher than in nonprofit institutions, however, and three times that in proprietary hospitals. The standardized rates of adverse events in upstate, non-metropolitan statistical area (MSA) hospitals were one-third those of upstate metropolitan hospitals and less than one-fourth those in New York City. The percent of adverse events due to negligence was not significantly different. Non-teaching hospitals had half the adverse event rates of university or affiliated teaching hospitals, but university teaching hospitals had rates of negligence that were less than half those of the non-teaching or affiliated hospitals.

Nearly half of all adverse events occurred in patients undergoing surgery. Not surprisingly, therefore, the operating room was the site where very many adverse events occurred. However, a relatively low fraction of those adverse events resulted from negligence.

We believe our findings support the view that medical intervention is a risky enterprise. As was found in the only other large study of the problem, that in California, most injuries are <u>not</u> the result of negligence. This is not to say that negligent injuries are not a major problem. On the contrary, we found at least as much negligence in New York as occurred in California a decade earlier. Further, a much larger

fraction of negligent than of non-negligent injuries have serious consequences, including death.

Our observations are in keeping with the proposition that patients who are older, patients who are sicker, and patients who are undergoing more complex procedures -- and these circumstances are often linked -- are more likely to suffer medical injury. Much non-negligent medical injury reflects the state of the art: we cannot, for example, predict with certainty whether a patient will be sensitive to a drug that he has never previously received. However, we can say with assurance that a severe infection requiring a new antibiotic puts the patient at risk of experiencing an adverse event, even in circumstances where all participants use today's knowledge as well as possible. Thus, one would anticipate that in those institutions where patients with more complex illness are hospitalized and where more complex procedures are carried out, more medical injury would take place. This we have observed. But also in such institutions where state of the art medicine is more likely to be practiced, one would anticipate less negligence. This, too, we observed.

For similar reasons, the fact that we found more adverse events in surgical patients does not mean that surgeons are more careless than their medical colleagues. Nor does the finding of more negligent injuries in surgical settings speak to more carelessness among surgeons. Our study, as all studies of this genre, does not and cannot detect negligence as such, but rather the injury that stems from negligence. The momentary lapse on the part of an internist who forgets to ask about sensitivity to an antibiotic until the end of an interview (but before writing a prescription) has far different consequences than the neurosurgeon's momentary lapse that occurs during an operation on the brain or spinal cord. One goal of our study was to examine such issues; the nature of medical injury and of negligent medical injury will help guide investigators who seek to reduce the occurrence of these events.

The fact that we have confirmed previous observations that many more injuries are unrelated to negligence than ascribable to it has potentially important policy implications. If the goal of our society is to see that the injured are compensated, it is important to note that the patient whose kidney failure is ascribable to a non-negligent medical intervention is no less incapacitated than the patient with the same injury that results from negligence. An arrangement such as the tort litigation system that requires proof of negligence in order to provide compensation may, if it works efficiently, serve the second group of patients well, but brings nothing, indeed, is not intended to bring anything, to the first group. Nonetheless, solely from these findings we do not know how well existing compensation schemes such as health and disability insurance serve either group. For that reason we undertook the patient survey.

Litigation Data

We turn now to determining how claims relate to medical injury. In 1984 the number of negligent adverse events was eight times the number of tort claims. If the experience of prior years is applicable, approximately half of the claims will be paid. This would mean that the number of negligent adverse events will exceed the number of paid claims by 16 times. On the other hand, the litigation gap seems much smaller for more severe and more costly disabilities: here one finds two to three times as many such injuries as there are paid claims.[1] Thus, even with respect to this more serious subset of our injury sample, these findings indicate that we do not now have a problem of too many claims; if anything, there are too few.

[1] This uses the figure from Chapter 7 that there are about 2,800 injuries inflicting moderate or greater disability on patients under 70 years of age who will not file claims.

However, when we compared the tort claims brought by the patients in our sample with the judgments made by our medical reviewers, we found that in a substantial proportion of cases where claims were filed, our reviewers judged from the medical record that a negligent adverse event had not occurred. Thus, the tort system imposes the costs of defending claims on providers who may not even have been involved in an injury, let alone a negligent injury. As of the time of our writing, few such claims have been resolved, with or without payment. Therefore, we have no information about the success of the tort system in weeding out the meritorious claims from those that appear to be non-meritorious.[2] We hope to monitor these cases as they proceed through the legal process, so that we can ultimately provide data on how the claims arising out of our sample of cases will be resolved.

Patient Survey

In any event, the tort system is providing very limited access to compensation for a large majority of patients who suffer negligent adverse events, and none for the much larger numbers who are injured due to no one's fault. There are other compensation systems available to people who suffer iatrogenic injuries, including a variety of health insurance plans, sick leave, and disability insurance. Our patient survey was designed to document the actual losses suffered by injured patients and the extent to which those losses are redressed or not by general loss insurance. With such information one can estimate the cost of a specialized no-fault program to compensate all injured patients.

[2] As has been emphasized elsewhere, there are cases in which negligent injury occurred and no evidence would be expected in the hospital record.

At this stage in our work we have completed and report on only one method for estimating the losses suffered by the five categories of patients we studied: workers, homemakers, children, the retired, and the disabled. We envisioned a no-fault program that would compensate specific kinds of economic losses flowing out of adverse events resulting from medical intervention. That program (like current tort law) would provide full compensation for all medical expenses, lost wages and fringe benefits, and lost household production (the latter being valued at the market wage for working women). On the other hand, the program would exclude both economic losses suffered in the first six months from the date of admission to the hospital, and the pain and suffering and other non-economic harm to the injured patient. The first exclusion was adopted largely because such shorter-term disabilities are far more likely to be protected under existing sick leave and other such programs. As well, while compensation for pain and suffering is a long-established (although now controversial) feature of the tort system, little if any of this kind of harm is paid for by existing no-fault schemes. We did, however, collect from permanently disabled patients detailed information about degrees of physical and functional impairment, data which could be used to generate estimates of the cost of some such benefit if so desired.

We estimate that the net compensable losses (thus defined) suffered by patients hospitalized in New York in 1984 were $894 million (in 1989 dollars). In arriving at that number the most crucial step was attributing the patient's medical, wage, and household production losses to the adverse event; that is, identifying the additional losses that would not have been incurred but for the adverse event. However, the tables in Chapter 8 depict the considerable difference that was made by the six months rule, by deducting taxes on earnings, and by the personal consumption allowance for the deceased. Our estimates are also sensitive to whether Medicare and Medicaid would

continue to be a primary payer. Also of interest is the fact that only about 20% of long term lost earnings (as contrasted with over 85% of medical costs) were in fact compensated by other sources of insurance.

Putting our $894 million estimate in perspective, it is slightly more than the 1988 total of $850 million of malpractice premiums paid directly in New York in 1988. It is considerably less than the $1 billion in total malpractice costs after one counts self-insurance by larger hospitals and other health care organizations.

Still, one cannot directly compare those two numbers. Not only does the tort system now pay benefits for some important harms (in particular, pain and suffering) that are not incorporated in our hypothetical no-fault program, but one must add to the latter's costs a sizable allowance for administrative and legal expenses. While no-fault systems do eliminate disputes about negligence, they still require judgments about the cause of the injury in question (which, as we observed earlier, itself may involve an implicit judgment of fault for certain kinds of medical injuries). Our best known no-fault system, workers compensation, now expends roughly 20% of its revenues on administration, much of it devoted to the controversial areas of occupational disease and permanent partial disability. Although we found that we could readily resolve most questions concerning the cause of the patient's injury and could distinguish the harm due to injury from that due to underlying disease, our experience with a number of difficult cases suggests that no-fault patient compensation would likely have a somewhat higher administrative cost ratio than does present-day workers compensation. (The data we have collected, though not yet analyzed, about the degree and distribution of rater confidence in these causal and attribution decisions will provide some help in the effort to fix these projected administrative costs more precisely.)

From the patient survey we conclude that a no-fault system must be considered a financially viable option for medical injuries. As we observed in Chapter 8, if we were to use as a benchmark the compensation program that New York now offers its citizens injured on the job, -- basically providing full payment of medical costs and partial replacement of lost wages (not fringes) -- a benefit structure such as this seems readily affordable for all the patients injured in New York hospitals irrespective of provider fault (and even making conservative assumptions about both administrative costs and about the confidence intervals for our loss estimates.)

Major issues of principle and of design in the debate about tort-fault versus no-fault remain -- most prominently the issue of prevention. But our data indicate that the no-fault option cannot be ruled out on grounds of cost alone.

Studies of Deterrence

Our work thus far is largely inconclusive with respect to the deterrent effect of the tort system. On the one hand, physicians believe that they are about three times as likely to be sued for a negligent case than for a case with an injury that did not involve negligence. Moreover, physicians who felt themselves at greater threat of suit are more likely to have changed their practice patterns in the past ten years. Specifically, they were more likely to order tests and more likely to have reduced their scope of practice over the past ten years. Finally, there is some evidence of greater hospital costs per case in those hospitals at greater threat of suit, as measured by open claims per discharge. All of these findings would be consistent with a deterrent or preventive effect of the tort system on injuries, although the evidence on cost would also be consistent with wasteful defensive medicine.

On the other hand, we could find no compelling statistical evidence that hospitals facing higher claims rates had lower adverse event rates or lower negligent adverse event rates conditional on an adverse event. Nonetheless, the precision with which we could estimate any effect is not high, and there is a substantial possibility that there is a deterrent effect and our sample of 51 hospitals was too small to detect it.

What lessons then do we draw from our overall study with respect to deterrence? Chapters 9 and 10 do contain some evidence that there are behavioral effects of the tort system, and it seems likely to us that some may reduce medical injury. For example, an elderly surgeon whose technical skills have deteriorated may be more likely to give up surgery sooner if the threat of litigation is higher than if it is not. Similarly, under those circumstances a hospital may be more likely to set up a protocol for administering anesthesia, and to assign nurses to count sponges placed in patients undergoing surgery. Thus, there may well be deterrent effects, though reasonable people could differ about their magnitude.

The more relevant issue, however, is the amount of deterrence under any other system relative to that under the tort system. Experience in other areas where no-fault insurance operates, most notably workers compensation and unemployment insurance, indicates that a no-fault plan to compensate medical injuries could be designed to incorporate incentives to prevent injuries.