Defensive Medicine and Medical Malpractice

July 1994

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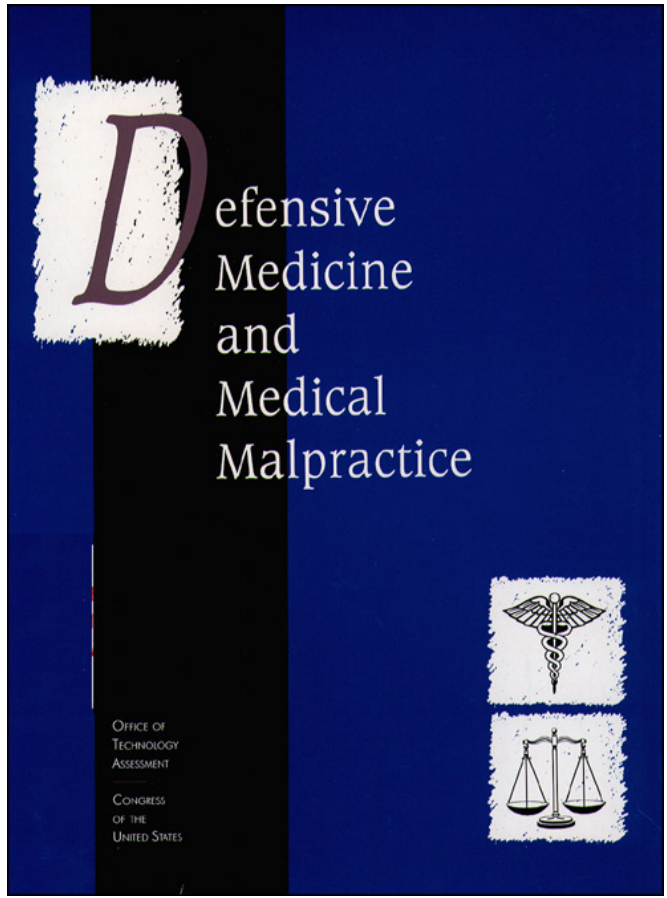

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Foreword

The medical malpractice system has frequently been cited as a contributor to increasing health care costs and has been targeted in many health care reform proposals as a potential source of savings. The medical malpractice system can add to the costs of health care directly through increases in malpractice insurance premiums, which may be passed on to consumers and third–party payers in the form of higher fees. However, total direct costs of the medical malpractice system represent less than 1 percent of overall health care costs in the United States.

The medical malpractice system may also increase costs indirectly by encouraging physicians to practice defensive medicine. In this assessment, the Office of Technology Assessment first examines the nature of defensive medicine, adopting a working definition of defensive medicine that embraces the complexity of the problem from both the physician and broader public policy perspectives. It then presents and critically examines existing as well as new evidence on the extent of defensive medicine. Finally, it comments on the potential impact of a variety of medical malpractice reforms on the practice of defensive medicine.

This assessment was prepared in response to a request by the House Committee on Ways and Means and the Senate Committee on Labor and Human Resources. The report was prepared by OTA staff, but OTA gratefully acknowledges the contributions of the assessment advisory panel, numerous researchers who did work under contract to OTA, and many other individuals who provided valuable information and reviewed preliminary drafts. As with all OTA documents, the final responsibility for the content of the assessment rests with OTA.



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Note: OTA appreciatess and is grateful for the valuable assistance and thoughtful critiques provided by the advisory panel members. The panel does not. however-, necessarily disapprove, or endorse this report. OTA assumes fu!l responsibility for the rcport and the accuracy of its contents.

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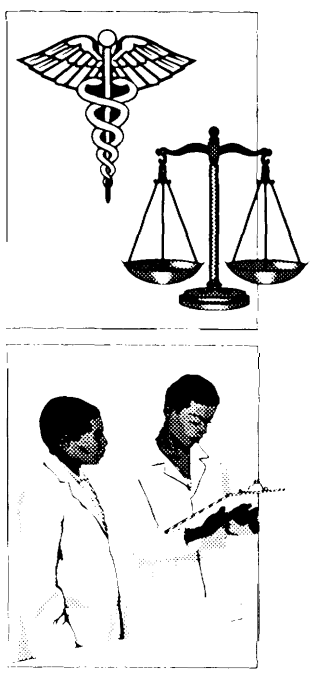

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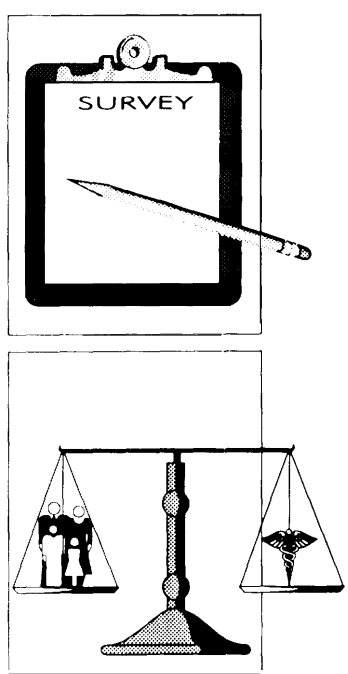

Findings and Policy Options 1

SUMMARY OF FINDINGS

. Defensive medicine occurs when doctors order tests, procedures, or visits, or avoid certain high-risk patients or procedures, primarily (but not necessarily solely) because of concern about malpractice liability.

- Most defensive medicine is not of zero benefit. Instead, fear of liability pushes physicians' tolerance for medical uncertainty to low levels, where the expected benefits are very small and the costs are high.
- Many physicians say they would order aggressive diagnostic procedures in cases where conservative management is considered medically acceptable by professional expert panels. Most physicians who practice in this manner would do so primarily because they believe such procedures are medically indicated, not primarily because of concerns about liability.
- It is impossible to accurately measure the overall level and national cost of defensive medicine. The best that can be done is to develop a rough estimate of the upper limits of the extent of certain components of defensive medicine.

Overall, a small percentage of *diagnostic* procedures--certainly less than 8 percent—is likely to be caused primarily by *conscious* concern about malpractice liability. This estimate is based on physicians' responses to hypothetical clinical scenarios that were designed to be malpractice-sensitive; hence, it overestimates the rate at which defensive medicine is consciously practiced in diagnostic situations.



- Defensive medicine has a substantial influence on physicians' behavior in certain isolated clinical situations; for example, Caesarean deliveries in childbirth and the management of head injuries in emergency rooms.
- Physicians are very conscious of the risk of being sued and tend to overestimate that risk. A large number of physicians believe that being sued will adversely affect their professional, financial. and emotional status.
- The role of the malpractice system as a deterrent against too little or poor-quality care--one of its intended purposes—has not been carefully studied.
- Traditional tort reforms—particularly caps on damages and amendments to the "collateral source" rule—reduce malpractice insurance premiums, but their effects on defensive medicine are largely unknown and are likely to be small. To the extent that these reforms *do* reduce defensive medicine, they do so without differentiating between defensive practices that are medically appropriate and those that are wasteful or very costly in relation to their benefits.
- One malpractice reform that directly targets wasteful and low-benefit defensive medicine is to enhance the evidentiary status in malpractice court cases of selected clinical practice guidelines that address situations in which defensive medicine is a major problem. The overall effects of this reform on health care costs would probably be small, however, because only a few clinical situat ions represent clear cases of wasteful or low-benefit defensive medicine.
- The fee-for-service system both empowers and encourages physicians to practice very low-risk medicine. Health care reform may change financial incentives toward doing fewer rather than more tests and procedures. If that happens, concerns about malpractice liability may act to check potential tendencies to provide too few services.

INTRODUCTION

For more than two decades many physicians. researchers, and government officials have claimed that the most damaging and costly result of the medical malpractice system as it has evolved in the United States is the practice of defensive medicine: the ordering of tests, procedures, and visits, or avoidance of certain procedures or patients, due to concern about malpractice liability risk.

Calls for reform of the medical malpractice system have rested partly on arguments that such reforms would save health care costs by reducing doctors' incentives to practice defensively. Such an argument even found its way into the 1992 presidential debates, when President Bush contended that "the malpractice ...trial lawyers' lawsuits ...are running the costs of medical care up $25 to $50 billion.'" (35)

Such claims notwithstanding, the extent of defensive medicine and its impact on health care costs remain a matter of controversy. Some critics claim that defensive medicine is nothing more than a convenient explanation for practices that physicians would engage in even if there were no malpractice law or malpractice lawyers.

This Office of Technology Assessment (OTA) study of defensive medicine grew out of congressional interest in understanding the extent to which defensive medicine does. indeed, influence medical practice and how various approaches to reforming the malpractice system might alter these behaviors.

The assessment was first requested by Congressman Bill Archer, Ranking Republican Member of the Committee on Ways and Means, and Senator Orrin Hatch, a member of OTA's Technology Assessment Board. Other members of OTA's Technology Assessment Board also requested that OTA examine these issues, including Senator Edward M. Kennedy, Chairman of the Committee on Labor and Human Resources: Congressman John D. Dingell, Chairman of the Committee on Energy and Commerce: and Senators Charles E. Grassley and Dave Durenberger.

OTA addressed the following questions:

- What is defensive medicine and how can it be measured?
- What are the causes of defensive medicine?
- How widespread is defensive medicine today?
- What effect will current proposals for malpractice reform have on the practice of defensive medicine?
- What are the implications of other aspects of health care reform for the practice of defensive medicine?

OTA also published a background paper in September 1993, *Impact of Legal Reforms on Medical Malpractice Costs,* which summarizes the current status of malpractice law reforms in the 50 states and evaluates the best available evidence on the effect of malpractice system reforms on physicians' malpractice insurance premiums.

DEFINING DEFENSIVE MEDICINE

OTA defines defensive medicine as follows:

> *Defensive medicine occurs when doctors order tests, procedures, or visits, or avoid high-risk patients or procedures, primarily (but not necessarily soley) to reduce their exposure to mal - practice liability. When physicians do extra tests or procedures primarily to reduce malpractice liability, they are practicing positive defensive medicine. When they avoid certain patients or procedures, they are practicing negative defensive medicine.*

Under this definition, a medical practice is defensive even if it is done for other reasons (such as belief in a procedure effectiveness, desire to reduce medical uncertainty, or financial incentives), provided that the primary motive is to avoid malpractice risk. Also, the motive need not be conscious. Over time some medical practices may become so ingrained in customary practice that physicians are unaware that liability concerns originally motivated their use.

Most importantly, defensive medicine is not always bad for patients. Although political or media references to defensive medicine almost always imply unnecessary and costly procedures, OTA's definition does not exclude practices that may benefit patients. Rather, OTA concluded that a high percentage of defensive medical procedures are ordered to minimize the risk of being wrong when the medical consequences of being wrong are severe:

> **OTA** asked panels of experts in three medical specialties-cardiology, obstetrics/gynecology (OB/GYN), and surgery-to identify clinical scenarios in which they would expect the threat of a malpractice suit to play a major role in their own or their colleagues' clinical decisions. **The** groups identified over 75 scenarios, all of which involved a patient presenting with a probable minor condition but with a small chance for a potentially very serious or fatal condition.

Thus, concern about malpractice liability pushes physicians' tolerance for uncertainty about medical outcomes to very low levels. Stated another way, concerns about liability drive doctors to order tests, procedures, and specialist consultations whose expected benefits are very low. Using such medical technologies and services to reduce risk to the lowest possible level is likely to be very costly even when the price of the procedure is low, because for every case where its performance makes the life-or-death difference, there will be many additional cases where its performance is clinically inconsequential.

THE EXTENT OF DEFENSIVE MEDICINE

Measuring Defensive Medicine

OTA searched for evidence of defensive medicine in the existing literature and also conducted and contracted for new analyses where feasibility and

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Physicians may stop performing certain tests or procedures if by doing so they can ellminatc the need for costly or hard-to-find malpractice insurance to cover these activities, The most frequently citcd examples of negative defensive medicine are decisions by family practitioners and even some obstetrlcim-gynecologists to stop providing obstetric services. These decisions may be a result of higher malpractice insurance premiums for physicians who deliver babies.

costs permitted. One conclusion from these efforts is **that accurate measurement of the extent** of this phenomenon is virtually impossible.

There are only two possible approaches to estimating how often doctors do (or do not do) procedures for defensive reasons: ask them directly in surveys, or link differences in their actual procedure utilization rates to differences in their risk of liability. Both of these approaches have serious limitations.

If physicians are asked how often they practice defensive medicine in survey questionnaires, they may be inclined to respond with the answer most likely to elicit a favorable political response and thus exaggerate their true level of concern about malpractice. Even when physicians are asked in a more neutral instrument what they would do in certain clinical situations and why, they might be prompted if one of the potential listed reasons relates to concern about malpractice suits. On the other hand, without listed reasons from which to choose, physicians may respond as if the survey is a medical board examination and justify their choices on purely clinical grounds when other factors do in fact operate. In addition, surveys cannot uncover defensive practices performed unconsciously by physicians. In short, surveys can elicit responses that are biased in either direction.

These obvious problems suggest that it might be better to start with actual behavior as recorded in data on utilization of procedures and try to ascertain the percentage of use that arises from fear of malpractice suits. The only way to measure such a percentage is to relate variations in utilization across physicians to variations in the strength of the "malpractice signal" across physicians. For example, physicians practicing in hospitals or communities with high rates of malpractice claims or high malpractice premiums might be more sensitive to malpractice risks and alter their practices accordingly. Statistical analyses of such variations could pick up these differential effects.

To take this tack, data must be available to control for other factors that can account for differences among physicians in their utilization of services, including the health status of the patient population. Often such data are unavailable.

Even more troublesome is the fact that this approach can pick up only the *incremental* effects of stronger versus weaker malpractice signals. It cannot accurately assess the generalized "baseline" level of defensive medicine that may exist in all physicians' practices. Professional society newsletters and other national media often report on especially large or unusual jury verdicts. Physicians may react to these news items as vigorously as they would to their own or their colleagues experience with malpractice claims. Physicians may be almost as defensive if they face a small risk of being sued as they are if they face a higher risk. This is especially likely if they have the power, with no negative and sometimes positive financial consequences, to order tests and procedures that reduce medical risks to their lowest feasible level.

Despite these problems, OTA undertook new analyses that offered the best chance, within time and budgetary constraints, of adding to the current state of knowledge about the scope of defensive medical practice while acknowledging the methodological problems described above. OTA-initiated studies included the following:

- Four separate physician surveys (conducted jointly with three medical specialty societies) containing hypothetical clinical scenarios that asked respondents to indicate what clinical actions they would take and the reasons for them. The survey materials contained no references to suggest that OTA's purpose was to study malpractice or defensive medicine, though malpractice concern was one of five reasons listed for each possible course of action.
- An analysis of the relationship between the use of prenatal care services in low-risk pregnancy and the level of malpractice risk facing doctors in Washington State.
- An analysis of the relationship between New Jersey physicians' responses on a clinical scenario survey and their personal malpractice claim history.

- An analysis relating changes in New York State physicians' obstetric malpractice insurance premiums to decisions to abandon the practice of obstetrics.

These analyses join a small preexisting literature and discussions with experts in the area to form the basis for OTA's findings. The following studies were particularly important evidence because of their relatively strong research designs:

- A study by Localio and colleagues of the relationship between Caesarean delivery rates and malpractice risk in New York State hospitals (128).
- A survey of physicians responses to c1inical scenarios conducted by a Duke Law Journal project on medical malpractice (58).

Other studies, including the ninny direct physician surveys conducted over the years by national. state, and specialty medical societies. are reviewed by OTA in this report. Their results are highly suspect, however, because they invariably prompt responding physicians to consider malpractice liability as a factor in their practice choices.

OTA's Clinical Scenario Surveys

OTA collaborated with three medical specialty societies to survey their member physicians using hypothetical clinical scenarios. The three medical specialty societies were the American College of Cardiology, the American College of Obstetricians and Gynecologists, and the American College of Surgeons. Each of these groups cooperated with OTA to convene a panel of experts, identify clinical scenarios, draw stratified national samples of their memberships, and generally assist in the development and implementation of the surveys.

The selected scenarios were clinical situations that the panel identified as likely to provoke the practice of defensive medicine. All but one of the nine clinical scenarios ultimately selected for inclusion in the four surveys involved clinical encounters requiring some diagnostic judgment or action.[2] Virtually all of the clinical scenarios involved patients whose presenting signs and symptoms would suggest only minor injury or a self-limiting problem, with a very small outside chance of a debilitating or life-threatening illness. Although the panelists were not asked to assess the appropriateness of different clinical actions or procedures, implicit in their creation of each scenario was the idea that conservative treatment was an acceptable course of action.

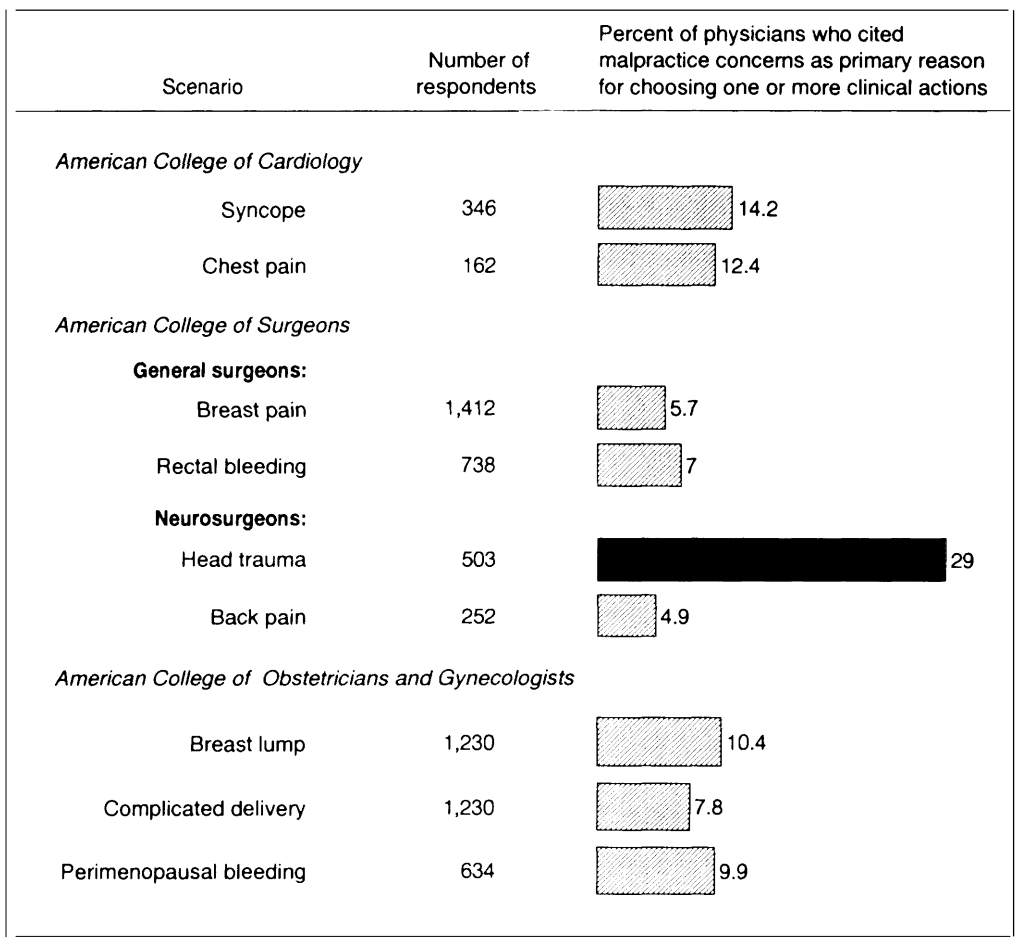
Across the scenarios, between 5 and 29 percent of all responding physicians cited malpractice concern as the primary reason for choosing at least one clinical action (figure 1-1), Yet, in six of the nine scenarios, defensive medicine was cited by less than 10 percent of all physicians as the primary reason for choosing at least one clinical action. The scenario with the greatest evidence of defensive medicine was a case of a 15-year-old boy with a minor head injury resulting from a skateboard accident. In that case, almost one-half of all respondents reported that they would order a computed tomography (CT) scan, and 45 percent of those who said they would order it would do so primarily out of concern for malpractice.

Figure 1-2 shows the specific clinical actions with the *highest* reported rates of defensive medicine. These procedures constitute only 23 out of the 54 "interventionist" actions in the nine scenarios (i.e.. other than waiting or doing nothing). Physicians who reported they would order the procedure said they would do so primarily out of concern about malpractice between 11 and 53 percent of the time. Yet. the percentage of responses in which the procedure would be ordered out of concern for malpractice seldom exceeded 5 percent, because relatively few physicians reported that they would choose the procedure at all.

Across all possible actions in the nine scenarios, excluding waiting or doing nothing, a me-

[2] The only nondiagnostic scenario involved obstetrical management of a difficult labor, in which diagnostic uncertainty plays a role in determining the course of action.

FIGURE 1-1: Extent of Defensive Medicine in the OTA Clinical Scenario Surveys



NOTE Results are weighted to reflect the total population of professional society members on which the survey sample was based Numbers reflect responses to "case" verslons of the scenarious only (see ch 3) See table 3-2 for confidence intervals of these proportions

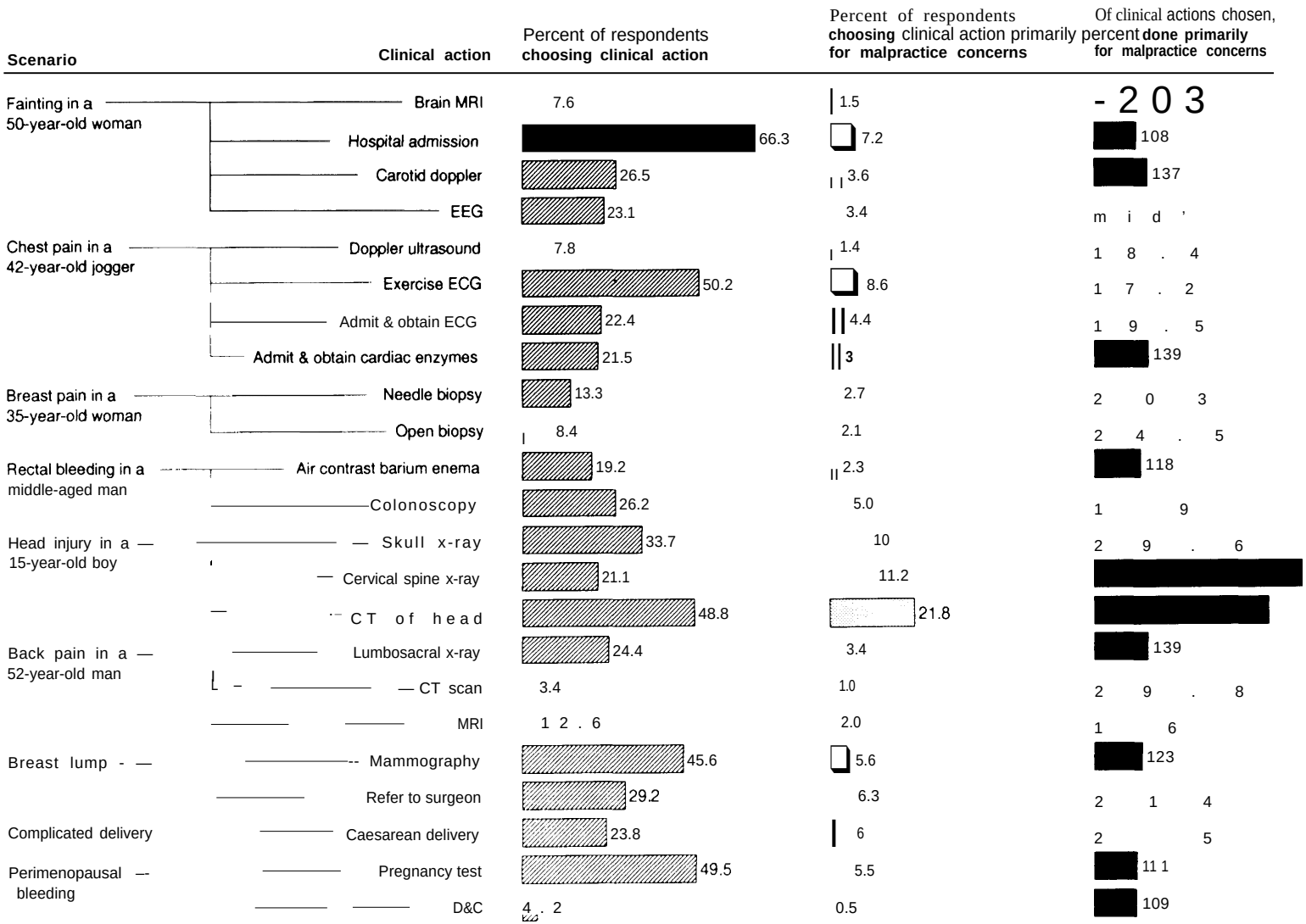
SOURCE Off Ice of Technology Assessment, 1994

dian[3] of 8 percent of those who chose the procedure or hospital admission said they would do so primarily because of malpractice concerns (see table 3-3 in chapter 3).

The surveys covered only three medical specialties, at least two of which have relatively high exposure to malpractice liability. Also, the level of defensive medicine recorded in these scenarios is

[3] That is, one-half of the procedures had a percentage score higher than the median percentage; one-half had a percentage score that was lower than the median.

FIGURE 1–2: Frequent Occurrences of Defensive Medicine Reported in the OTA Clinical Scenario Surveys



KEY MRI – magnetic resonance image EEG - electroencephalogram ECG = electrocardiogram CT computed tomography D&C dilation and curettage

NOTES A *frequent* occurrence was defined as when at least 10 percent of physicians who would take the clinical action would do so primarily because of malpractice concerns Twenty-three out of a total of 54 clinical options (excluding waiting or doing nothing) in the OTA scenarios met this criterion (case scenarios only) See table 3-3 for complete results

SOURCE Off Ice of Technology Assessment 1994 Data analyzed in collaboration with Dr Russell Localio of Pennsylvania State University

likely to be above average for diagnostic encounters, since the scenarios were explicitly designed to evoke concern about liability. Thus, a relativel y small proportion of diagnostic procedures overall--certainly less than 8 percent—is likely to be caused by conscious concern about malpractice liability.

In virtually all of the scenarios, many physicians chose aggressive patient management styles even though conservative management was considered medical] y acceptable by the expert panels. In most cases, however, it was medical indications, not malpractice concern, that motivated the interventions:

> For example, almost two-thirds of all cardiologists reported that they would hospitalize a 50-year-old woman who had fainted in a hot church with no other serious problems, but only 10.8 percent of those would do so primarily out of concern for malpractice risk. instead, the vast majority of those who would hospitalize a patient of this kind reported that they would do so primarily because it was medically indicated.

Thus, if malpractice risk is a **major** factor influencing physicians' actions in general, it is not conscious, but works indirectly over time through changes in physicians assessments of appropriate care.

It is impossible to use these very specific clinical scenarios to estimate overall health care costs that are due to defensive medicine. First, the scenarios were selected to heighten the probability of finding defensive practices. Second, they involve very specific presenting signs and symptoms. Slight changes in the scenarios might yield large changes in the kinds of procedures chosen and their consequent costs. OTA did estimate the national cost of defensive medicine for selected procedures in two scenarios: Caesarean delivery in a difficult labor, and diagnostic radiology in a young emergency room patient with minor head injury.

- The annual national cost of "defensive" Caesarean deliveries in cases of prolonged or dysfunctional labor in women between 30 and 39 years of age is approximately $8.7 million.
- The annual national cost of defensive radiologic procedures (CT scans, skull x-rays, and cervical spine x-rays) in children between 5 and 24 years of age arriving in emergency rooms with apparently minor head injuries is roughly $45 million.

Although these estimates in and of themselves represent a miniscule percentage of total health care costs, they cover on] y a few procedures performed in very specific clinical situations, and they reflect only that portion of defensive medicine that physicians practice consciously. The numbers suggest, however, that if conscious defensive medicine is costly in the aggregate, it would have to operate in a very large number of clinical situations, each contributing a relatively small amount to total costs.

Procedure Utilization Studies

OTA's review of the evidence relating actual use of services to measures of malpractice risk, including the OTA-sponsored studies using this approach, found only limited evidence that defensive medicine exists. The strongest evidence was produced in a study by Localio and colleagues of Caesarean deliveries in New York State (128):

> New York State obstetricians who practice in hospitals with high malpractice claim frequency and premiums do more Caesarean deliveries than do obstetricians practicing in areas with low malpractice claim frequency and premiums. The odds of a Caesarean delivery in a hospital with the highest frequency of obstetric malpractice claims were 32 percent higher than the odds of a Caesarean delivery in a hospital with the lowest f'requency of obstetric malpractice claims (128).

Two OTA-sponsored research contracts that attempted to relate physicians' utilization rates to

their actual or perceived malpractice risks failed to find significant relationships between the risk of malpractice and physician behavior:

> A study of 1,963 low-risk pregnancies managed by 209 physicians in Washington State failed to find a significant relationship between physicians' personal malpractice suit history or the malpractice claims rate in the county and the use of selected services, such as diagnostic ultrasound early in pregnancy, referrals to specialists, and Caesarean delivery (10).

> A study of 835 New Jersey surgeons, cardiologists, obstetrician/gynecologists, and internal medicine specialists failed to find a significant relationship between physicians' personal malpractice suit history and their use of services as reported in their responses to hypothetical clinical scenarios (73)

Both of these studies were based on a small number of cases; consequently. failure to find a significant relationship could mean either that no relationship exists or that the studies lacked the statistical power to identify a significant relationship. Also, the New Jersey study did not examine the malpractice signal that physicians may receive because they practice in a high-risk locality. Nevertheless, if doctors do react to the strength of the 'malpractice signals" measured in these studies, the changes are not large enough to be detectable in studies of the size reported here.

OTA commissioned one study of "negative" defensive medicine—the decision not to provide a service because of concern about the risk of malpractice liability or the availability or cost of malpractice insurance. That study also failed to find significant effects:

> Doctors active in obstetrics in New York State in 1980 who experienced rapid increases in malpractice insurance premiums between 1980 and 1989 *were* NOT found to be more likely than physicians with lower premium increases to withdraw from obstetrics practice during the same period (81).

RECENT FACTORS AFFECTING THE AMOUNT OF DEFENSIVE MEDICINE

OTA staff talked with over 100 physicians and health care professionals about their beliefs regarding the existence and frequency of defensive medicine. These conversations reinforced the findings of opinion surveys that many physicians *believe* defensive medicine is an important and growing phenomenon that distorts their medical judgment in ways they find very troubling.

New Technology

Perceptions of increasing risk may arise from the continual development of new diagnostic techniques and improved therapies for serious conditions. Both of these technological trends could make the consequences of not testing more serious. The availability of more accurate or early tests or new therapies changes a natural risk—for example, the risk of death from disease—into a preventable risk, and places a new burden on the physician to correctly interpret the results of the test. When a medical technology is new, physicians may have greater uncertainty about the appropriate indications for its use and therefore more conscious concern about the potential for liability:

> A urologlst interviewed by OTA described hls practice of ordering a prostate specific antigen (PSA) test, a screening test for prostate cancer first available in 1990, on all men over age 50 who come to his office, regardless of their complaint, and despite his belief that the test may, in the end, do more harm than good

> A cardiology fellow who makes daily decisions about the choice of clot-dissolving drugs in heart attack patients described the difficulty she and her colleagues are having evaluating the evidence on the relative effectiveness of newer versus older drugs under specific conditions of use and in different kinds of patients She and her colleagues openly discuss the potential for a malpractice suit if a patient dies when the less costly thrombolytic agent is used

The fear of malpractice does not operate alone to stimulate the diffusion of new technologies, however. As with all medical practices, a complex array of factors influences physicians' decisions to adopt new technologies:

> In an OTA-sponsored study of low osmolality contrast agents (LOCAs), a new kind of contrast media injected in patients undergoing certain diagnostic x-ray examinations, Jacobson and Rosenquist found that legal concerns ranked seventh out of 11 possible factors in decisions on whether or not to use this expensive new technology. Clinical factors, such as patient safety and comfort, were ranked as the most important determinants by the responding physicians (105).

Changing Consequences of Malpractice Suits

Another reason for growing concern about the malpractice system is that the negative consequences to physicians of being sued appear to be on the rise. For the majority of physicians, a single malpractice suit does not have a significant impact on personal finances or professional status. Recent federal and state laws requiring reporting of malprtictice claims to a central repository. however, may increase the professional and financial significance of even a single lawsuit in the minds of physicians.

Since 1990, federal law has required malpractice insurers to report all payments on behalf of a physician to a National Practitioner Data Bank (NPDB). The NPDB maintains a short narrative on the incident. and this information must be accessed by hospitals when hiring new staff and every two years for review of current staff (45 C.F. R. Sec. 60. 10). It can also be accessed by other potential employers. Some states also have malpractice reporting requirements tied to licensing or disciplinary processes.

None of the federal or state databanks currently in place is open to the general public. Yet the ongoing debate as to whether to allow public access to the federal NPDB (165) may have already increased physicians' anxiety about being sued.

THE IMPACT OF MALPRACTICE REFORM ON DEFENSIVE MEDICINE

OTA assessed the impact of malpractice reforms on the practice of defensive medicine. Other impacts of malpractice reform may be as or even more important than defensive medicine, including impacts on:

- the quality of care,
- the physician-patient relationship,
- access to the legal system,
- the adequacy of compensation for medical injuries.

These other impacts of malpractice reform have been reviewed extensively elsewhere (12,21,37, 102,122,191 ,208a,243) and are not discussed at length in this report.

Predicting the impact of any malpractice reform on defensive medicine is very difficult, because there is little understanding of which specific aspects of the malpractice system actually drive physicians to practice defensively. Is it simply distaste for having one's clinical actions called into question? Is it distaste for having one's actions judged by lay juries? Is it a desire to avoid court trials? Is it a fear, however unfounded, of being financially ruined? Or is it the belief that the legal standard of care is so capricious that the system offers no clear guidelines for how to avoid liability?

The relative importance of each of these factors in explaining motivations for defensive medicine will determine the effect of specific malpractice reforms on defensive medicine. For example, if physicians are afraid only of the extremely low chance of financial ruin, then reforms that eliminate the possibility of such an event might reduce defensive medicine even with no major changes in the system. But if physicians abhor the prospect of having to defend their judgment in any forum, then malpractice reformers would have to find ways to substantially reduce the frequency with which claims are brought, regardless of the process for resolving those claims.

OTA assessed how different kinds of tort reforms would address the various aspects of the malpractice system that might motivate physi-

cians to practice defensively. We also analyzed the extent to which different proposals address the fundamental problem of how to discourage defensive practices that are clearly wasteful or very costly in relation to their benefits without discouraging "good" defensive practices.

Traditional Tort Reforms

Over the past 20 years, almost every state has passed some type of medical malpractice tort reform. Most of the legislative activity occurred during the mid-1970s and mid-1980s, in response to two malpractice "crises" marked by rapid increases in medical malpractice insurance premiums (22).

The "traditional" tort reforms enacted by many states have, for the most part, tinkered with the details of the existing system, leaving malpractice cases in the tort system. The goal of most of these state-level reforms has been to reduce malpractice insurance premiums by limiting the number of claims, the costs of resolving a claim, or the damages that can be paid. The reforms adopted most widely in the states include:[4]

- shortening the statute of limitations (the time period in which a suit can be brought),
- limiting plaintiffs' attorney fees,
- requiring or allowing pretrial screening of claims,
- placing caps on damages,
- amending the collateral source rule (requiring or letting the jury reduce the award by the amount received from health or disability insurance), and
- periodic payment of damages (instead of up-front lump-sum payment).

Although some of these reforms effectively limit the direct costs of malpractice (i.e., malpractice insurance premiums) (236), evidence of their effect on defensive medicine is weak.

The best evidence that physicians' behavior can be altered by reducing the frequency with which plaintiffs sue, or the amounts that can be recovered when they do, comes from a study of the impact of malpractice risk on Caesarean delivery rates in New York State (128, 129). That study, which found a systematic relationship between the strength of various malpractice risk measures (i.e., claim frequency and insurance premiums) and Caesarean delivery rates, is consistent with the hypothesis that tort reforms that reduce claim frequency or malpractice premiums will reduce defensive behavior. Yet. it is unknown how far Localio's findings for obstetricians and Caesarean rates can be generalized to other states, specialties. clinical situations, or procedures-especially in light of the failure of other studies funded by OTA to find a correlation between malpractice risk and clinical behavior.

To the extent that physicians respond not to the absolute risk of suit but to their inability to predict what kinds of behavior will lead to a suit, they may behave defensively even in the face of very low malpractice risks. Malpractice reforms that limit damages or reduce claim frequency without making the system more predictable may not have much effect on defensive behavior. In the early 1970s, when malpractice claim frequency and premiums were quite low compared with today's levels, there was still considerable concern about defensive medicine (13, 14,20,58,243).

Some experts have suggested that states (or the federal government) develop compensation guidelines to help juries determine a "fair" award for noneconomic damages (i.e.. "pain and suffering") (23a). The guidelines would be keyed to characteristics of the plaintiff and his or her injuries. including age and type or level of disability. This approach would be less punishing to seriously injured plaintiffs than a single cap on damages applicable to all cases, and it would also promote consistency in amounts awarded across juries and jurisdictions.

[4] For a detailed compendium of the current implementation of these reforms in the 50 states, see OTA's background paper on the subject (236).

The effect of such compensation guidelines on claim frequency is unpredictable, because they would probably raise some awards while lowering others. If the mean award declined, claim frequency would decline as plaintiffs' attorneys weighed the lower potential payouts from success against the cost of pursuing a case. Such marginal reduction in claim frequency would probably not do much to induce physicians to reduce defensive medicine.

One problem with the traditional tort reforms enacted by the states is that their effect on defensive medicine is not very well targeted. While they may reduce physicians' general anxieties about being sued, these reforms do not send specific signals about which defensive practices are more or less appropriate.[5] Thus, even when limits on access to the courts or on amounts that can be recovered do reduce defensive medicine, they may do so indiscriminately, reducing appropriate as well as inappropriate practices.

Recent Malpractice Reform Proposals

Recent proposals for malpractice system reform go beyond the traditional approaches of the 1970s and 1980s. They involve substantive changes in the relationships among the parties to malpractice suits or in the process or criteria used to determine negligence and compensation. They include the following:

- greater use of clinical practice guidelines as the standard of cam,
- enterprise liability,
- alternative dispute resolution (ADR), and
- selective no-fault malpractice systems.

Clinical Practice Guidelines

A larger role for clinical practice guidelines in medical malpractice litigation is being tested in a small number of states. The State of Maine's ongoing experimental program has become a model for such efforts. In Maine, selected guidelines can be used as an affirmative defense (i.e., a complete defense if it can be shown that the defendant adhered to the guidelines). The state has recently adopted guidelines in areas of practice thought to involve substantial defensive medicine (e. g., Caesarean deliveries, cervical spine x-rays for head injury, preoperative testing).

The Maine guidelines were written in part to reduce defensive medical practice. For example, Maine's guideline for cervical spine x-rays prov ides physicians with explicit criteria for when it is *not* necessary to obtain such an examination. If these guidelines are upheld in court, physicians may be able to rely on them for legal protection when they decline to perform such a test.

There is some evidence that the Maine initiative has reduced defensive medicine in some Select procedures (e.g., cervical spine x-rays in emergency rooms). Because the number of clinical situations in which such guidelines can be applied is limited, however, these approaches may not have much of an impact overall on medical practice or health care costs.

Even under the current legal system, where guidelines carry no greater legal weight than other expert testimony, the continued development of clinical practice guidelines by professional groups and governments might reduce defensive medicine in certain areas if they help clarify the legal standard of care.

The greatest potential benefit for increasing the use of guidelines in the tort system is that they offer a method for *selectively* addressing problems of defensive medicine by differentiating procedures that are appropriate from those that are not worth their medical risks and costs. They can also address instances in which defensive medicine is practiced unconsciously by alerting physicians to the new standard of care as reflected in the guidelines.

[5] Indeed, there is virtually no information on whether reductions in malpractice risk lead to improvements or a decrease in the quality of medical care. Localio's study of Caesarean deliveries in New York State did not address the effect on patient outcomes of lower Caesarean delivery rates in areas with lower malpractice risk.

It is worth noting, however, that guidelines are generally developed by panels of experts (usually dominated by physicians) who, for a variety of reasons, may recommend aggressive use of diagnostic and therapeutic interventions without consideration of the implications for health care costs. For example, prior to the 1992 reauthorization of the federal government new guideline development program, the expert groups developing the guidelines were advised to consider only medical effectiveness and risks, and *not* the cost, of interventions (241). Moreover, when there is a great deal of uncertainty about the relative effectiveness of alternative courses of action, the developers of guidelines often demur from taking a stand and instead provide an array of diagnostic and treatment options, leaving it to the physician to make the choice. Thus, the net impact of the general trend toward more development of practice guidelines on defensive medicine is unclear.

Enterprise Liability

The main feature of enterprise liability is that the physician would no longer be personal] y liable for his or her malpractice. Instead, the institution in which the physician practices, or the health plan responsible for paying for the services, would assume the physician's liability.

Enterprise liability promises certain efficiencies; for example, eliminating the costs of suits involving multiple defendants and thereby facilitating settlement. It could also promote better quality control within institutions and health plans while relieving physicians of some of the psychological burdens of a malpractice suit.

Although the physician would not be named in the suit and may not have as great a role in the pretrial discovery process, if the case does go to trial, the physician would probably be the primary witness. (Presently, only 10 to 20 percent of malpractice cases go to trial.) Thus, although there maybe some psychological benefit to physicians of not being held personally liable, they may still feel burdened by the prospect of having to defend their actions in court.

The number of claims against health plans or institutions could go up under enterprise liability if patients feel more comfortable suing institutions than suing their own doctors. If doctors find themselves being witnesses in a larger number of suits, and subject to greater oversight and possibly disciplinary action by the institution in which they practice, they could become even more fearful of malpractice and, hence, practice more defensive medicine.

The enterprise that assumes the liability would have incentives to limit potential suits and improve the quality of care. Enterprise liability may not, however, lead to a reduction in the kinds of defensive medicine whose costs are high in relation to their potential benefits unless the organization also has incentives to limit health care costs. If the organization that assumes liability has no financial incentive to control health care costs, it may target its quality control efforts to eliminate all adverse events and charge patients or their insurers for defensive procedures with low benefits and high costs.

Alternative Dispute Resolution

ADR can take many forms, but a common attribute of most such programs is that the dispute is heard or decided by one or more arbitrators or mediators rather than by a jury. The ADR proceeding is often less formal, less costly, and less public than a judicial trial.

ADR can be nonbinding or binding. For nonbinding ADR, the case can still proceed to trial. Therefore, if physicians practice defensively out of anxiety about court trials, binding ADR may be the better approach to reduce defensive medicine.

The most feasible approach to binding ADR is voluntary pretreatment contracts between patients and providers (or between patients and health plans) in which the parties agree prior to treatment to arbitrate any malpractice suit that might arise from that treatment. This approach has not been

tried very often because of present uncertainty about the enforceability of such contracts.6

To the extent that physicians believe an ADR system is more fair than the judicial system, they might practice less defensively. Also, cases would not go to public trial under binding ADR, so if physicians abhor the publicity of a trial, they would be relieved of that concern.

On the other hand, arbitrators may be more likely to reach compromise decisions rather than completely exonerate the physician. Physicians might find they are held liable more often in arbitration than in trial. An increase in liability findings could make physicians more defensive.

Finally, ADR may increase the frequency of suits, because the cost of bringing a claim should be lower and plaintiffs may find arbitration less intimidating than civil litigation. To the extent that physicians react to increasing claim frequency by becoming more defensive, this feature of ADR could increase the practice of defensive medicine.

Like the traditional malpractice reforms, any effect of ADR on defensive medicine would be general; ADR could not provide specific guidance about which defensive medical practices are, and which are not, worth their costs.

The American Medical Association/ Specialty Society Medical Liability Project

Another ADR model has been proposed by the American Medical Association and 31 national medical specialty societies (AMA/S SMLP). Each state's medical licensing board would have exclusive authority to hear and decide malpractice claims. The newly expanded medical licensing boards would consist of seven members, with no more than three coming from the health professions,

The AMA/SSMLP proposal outlines in detail the process for claim resolution and proposes certain revisions in the legal rules to be used, including a cap on damages and a change in the legal standard of care to more explicitly recognize resource limitations. For plaintiffs, the plan offers easier filing of claims and free legal services once a claim is judged to have merit. Most cases would probably be decided by a claims investigator, a single physician, or a hearing examiner, depending on the stage at which they are resolved.

Although the proposal would eliminate physicians' anxiety about court trials, linking malpractice claim resolution with medical licensing could make physicians apprehensive in another way. In addition, if the AMA is correct in its prediction that many more injured patients would file claims under such a system, physicians could find themselves named in more claims. Both of these factors—higher claims frequency and the increased link between malpractice claims and formal disciplinary bodies--could increase incentives to practice defensive medicine.

On the other hand, if the determinations of the medical boards improve the consistency of findings of negligence, physicians may get clearer signals about which kinds of defensive medicine will protect them from disciplinary actions. Thus, the system may differentiate better than the present system between "good" and "bad" defensive medicine.

Selective No-Fault

Under a selective no-fault system, medical experts would identify categories of medical injuries that would be compensable without a determination of fault on the part of the physician. When these injuries occur, patients would be compensated through some kind of administrative system. Claims not involving these injuries would still be compensated through either a judicial system or an ADR system, retaining negligence as the liability standard.

Virginia and Florida have implemented no-fault systems for a selected set of severe birth-related injuries. These injuries were chosen because the issue of causality is very muddled in these cases (i.e., it is difficult to prove that an injury did not result from the birth process). Although the

6 The courts often scrutinize the fairness of such contracts, because the health care provider usually has superior bargaining power.

two programs have been operational for close to five years, no studies have documented whether these programs have increased the availability of obstetric care or changed the use of any obstetric procedures.

A selective no-fault system with broader application across a wide array of clinical situations has been proposed by researchers since the early 1970s (2, 19,22 1). The developers of this proposal have identified about 150 "accelerated compensation events" (ACES), defined by adverse outcomes resulting from certain clinical actions or omissions. These adverse outcomes should be avoidable with good medical care. Under their proposal, injuries falling into an ACE category would be compensated quickly and with no inquiry into negligence.

Selective no-fault goes further than enterprise liability in relieving the physician of personal liability; it should therefore reduce some pressures to practice defensively, Yet compensation under an ACE may still carry a personal stigma for the physician.

ACES can and probably would be used to monitor the quality of care as well as to determine compensation, and physicians might be disciplined if they are implicated in a large number of ACES. Some ACES involve failure to diagnose a fatal condition, such as breast cancer. If, as OTA contends, a substantial proportion of defensive medicine involves extra tests and procedures to avoid very unlikely but serious consequences, physicians may feel as compelled to practice defensively to avoid an ACE as they do to avoid a malpractice suit.

DEFENSIVE MEDICINE IN AN ERA OF HEALTH CARE REFORM

Positive defensive medicine as it is practiced today evolved in the context of a fee-for-service health care system in which physicians for the most part faced little or no financial penalty and sometimes were financially rewarded when they ordered or performed extra tests and procedures. Even the growth of health maintenance organizations (HMOs), which put plans at risk of exceeding their capitated budgets, has not changed this reality for most of the health care system.[7]

As noted above, OTA concluded that most defensive medicine practices are not completely wasteful but instead reflect the tendency of liability concerns to push physicians' tolerance for medical risks of a bad outcome to extremely low levels. The fee-for-service system of third-party payment both empowers and encourages physicians to practice very low-risk medicine.

A new health care delivery system may evolve in the coming years as a consequence of health care reform. Whether the new system actually changes the financial incentives to order or perform tests and procedures remains to be seen, but some proposals clear] y do envision a new set of incentives. In particular, proposals that embody managed competition as a governing framework for the organization of the health care system would create incentives for health plans to reduce the number of procedures used by their members.

Just as the malpractice system may push doctors' tolerance for medical risks to low levels, managed competition may provide a countervailing force to raise it back up. Indeed, a critical question regarding managed competition is how quali(y of care will be monitored and enforced in plans where incentives to cut costs are strong.

For all its problems, the medical malpractice system is designed to hold the medical profession to an acceptable level of quality by deterring negligence. Whether the current malpractice system is effective in achieving this objective is a matter

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[7] Today, only about 17 percent of Americans are enrolled in HMOs (141).

[8] *Managed competition* i, this report refers to a system in which each consumer chooses among competing health plans that offer a standard set of benefits at different prices (i.e., premiums). Competition among plans for patients on the basis of price as well as quality would presumably force plans to look for opportunities to eliminate wasteful or only marginally useful serv Ices. In acid tion, the Administration's proposal imposes caps on increases in health insurance premiums. I t i\ expected that plans will exert greater influence on their participant ing doctors and hospitals to be more cost conscious in making clinical decisions.

of debate. OTA found only one study that tested the deterrent effect of the malpractices system, and that study failed to show an effect:

> In an attempt to estimate the deterrent effect of the malpractice system, researchers at Harvard University recently analyzed the relationship between the number of malpractice claims per negligent injury and the rate of negligent injury in New York State hospitals in 1984. They failed to demonstrate a statistically significant relationship between malpractice claim activity and the rate of negligent injury in a hospital (254).[9]

Nevertheless, given new incentives to do less rather than more in a "reformed" health care system, major reforms of the medical malpractice system that reduce or remove incentives to practice defensively could reduce or remove a deterrent to providing too little care at the very time that such mechanisms are most needed.

Ultimately two questions must be answered as the United States moves to a new health care system:

- what level of medical risk are the American people willing to bear for the sake of cost containment?
- what quality assurance mechanisms should be used to decide on and enforce adherence to that level?

Under the malpractice system as it is currently configured, juries help decide the acceptable level of medical risk in at least some cases. Better methods may exist, but until such alternatives are tried and tested, the advisability of major changes in the malpractice system is a policy issue that deserves careful consideration.

POLICY OPTIONS

OTA's assessment of the extent of defensive medicine will not close the debate on how often such practices are performed, how costly they are, or how much they affect the quality of care. Although physicians do not appear to *consciously* practice defensive medicine as often as they say they do, the malpractice system may have a subtle and cumulative effect over time on what physicians believe is the appropriate level of care. This *unconscious* component of defensive medicine may comprise a large part of the defensive medicine "problem." Yet, an unknown proportion of both conscious and unconscious defensive medicine improves the outcomes of patient care.

A reasonable goal of federal policy would ~be to reduce physicians' ability or incentives to engage (either consciously or unconsciously) in defensive practices whose benefits to patients are not worth their costs. Finding specific policies that move the health care system toward that goal is not so easy, however.

Below are four specific options for addressing the problem of defensive medicine. Each is imperfect, some more so than others. OTA has provided a rationale for suggesting that certain of these options provide a sharper scalpel than others for excising the "bad" practices while retaining the "good." Finally, each policy option has different implications for fairness and equity to patients. These implications are laid out in the discussion following each option.

OPTION 1: *Reduce the strength of the malpractice signal by mandating traditional tort reforms that limit plaintiffs' access to the courts or potential compensation.*

Some traditional tort reforms, particularly caps on noneconomic damages and elimination of the collateral source rule, have been shown to reduce malpractice premiums consistently in a number of studies. Any tort reform that makes it more difficult to prove liability or less potentially remunerative for a plaintiff to file and pursue a malpractice case should reduce claim frequency or payouts.

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[9] Lack of statistically significant findings in this case may result from the small sample of hospitals in the study. The estimated effect of the malpractice system on negligent injuries was negative, though not statistically significant.

That malpractice premiums are lower in the presence of these reforms is therefore not surprising.

The evidence linking frequency of claims and malpractice premiums to the frequency with which physicians practice defensive medicine is sparse, consisting of one study showing that lower claims frequency and lower premiums are associated with lower rates of Caesarean deliveries (128). (Smaller studies of other procedures commissioned by OTA failed to find an effect.) That study did not address the effect of differences in Caesarean delivery rates on patient outcomes. Thus, while the very limited existing evidence supports the notion that defensive medicine might be sensitive to the general strength of the malpractice signal, the existence of the effect across different procedures and the impact on the quality of care are unknown.

The main problem with using the traditional reforms to reduce defensive medicine is that they do not target the practices that are likely to be least medically beneficial. In reducing physicians general anxiety about being sued or having unlimited financial exposure, the y may also weaken whatever "deterrence" value the current malpractice system provides, with no quality assurance system offered in its place to otherwise hold physicians accountable for the care they render.

Some traditional tort reforms, particularly those that limit potential compensation (e.g., caps on damages or mandatory periodic payment of damages), affect the vety small minority of plaintiffs who receive high damage awards. These are disproportionately those with the most severe injuries. Not only does this raise the issue of fairness to victims of negligence, but it ~UISO sends a signal to physicians that the most serious results of malpractice will have more limited financial consequences.

OPTION 2: *Consider permanent changes in malpractice law only after the structure of the health care system under federal health care reform has been settled.*

A "go-slow" approach to malpractice reform would permit state and federal policy makers to assess the incentives and quality assurance mechanisms inherent in health care reform before changing the basic structure of the malpractice system.

While this approach would avoid the potential for removing whatever "deterrence" value the current malpractice system offers before alternative quality assurance mechanisms are in place, it could also put the malpractice system in direct conflict with the incentives inherent in health care reform. In particular, under health care reform. physicians may feel pressure to make cost-benefit tradeoffs in their clinical choices. Yet the current legal standard of care does not explicitly recognize cost concerns as a legitimate input into c1inical decisionmaking.

Over time, cost-benefit tradeoffs may become integrated into the customary standard of care and the courts will defer to this new standard of care. However, there is likely to be a transition period in which the physician will be pushed to conserve resources but will not be provided legal protection for those decisions. This could lead to new tensions among physicians. patients, and patients' health plans.

OPTION 3: *Promote predictability in the legal standard of care for defensive clinical situations using practice guidelines.*

One kind of malpractice reform that will be useful regardless of the shape of health care reform is the development and enhanced use as evidence in the courts of' clinical practice guidelines covering situations in which defensive medicine plays a substantial role.

OTA found that Caesarean deliveries and head injuries in emergency rooms are two c1inical situations in which defensive medicine is a major problem. Other possible subjects for guideline development include procedures for followup of routine mammography (see chapter 2) and routine preoperative testing (125).

The federal government already has the administrative mechanisms in place to sponsor guideline development efforts in areas identified as high potential sources of inappropriate defensive prac-

tices. The Agency for Health Care Policy and Research's Office of the Forum for Quality and Effectiveness in Health Care could sponsor the development of such guidelines and dissemination to the states. It could also act as a clearinghouse for similar defensive-medicine targeted guidelines developed at the state level.

The development and dissemination of guidelines linked to specific problems of defensive medicine may be enough to encourage states to adopt legislation that would give them greater weight in court and thus help clarify the standard of care. Alternatively, the federal government could mandate changes in state civil procedure to make it easy to introduce such guidelines as evidence or to enhance their evidentiary weight. Constitutional issues would have to be considered in designing any such federal legislation.

The impact of this approach on defensive medicine is more predictable than other reforms, because guidelines would be targeted to specific areas where defensive medical practice is prevalent and widely agreed to promote medical practices with low expected benefits and high costs.

The overall impact on health care practices and costs is likely to be small, however. There are probably a very limited number of clinical situations in which such guidelines could be developed with sufficient specificity to provide clear-cut clinical guidance and legal protection. In addition, even if clinical practice guidelines do indicate when a procedure need not be ordered, there is no guarantee that physicians will substantially change their behavior to conform to such guidelines.

It must also be recognized that such guidelines, when legislatively mandated for use in malpractice cases, are implicitly setting upper limits on the cost that society is willing to bear for small improvements in health outcomes. Who makes these decisions (e.g., physician groups, broadly representative public commissions) may affect the acceptability of guidelines to practicing physicians, their legal status, and the degree to which they reflect society's true preferences.

Establish demonstration projects of malpractice reforms that either remove or limit the physician's involvement in the litigation proc - en.

Physicians express dissatisfaction with many aspects of the legal system, for example, large noneconomic damages, the jury's ability to determine the standard of care, and the quality of expert witnesses.

Although traditional tort reforms may reduce physicians' anxieties about being sued or financially ruined, they do not eliminate the threat of being sued and do nothing to clarify the standard of care. Reforms that relieve the physician of personal liability may be more likely to reduce defensive medicine. The two most promising reforms from this perspective are:

- selective no-fault compensation systems using ACES, and
- enterprise liability.

If personal liability is retained, then reforms that significantly alter the nature of the physician's interaction with the legal system to provide greater consistency in outcomes and payouts may have some impact on defensive medic inc. Such reforms include:

- programs to encourage the use of binding arbitration, and
- the AMA/SSMLP administrative proposal.

The impact of these reforms on defensive medicine is unknown. However, any reform that relieves the physician of personal liability could also have an adverse impact on the quality of care. To counter this effect, quality control systems would need to be in place. If these systems used sanctions to ensure quality, they could also prompt defensive medical practice. Much would depend on whether physicians perceive new quali-

t y control systems as rational and fair—two adjectives rarely used by physicians to describe the tort system.

Because of the many uncertainties about the impact of these reforms on defensive medicine and the quality of care, state-level demonstrations may be warranted to evaluate these more innovative alternatives before full-scale commitment to any particular model.

Finally, the savings generated through reductions in defensive medicine, which are likely to be modest overall, are unlikely to offset the additional costs of some of these reforms. In particular, a selective no-fault system and the AMA/SSMLP administrative proposal will probably substantially increase net expenditures for medical injury compensation.

Defensive Medicine: Definition and Causes

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Despitc widespread use of the term in the current health policy debate, there is limited understanding of-—let alone consensus on-- the true nature of defensive medicine. This chapter explores the concept of defensive medic inc. First, it sets forth the Office of Technology Assessment (OTA's) definition and **compares** it with alternative approaches to defining defensive medicine. Second. it explores the sources of defensive medicine: why physicians want to avoid lawsuits: what types of signals the malpractice system sends to physicians; the role of institutional risk management and quality assurance activities in defensive medicine; and finally, the role of graduate medical education in promoting defensive medicine.

DEFINING DEFENSIVE MEDICINE

OTA'S definition of defensive medicine, adapted from several sources (71 ,252,260), is as follows:

> *Defensive medicine occurs when doctors order tests, procedures, or visits, or avoid high-risk patients or procedures, primarily (but not necessarily solely) to reduce their exposure to malpractice liability. When physicians do extra tests or procedures primarily to reduce malpractice liability, they are practicing positive defensive medicine. When they avoid certain patients or procedures, they are practicing negative defensive medicine.*[1]



[1] Physicians may stop performing certain tests or procedures if by doing so they can avoid the need for costly or hard-to-find malpractice insurance to cover these activities. The most frequently cited example of negative defensive medicine is decisions by family practitioners and even some obstetrician-gynecologists to stop providing obstetric services. These decisions may result when malpractice insurance premiums vary depending on whether the physician delivers babies.

Note that this definition includes only those practice changes affecting the rate of use of medical services, Changes in practice style, such as spending more time with patients, giving more attention to careful documentation of the medical record, or making greater efforts to communicate or obtain informed consent, are not defensive medical practices under OTA's definition. Documenting the extent of these changes in practice style would be very difficult, and their positive implicat ions for the quality of care are less equivocal than are the implications of doing more or fewer procedures.

OTA's definition raises three important issues of interpretation. Each is discussed below.

Conscious vs. Unconscious Defensive Medicine

The first question is whether the desire to limit malpractice liability must be conscious in order for a practice to be labeled defensive medicine. OTA's definition permits a practice to be defined as defensive even if the physician is not consciously motivated by a concern about liability.

How can physicians practice defensively without knowing that the y do? Over time, many procedures originally performed out of conscious concern about liability may become so ingrained in customary practice that physicians are no longer aware of the original motivation for doing them and come to believe that such practices are medically indicated. Medical training may incorporate such customs without explicitly communicating to interns and residents the medicolegal considerations behind them. Thus, although physicians may practice conscious defensive medicine in a limited set of clinical situations, additional defensive practices may result from the cumulative response of the medical profession to signals from the malpractice system.

Primary vs. Sole Motivation

Under OTA's definition, defensive medicine is assumed to exist even when it acts together with other motivations, such as belief in a procedure's effectiveness, desire to reduce medical uncertainty, or financial incentives. A more stringent definition of positive defensive medicine would limit it to the ordering (or avoidance) of tests and procedures *solely* to protect the physician against future malpractice suits.[2] Under this definition, the physician would be engaging in defensive medicine only when he or she believed that a test or procedure offers no chance of helping the patient.

OTA rejected this stringent definition of defensive medicine for two reasons: first, such behavior, when it is conscious, appears to violate physicians' ethical principles; and second, medical practice involves implicit judgments about whether the benefits of tests or procedures outweigh their costs and risks to the patient. The fear of being sued may cause physicians to increase their tolerance for these costs and risks. So, while the physician may be driven by malpractice concerns to "rule out" a highly unlikely diagnosis, he or she can also believe that the action will offer some benefit to the patient. The frequency of these instances probably vastly outweighs the frequency of defensive medical practices performed with certainty that the patient will *not* benefit.

Defensive Medicine: Good, Bad, or Both?

OTA's definition does not specify whether the defensive action is good or bad for the patient; it requires only that the physician's primary motivation to act is the desire to reduce the risk of liability. Thus, some defensive medical practices may be medically justified and appropriate while others are medically inappropriate.

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[2] For example, Dr. James Todd, executive vice president of the American Medical Association, recently defined defensive medicine as "objective measures taken to document clinical judgment in case there is a lawsuit... " (226). Lewin-VHI, Inc., adopted a similar definition in a recent study funded by MMI, **Inc.** (125).

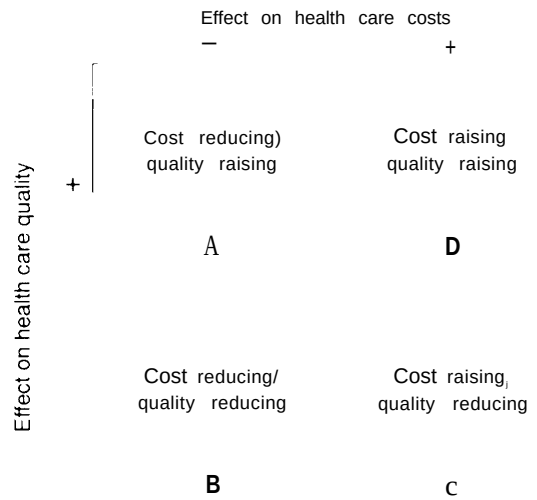
This definition conflicts with other definitions of defensive medicine. The Secretary's Commission on Medical Malpractice, for example, defined defensive medicine to include only those medical practices performed primarily to prevent or defend against the threat of liability *that are not medically justified (243).* This definition is consistent with the widely accepted pejorative view of doctors ordering unnecessary and cost] y procedures because of the malpractice system.

OTA rejected this definition for two reasons. First, measuring the extent of defensive medicine under such a definition would require judgments about the appropriateness of all medical practices—a task far beyond the scope of this study and infeasible given the current state of medical knowledge. Second, malpractice reforms that reduce physicians' propensity to engage in inappropriate defensive medicine may also reduce their use of appropriate practices. Analysis of the impact of malpractice reforms on defensive medicine should include explicit consideration of their impact on both kinds of behavior.

One explicit goal of the medical malpractice system is to deter doctors and other health care providers from putting patients at excessive risk of bad outcomes. To the extent that it exists, defensive medicine that improves outcomes contributes to the deterrence goal. In the process of improving outcomes, "good" defensive medicine may raise or lower health care costs. But the malpractice system may also encourage physicians to order risky tests or procedures that both raise health care costs and on balance do more harm than good for patients. These practices are clearly both inappropriate and wasteful of health care dollars.

Figure 2-1 gives a simple schematic of four kinds of defensive medicine. classified according to their impact on health care outcomes and costs. Box A includes practice changes that are unquestionable y good for the health care system and its patients, because patients do better and health care costs are reduced. Box C includes practices that are unquestionabl y bad. Boxes B and D, however , represent situations involving tradeoffs between health care quality and health care costs. All defensive practices in boxes A and D would contribute to the "deterrent" effect of the malpractice system, because patients do better when they have access to them. Which practices in box D are medically appropriate, however, is a matter of judgment. Is an expensive test justified for a patient who has one chance in 15,()()0 of having the disease in question? What if the chance of a positive test is one in 100,000? What if the disease in question is not very serious'? Judgments about questions such as these determine the dividing line be - tween appropriate and inappropriate medical procedures.

FIGURE 2-1: A Typology of Defensive Medical Practices



SOURCE: Office of Technology Assessment, 1994

OTA has no evidence on the frequency of these four different kinds of defensive medicine.[3] Not only is it difficult to measure the frequency of defensive medicine overall, but when instances of defensive medicine are found it is also difficult to categorize them according to their ultimate impact on costs and health outcomes. The following two examples illustrate this point.

Example #1: Referrals for Breast Biopsy After Screening Mammography

The Physicians' Insurance Association of America recently reported that delayed diagnosis of breast malignancy was the second most common cause of malpractice claims and accounted for the greatest percentage of money awarded to plaintiffs (184). It would not be surprising, then, if it were discovered that radiologists responsible for interpreting screening mammograms practice defensively by referring for- biopsy any patient whose mammogram contained a suspicious finding, no matter how equivocal.

A study by Meyer and colleagues at Brigham and Women's Hospital, a large teaching hospital in Boston, suggests that community-based radiologists are more aggressive in their recommendations for followup of suspicious mammograms than are hospital radiologists (160). Table 2-1 contrasts the positive biopsy rate for mammograms interpreted by staff radiologists at the teaching hospital with that of mammograms referred for biopsy by radiologists practicing at other institutions or in the community. Whereas 26.1 percent of the biopsies performed on cases originating at the hospital were positive, only 16.7 percent of biopsies for cases originating in other settings were positive. 4

TABLE 2-1: Positive Biopsy Results in Cases Referred from Screening Mammograms, 1987-88

	Number of biopsies	Percent malignant[a]
Mammograms interpreted at Brigham and Women's Hospital	280	26.1%
Mammograms Interpreted at other hospitals and offices[b]	981	16.7C

[a]Lobular carcinomas considered benign
[b]There were 73 separate hospitals and offices
[c]Statistical significance of difference in percent malignant = p< 05

SOURCE J E Meyer, T Eberleln P Stomper, and M Sonnenfeld, "Biopsy of Occult Breast Lesions Analysis of 1261 Abnormalities, "Journal of the American Medical Association 263(17) 2341-2343, 1990

Meyer and colleagues did not study whether the difference was due to defensive medicine on the part of the community radiologists versus other factors such as skill or patient differences, Even if it were possible (o conclude that the entire difference is due to defensive medicine, however, it Would still be impossible to classify it according to the schematic of figure 2-1. On the one hand, the community radiologists followed a diagnostic process that presumably would find more cancers, most likely at an earlier and more easily treatable stage. On the other hand, breast biopsy is painful and scarring, which not only distresses patients but also makes future diagnosis of malignancy in a patient with a negative biopsy more difficult (27).

Some experts advocate mammographic followup in 6 to 12 months in cases where the first mammogram is interpreted as most likely benign (28). However, in a retrospective study of **400** breast biopsies from screening mammograms, researchers found that eliminating 126 of the "least suspicious" findings from the group referred for biopsy would have missed five cancers, four of

[3] At present, there are almost no studies of the extent to which the malpractice system, as it is presently configured, deters physicians from providing care of low quality. OTA is aware of (rely one study addressing this issue in a hospital inpatient population. Researchers at Harvard University r_ee nt], analyzed the relationship between the number of malpractice claims per negligent injury and the rate of negligent injuries in New York State hospitals in 1984. They failed to demonstrate a significant relationship between ii hospital's malpractice claim activity and its rate of negligent injury (254).

[4] The latter percentage is actually inflated, because some referrals from outside the hospital were canceled after consultation with a radiologist at the hospital before scheduling the surgical biopsy.

which were noninvasive at the time of the biopsy (87). If these results are representative, then for every 1,000 biopsies avoided by not referring less suspicious mammogram results, about eight already-invasive cancers would be missed, and a small but unknown proportion of the 40 noninvasive cancers missed would progress to an invasive stage in the followup period.

Whether the benefits from detection of more early breast cancers outweigh the pain and risks associated with negative biopsies is a value judgment, so it is not clear whether defensive medicine, if it is being practiced by community radiologists in Massachusetts, improves or worsens health outcomes. If on balance it does improve health outcomes, it is likely to do so at a high dollar cost. Whether the benefits are worth this high cost is also a value judgment.

Example # 2: Diagnostic X-Ray Examinations in the Hospital Emergency Department

A 1980 study looked at x-ray tests ordered for patients at Stanford University Medical Center's Emergency Department who had a history of trauma during the previous seven days (63). Just prior to x-ray, a member of the research team (either an intern or resident) placed each patient in one of the following four categories using a set of detailed criteria developed for the study:

- positive for fracture
- highly suspicious of fracture
- suspicious of fracture
- medicolegal.[5]

Of the 2,179 patients for whom diagnostic x-rays were ordered, 1,009 (46 percent) were labeled *medicolegal* under the categorization scheme. Of these medicolegal procedures, 7.5 percent were positive for fracture, compared with 20 percent of all procedures. Table 2-2 shows the percent of procedures in each region of the body that were classified as medicolegal. In only one of the 1,009 x-ray procedures classified as medicolegal—an undisplaced navicular (hand) fracture-did treatment change as a result of the x-ray.

The study did not explore the extent to which the emergency room physicians who ordered these x-rays were practicing defensive medicine. Other motivations may have entered into ordering procedures. The study authors suggested that the emergency room physicians, most of whom were interns and residents, may not have had the experience or appropriate training to discriminate adequately among cases. The high percentage of medicolegal spine and skull x-rays (see table 2-2) suggests that physicians tend to be aggressive in their test ordering when the medical consequences of being wrong are very serious.

TABLE 2-2: Frequency of Medicolegal Diagnostic X-Rays in a Series of Emergency Room Procedures[a]

Region	Percent of all procedures	Percent classified medico legal
Cervical spine	1 %40	7 8 %
Pelvis	10	71
Skull	19	70
Sacrum	0 5	69
Lumbar spine	4	62
Other	80	39

[a]Total number of procedures was 2,359 Some patients underwent more than one procedure

SOURCE M Eilastam, E Rose, and H Jones, "Utlllzatlon of Dlagnostlc Radiologic Examinations Journal of Trauma 20(1) 61-66, 1980

Probabilities, Medical Consequences, and Defensive Medicine

When a physician is very certain about a diagnosis—that is, when the probability that the patient has a specific disease is either very high or very low—then his or her desire for confirmatory tests is likely to be lower than when the physician is very uncertain about the diagnosis. Thus, the frequency of test ordering for different patients

5 "Medicolegal" was a name given after the study was completed to all cases not meeting the cl inical criteria for fracture in the other three categories.

should grow as the probability of a disease increases from zero and then declines again as it approaches 100 percent.

When the medical consequences of being wrong are severe, as in the case of a life-threatening or debilitating disease for which early diagnosis would mean better and more effective treatment, then the desire for certainty, and the tests that can increase it, undoubtedly grows. Thus, the frequency of test ordering at any given probability of disease should be higher in patients suspected of having diseases that are more serious.

Roughly 25 to 30 percent of all malpractice cases allege missed or delayed diagnosis (67,235). Thus, when the medical consequences of being wrong are severe, so too are the consequences for malpractice.[6] Defensive medicine should be more frequent in clinical situations with the following characteristics:

- when the disease or condition to be detected or prevented is life-threatening or disabling,
- when timely detection of the disease or condition changes therapy,
- when the change in therapy can be expected to make a real difference to the patient's ultimate state of health, and
- when the diagnostic test or treatment alternative is readily available and low-risk.

In meetings with panels of experts in three specialties—cardiology, surgery, and obstetrics/gynecology—OTA asked panelists to identify clinical situations in which the threat of a malpractice suit would play a significant role in their own or their colleagues' clinical decisions. Uniformly, the situations chosen by panelists were similar to the conditions outlined above—i.e., the patient presented with a probable minor condition, but concern about malpractice liability might lead many physicians to order an expensive diagnostic test, or even admit the patient to the hospital, to rule out a remote but potential] y very serious or fatal condition.

When the same experts were asked to alter the clinical scenarios to remove defensive medicine as a motive, they virtually always added signs and symptoms that increased the probability that the patient had a serious disease.

Figure 2-2 illustrates the general relationship between the probability that the patient has the disease(s) or condition(s) being tested for and the probability that a physician will order a test. As the severity of the suspected disease or condition increases, the desire to test increases at any given probability of disease.

In certain cases, concern about liability might decrease physicians' tolerance for uncertainty and cause them to order tests more frequently when the probability of disease is very low or very high (see figure 2-2). When the probability of disease is very low, the physician may want to "rule out" its possibility. When the probability of disease is very high, the physician may be concerned about documentation of the condition for protection against potential claims of misdiagnosis. At more intermediate probabilities. the effect of malpractice liability on physicians' test ordering might not be so great, since uncertainty is already high. Again, one might expect defensive medicine to be most pronounced when the probability of a positive test is very low but the consequences of not finding the disease are catastrophic.

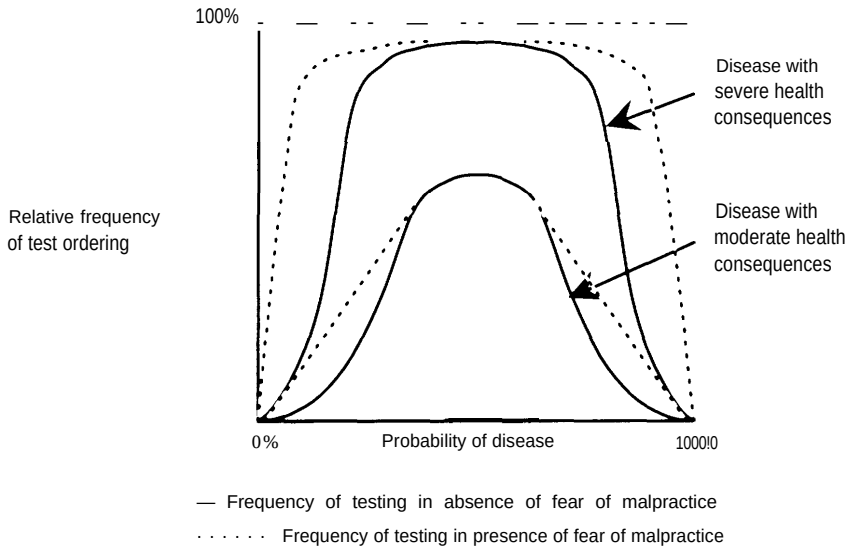
THE SOURCES OF DEFENSIVE MEDICINE

The Consequences of Being Sued

In conversations with OTA, physicians expressed emotions ranging from annoyance to animosity toward the legal system, often questioning its ability to fairly judge medical practice. Physician sur-

[6] Not all of these missed diagnoses result from omissions in testing. Missed diagnoses may occur as a result of failure to complete a physical examination, incorrect interpretation of a diagnostic test, or delay in following up on a positive finding. Omissions in testing probably represent a minority of all cases of missed diagnosis (26, I I 9).

FIGURE 2-2: Hypothetical Impact of Uncertainty and Severity of Disease on Frequency of Test Ordering



SOURCE Office of Technology Assessment 1994

veys reveal that an overwhelming majority believe that most malpractice claims are unwarranted and that the present system for resolving claims is unfair (38, 180). Although some of these beliefs may not be well-founded,' they are real and pervasive in the physician community. Evidence has also shown that, across all specialties, physicians tend to substantially overestimate their risk of being sued (123) (see table 2-3).

Financial Consequences

For the vast majority of physicians, a malpractice suit does not have a major impact on personal finances or professional status, mainly because most physicians have adequate malpractice insurance. Some physicians report that lawsuits damage their reputation or reduce the demand for their services, but most classify such losses as minor, and physicians who have already been sued are less likely than those who have not to report these effects (180).

Physicians do incur some personal financial costs when they are named in a malpractice suit. These costs are primarily in the form of lost days of practice, although sometimes physicians retain personal counsel. (Physicians are usually represented by their insurer's counsel.)

Survey-based estimates of physician time and income lost in defending against malpractice claims range from 2.7 to 5 days of practice and

[7]The best available empirical evidence indicates [hat -U) to 60 percent of malpractice claims are nonmeritorious, but most of these suits are eliminated early in the process *(68,222.235).* In addition, retrospective studies of closed clai M suggest that payment of malpractice claims, whether through settlement or a trial, is not haphazard-the vast majority of indefensible claims are paid, and the substantial majority of defensible claims are dropped (40,68,222). (Defensibility of a claim was judged either by an insurer, physician panel, or hospital.) On the other hand, the studies also document [hat mistakes are so metimes made both m finding physicians negligent who met the standard of care and in failing to compensate victims of medical negligence.

TABLE 2-3: Actual and Perceived Risk of Being Sued Among New York State Physicians

Physician characteristic	Perceived risk: percent of physicians sued per year[a]	Actual risk: percent of physicians sued in 1986	Ratio of perceived risk to actual risk
Specialty group			
Low-risk internal medicine[b]	12 .I%	3870	3.2
Medium-risk general surgery[c]	234	109	21
High-risk obstetrics, orthopedics, neurosurgery	343	208	16
Suit status			
Never sued	149		
Sued at least once	238		
Overall	195	6.6	3.0

[a] The question asked of physicians in this 1989 survey was "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?"
[b] Includes associated specialties such as family practice, gastroenterology, and neurology
[c] Includes associated specialties such as ophthalmology, plastic surgery, and urology

SOURCE Adapted from A G Lawthers A R Localio, N M Laird et al , "Physicians' Perceptions of the Risk of Being Sued, " *Journal of Health Politics. Policy and Law* 17(3) 462-482, fall 1992

from $2,400 to $5,600 in lost income per claim (123,194). In a 1989 survey of New York physicians, six percent of those sued reported that they had retained their own counsel and incurred between $1,000 and $5,000 in out-of-pocket expenses; three percent of sued physicians reported paying out-of-pocket settlement costs, with one percent reporting expenses greater than $25,000 (123).

Physicians' anxiety about being sued may result from misperceptions about the potential financial consequences of a lawsuit. Numerous examples exist of multimillion dollar malpractice verdicts—verdicts that far exceed most physicians' insurance limit.[8] But physicians almost never pay any damages above their policy limits because such awards are usually either covered by several defendants or reduced in post-trial negotiation among the parties (45). Individuals' perceptions of risk, however, do not always agree with objective measures of risk.

Recent federal and state laws requiring repotting of malpractice claims to central repositories may change the perceived importance of even a single lawsuit in the minds of physicians. Since 1990, federal law has required all payments for malpractice made by or on behalf of a physician to be reported to a new National Practitioner Data Bank (NPDB). The NPDB maintains a short narrative on the incident, including any response filed by the physician (246). This information must be reviewed by hospitals when hiring new staff and every 2 years for current staff (45 C.F.R. Sec. 60.10). It can also be accessed by a limited number of other potential employers.

Some states have their own malpractice reporting requirements. In California, for example, a report to the medical licensing board is required whenever a payment of $30,000 or more is made on behalf of a physician (Cal. Bus. & Prof. Code Sees. 801,802,803 (1989)).

The purpose of federal and state reporting systems is to improve monitoring of physician quality and conduct. In California, for example, reports of malpractice awards are reviewed by the licensing board to determine if disciplinary action is warranted (153,224). The overwhelming majority of claims are reviewed by contract physi-

[8] Most physicians carry policies of between $1 million to $2 million per occurrence and $3 million to $6 million per year(211).

cians and closed. Only those with evidence of gross negligence or incompetence are referred to regional offices for further action (224). Disciplinary actions in these few cases are almost always relatively minor; for example, being called in for a conference with a regional medical consultant. In rare cases, the Board may issue a restraining order or suspend a physician medical license (152).

None of the federal or state databanks current] y in place are open to the general public. However, an ongoing debate over whether to allow" public access to the Federal NPDB has probably increased physicians' anxiety about being sued (165).

The financial burden of malpractice premiums may be substantial for certain physicians in high-risk specialties or living in certain geographic areas. Malpractice insurance prcmiums vary by specialty and geographic area and can be very high in some localities. In 1987. obstetricians/ gynecologists (O B/GYNs) in Dade and Broward Counties, Florida. paid $165,300 per year for standard coverage, compared with $69.300 for OB/GYNS outside of those counties, and $19,400 for family practitioners in Dade and Broward Counties (176).

Physicians' reactions to premium costs may sometimes be exacerbated by the fact that premiums are generally not volume-sensitive; OB/GYNs with coverage for high-risk deliveries pay the same premium regardless of how many deli\'-eries they perform (2 100).[9]

While malpractice insurance rates arc generally insensitive to personal malpractice history (21 0), the physician malpractice claim history can lead to denial or termination of coverage 206.207). In addition, a very smal1 percentage of physic i ans may incur some kind of financial or profcssiona sanction from their malpractice insurers if they have been named in negligence suits (207).

Psychological Consequences

Although the financial and professional costs of malpractice liability are real, the primary impact on physicians may be psychological. Physicians report that a malpractice claim causes short-term losses of self-esteem, and in two physician surveys. between 20 and 40 percent reported symptoms of clinical depression, anger, fatigue, or irritability (37,38).[10]

In another survey, 50 percent of physicians felt there would be a short-term decrease in self-esteem, and about one-third felt a suit could lead to long-term behavioral or personality changes, or physical illness. However, physicians who had already been sued reported these adverse effects at a rate about half of that for non-sued physicians, suggesting a "worried well" effect among physicians who have not been sued (180).

The anxiety caused by a lawsuit may continue for a long time. The average time between filing of a claim and its resolution is approximately 33 months, although it may take longer than 48 months (186). Moreover, a claim is often not filed until 20 months after the incident (186), leaving the physician much time to speculate as to whether a particular patient will bring a suit after an adverse outcome.

Signals from the Malpractice System to Physicians

A central goal of the tort system is to deter negligent behavior and hence improve the quality of medical care (253). At least two conditions must be met for the tort system to effective y deter poor quality care: first. the malpractice system must provide physicians with information as to what care is acceptable; second, physicians must be able to improve the quality of care they offer. The malpractice system, however, may not always

[9] A few insurers offer lower premiums for physicians who work part-time or who work in academic settings (210).

[10] The low response rate in both surveys (approximately 32 percent), and the prompting of physicians with a list of symptoms, raises the possibility of response bias.

send a clear signal to physicians about the standard of care the legal system demands (221).

Physicians' Interpretation of *the Legal Standard of Care*

Physicians often express frustration with the malpractice system and, in particular, with the legal standard of care.[11] In onversations with OTA. many physicians claimed that the legal standard of care does not reflect medical practice but is instead a legal construct divorced from the practice of medicine. Some of this frustration may stem from the fact that it is difficult for physicians to predict from previous cases the standard of care expected in the future. The legal standard of care is developed anew in each case. which is not surprising, since each patient has unique medical and other characteristics. In addition, the practice of medicine changes rapidly. This de novo approach to each case. however. may appear to physicians as unpredictable, despite the fact that the legal standard of care is always based on expert testimony about the prevailing standard in the profession.

Physicians also express concern about the qual - ity of expert witnesses who establish the standard of care. An expert witness is required to have knowledge and skill above that of a lay person, but there is generally no requirement that an expert have education, training, and experience similar to that of the defendant (185).

According to the American Medical Association (AMA), experts have been permitted to testify when they do not have specific cxperience in the relevant area of practice (9). In some cases, the expert had not yet entered the profession at the time of the incident (9). Although a witness's qualifications may be challenged to prevent admission of testimony before the jury, once the testimony is admitted, the jury decides whether the testimony is credible.

The courts recognize that there is variation in medical practice, and a physician will not be held 1 i able for following a practice if a ● 'respectable minority'" of physicians also follows the practice (134). But the jury must resolve any disagreements among experts on whether a physician should have made a particular diagnosis or performed a certain procedure. Physicians believe that lay juries are poorly equipped to resolve complicated clinical judgment issues (9).

If physicians believe that the legal system is unpredictable and incapable of accurately judging the quality of medical care (a conclusion not fully supported by recent empirical research—see footnote 7), then physicians are not receiving a clear signal about the standard of care demanded *by the legal system.* Consequently, physicians may **conclude that the** only way to avoid a suit is to do everything possible to avoid an adverse outcome, no matter how unlikely the bad outcome is or how costly the intervention.

A key area of concern is the potential liability for missed or delayed diagnosis, Suits alleging missed or delayed diagnosis appear to be increasing in severity. Data obtained from St. Paul's Fire and Marine Insurance Company showed that al**though "failure-to-diagnose"** claims did not increase as a percent of total claims between 1980 and 1993, there was a statistically significant increase in the amount paid for these claims. In 1984, payments for failure-to-diagnose claims ac - counted for 25 percent of all payouts, compared \vith 34 percent in 1993 (228).

The increasing relative importance of failure-t o-diagnose claims may result from a combination of better diagnostic techniques and improved outcomes when serious medical conditions are detected earlier. Both of these technological trends could make the consequences of not testing more serious. As technology changes, the legal standard

[11] The legal standard of care is the standard of acceptable medical practice as determined by the courts. The physician's conduct is judged against the prevailing standard of medical practice in the medical profession. The courts require physicians to practice medicine that is "customary and usual in the profession (111)." This standard is often referred to as the customary standard of care.

of care evolves, and physicians may feel especially vulnerable if they are not aggressive n diagnosis.

Changing *Legal Doctrines*

Changes in legal doctrines that alter the boundary between negligence and non-negligence may also confuse physicians. Recent changes in the legal doctrine called "loss of chance"' in some states have put physicians at greater risk of being held negligent for not providing a diagnosis or treatment even when the chance of recovery from the condition are low.

In cases involving the "loss-of-chance" doctrine. the plaintiff usually has a serious or fatal condition but, if properly treated, has a chance of longer survival or cure. A patient (or the patient's estate) can sue for malpractice, claiming that a physician's negligent act. rather than the underlying disease. was the proximate cause of the plaintiff death or increased suffering.

The questions of whether the physician caused the injury and whether the underlying disease was responsible are decided by the jury. However, the judge does not allow the jury to consider questions of causality and negligence unless there is sufficient evidcncc that the physician"~ action could be the proximate cause of the patient injury or death.

In general, to have sufficient evidence, the plaintiff must prove that it is more likely than not that, in the absence of the physician ncgligence, he or she would have survived or had a better outcome (96, 110, 178). To meet this standard, the courts have traditionally required that the plain - tiff chance of survival with proper diagnosis or treatment would have been better than 50 percent (96,1 10).

A minority of courts have abandoned the strict "51 percent" rule and instead allows the jury to determine whether a physician was negligent when the physician's conduct is determined to be a "substantial factor" in causing the plaintiff's harm (178).12 The physician may be held liable when his or her negligence eliminated a 35 or 40 percent chance of survival or recovery (96).

In one often -cited case, the jury was allowed to consider whether a health maintenance organization (HMO) could be held liable for the patient's death from lung cancer when his physicians' negligence in diagnosing the cancer reduced the patient chance of survival from 39 to 25 percent. 13 The court went on to say, however, that the defendant was not liable for full damages resulting from the plaintiff's death. but only for those damages directly related to the delay in diagnosis caused by the physician negligence. 14 A number of courts that allow recovery when the chance of survival is less than 50 percent limit the damages according] y (96, 110,151).

Physicians may find these cases troubling because the courts are willing to hold the physician liable when his or her conduct diminishes the patient's chances for survival by only a small percentage. Physicians may feel they are being unfairly held accountable for an inevitable injury or death, given the patient underlying medical condition. As one court noted, when dealing with causation, "it can never be known with certainty whether a different course of treatment would have avoided the adverse consequenccs." 15 Finally, predicting surviva l rates is not an exact science, which leaves room for conflicting expert testimony.

If sufficient numbers of physicians respond to missed diagnosis cases by beginning to screen for

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[12] Courts have moved in this direction because it is arguably unfair to have a case turn on whether a plaintiff can find a witness who will claim the chance of recovery was 51 percent, rather than 49 percent. More importantly, the courts did not want negligent physicians to be shielded from liability just because the patient had less than a 50 percent chance of survival when he or she entered medical care (96).

[13] *Herskovits* v. *Group Health Cooperative of Puget Sound*, 664 P. 2d 474, 481 (1983).

[14] *Herskovits* v. *Group Health Cooperative of Puget Sound*, 664 P. 2d 474, 481 (1983).

[15] *Toth* v. *Community Hospital*, 239 N.E. 2d 368 (N.Y. 1968).

serious conditions in low-risk populations, then the standard of care in the profession may change. If ordering diagnostic tests on low-risk patients becomes more common, plaintiffs will have an easier time establishing that the failure to order the test was negligent, because more medical experts will be willing to testify that such testing is the standard of care. Gradually, the standard of care will be "ratcheted up" as physicians respond to the increasing threat of malpractice for failure to diagnose. Eventually, physicians may cease to characterize or even think about their actions as "defensive."

terize or even think about their actions as
sive."

Hospitals, HMO's, and malpractice insurers often have risk management and quality assurance programs that seek to minimize the number of adverse events and malpractice suits and improve the quality of care by changing physician behavior.

Many risk management activities are directed toward nonphysician hospital employees (e.g., nursing staff) (41), but risk management programs are increasingly focusing on reducing the risk of injury in clinical care (41, 120.163, 167).

Because risk management is an administrative function, risk managers are unlikely to be clinical - ly trained. Recently, however, nurses have played a more active role in risk management (41 ,237). Risk managers do not typically develop clinical protocols for physicians but instead spend much of their time working with the hospital and legal personnel to address existing and potential claims.

Larger risk management programs provide educational information on the kinds of suits that are brought and analysis of how these suits might be prevented+. g., through better communication with patients, better informed consent, and implementation of systems designed to minimize human error (46, 181,182.183,184, 196,237),

The most common recommendations of risk managers are to document the record completely and to obtain informed consent (5,36,46). Systems can also be set up to prevent mistakes that can lead to injuries. For example, protocols are often set up to account for all sponges and instruments after surgery, or to ensure that the correct heart valve is selected during surgery (163,237). OTA learned in interviews with risk managers that they may also recommend *removing* technology if the staff does not know how to use it properly; for example, removing fetal monitors from an emergency room, closing underequipped or understaffed faci1ities, or referring difficult cases to specialists.

How physicians respond to information promulgated through risk management programs has not been studied. Although risk managers stress documenting the chart, communicating with the patient, and obtaining informed consent, physicians' preferred method of documenting diagnosis may sometimes be to perform additional tests and procedures (46,86). For example, in a risk management study of Erb's Palsy and shoulder dystocia conducted by the Risk Management Foundation of the Harvard Medical Institutions, physicians were told:

> although shoulder dystocia occurs infrequently and largely unexpectedly, assessing risk factors such as maternal diabetes or large fetus (4000 grams or more) may help obstetricians anticipate shoulder dystocia . . . Obstetricians should document any evaluation performed for these conditions as well as their conclusions and followup. (217)

This guidance appeared with a review of malpractice claims that included an allegation of failure to do an ultrasound to evaluate cephalopelvic disproportion (2 17). Physicians could interpret such information as a suggestion that they perform routine intrapartum ultrasound to evaluate fetal size.

.A trend in recent years is the linkage of risk management with quality assurance activities. The Joint Commission on Accreditation of Health Care Organizations requires that hospitals seeking accreditation have programs linking risk management with quality assurance (167). American Health Care Systems Inc., has published a model

program for integrating quality and risk management activities in multihospital systems (4).

Quality assurance in hospitals or other institutions is usually overseen by physicians (42,46, 163). The quality assurance process is often triggered by reports from the risk management department (41,1 63).

In some quality assurance programs, protocols are designed specifically to reduce the number of malpractice claims. For example. several clinical departments of the Harvard University-affiliated medical institutions use protocols for anesthesia, obstetrics, and radiology that were designed to address problems identified in reviews of malpractice claims (99). These guidelines primarily address proper documentation, prompt and accurate communication of clinical data among staff. informed consent, and monitoring of patients.16 The guidelines are voluntary, but they have been widely adopted within the Harvard Medical Institutions (99).

Certain malpractice insurers—mainly physician--owned companies-develop guidelines to prevent malpractice claims (19,223). Some insurer guidelines are mandatory clinical protocols that physicians must follow to maintain coverage. although physicians may deviate from the guidelines with proper documentation (19.43,154,). These protocols are often developed through a consensus development process among physicians using medical literature and expert consultants.

If these guidelines and protocols improve outcomes of care and minimize errors, then they may be an appropriate response to the signals from the malpractice system, even if they involve increasing the number of procedures or services provided. That is, they may promote quality-enhancing rather than wasteful defensive medicine.

Risk managers contacted by OTA and others who were involved in quality control consistently stated that their quality assurance programs did not promote unnecessary tests and procedures (80.163.237). However, risk management and quality assurance programs may at times encourage broader use of certain tests and procedures in order to avoid the potential for serious. but remote, adverse outcomes. Whether these measures are unnecessary is a value judgment. If the risk management process is insulated from pressures to control healh care spending. recommendations are unlikely to reflect a balancing of cost and outcome considerations.

In contrast to risk management and quality assurance programs, the individual physician does not undertake a specific review of claims but instead reacts to a less orgamozed signal and tries to anticipate future suits. This reactive and emoional process may be even more likely to lead to defensive medicine than the systematic claims review and guideline development done by hospitals, HMOs. and malpractice insurers.

The Role of Graduate Medical Education in Teaching Defensive Medicine

Although medical students become aware of liability issues during their 4 years of undergraduate medical education, it is not until residency training—when they first become intimately involved in medical decisionmaking—that their concerns have an opportunity to influence the course of patient care.[17]

Medical residents are shielded from the threat of personal liability to a greater extent than practicing physicians because residents are covered under the insurance policies of the hospitals where

[16] The anesthesia guidelines largely deal with better monitoring of patients; for example, blood pressure and heart rates taken every 5 minutes and continuous monitoring of the patient's ventilation and circulation. These guidelines also encourage the use of specific technologies for monitoring, including pulse oximeters (60).

[17] Postgraduate medical training lasts from 1 to 5 years, depending on the specialty. The first year is the equivalent of a general internship, where trainees rotate through a number of departments and learn the basic elements of a variety of areas of practice. For physicians who pursue specialty training, training becomes more specialized beginning in the second postgraduate year.

they train. The ultimate liability for their actions rests with the hospital and the attending physician who supervises and gives final approval for all patient care decisions.

Residents are not entirely deaf to the malpractice signal, however. First, residents can be and sometimes are named in malpractice actions.[18] Second, residents feel pressure to protect not only themselves but also their supervisors and attending physicians from liability stemming from their own errors—and all this during a period when they are only beginning to develop a sense of confidence in their own clinical skills (69,146).

Whether and to what extent medical residents respond by consciously practicing defensive medicine is difficult to ascertain. Studies of defensive medicine among residents are old and may be obsolete because changes in hospital liability during the 1980s increased residents' personal exposure to malpractice liability.

- In a 1981 study, residents and medical faculty cited inexperience, habit, pressure from others, reliance on lab results to follow daily progress, and substitution of lab tests for clinical judgment as the leading reasons for excessive diagnostic testing (258). Malpractice concerns were ranked last out of 19 reasons for excessive testing.
- In a 1978 study of laboratory testing by first-year residents in internal medicine, residents classified only 2 percent of tests as having been motivated by medicolegal concerns (71).

To understand better whether and how defensive medicine is "taught" during graduate medical education, OTA conducted structured interviews with residents and faculty in internal medicine and obstetrics/gynecology at two academic medical centers—one in a large urban area and the other in a small city. Because of the limited number and type of programs studied, it is difficult to draw any broad generalizations from the interviews about the teaching of defensive medicine during graduate medical training. However, responses to the interviews suggested the following findings regarding the role of graduate medical education in promoting defensive medicine:

- Malpractice concerns were noted by residents and faculty in all four (mining programs, but the extent of concern varied greatly across department specialty, geographic location, and individual attending physician. Concern appeared to be more pervasive in obstetrics/gynecology than in internal medicine and more heightened in the metropolitan training center than at the training center in a small city (see box 2-1).
- Limited formal instruction on malpractice Issues in organized classes and conferences does exist, but defensive medicine is not taught explicitly at these seminars.
- In general, residents are exposed to many different practice styles during their training. The extent to which they are exposed to defensive medicine practices depends in large part on the practice styles of the faculty with whom they work most closely. Some faculty and senior residents in each of the four centers acknowledge that they teach some defensive practices to junior residents; others claim they do not.
- [formation about defensive medicine is conveyed not only consciously but also unknowingly by faculty and senior residents.
- Recordkeeping, patient communication, informed consent, hospital admissions, referrals and consultations, and use of additional tests and procedures were all cited by faculty and residents as examples of defensive practices

[18] For example, data from the major insurer of physicians in the Harvard teaching institutions show that during the period 1982-92, the risk of being named in a lawsuit was 2.2 per 100 physician-years of coverage for residents and fellows versus 3.4 for attending physicians (52). The experience of the Harvard teaching institutions is comparable to that of other major teaching institutions (51).

BOX 2-1: The Role of Graduate Medical Education in Defensive Medicine: Selected Impressions of Faculty and Residents at Two Training Hospitals[a]

Obstetrics and Gynecology Training Program, Medical Center A

Faculty

- "[It is] very difficult for residents to escape sensing concern [about malpractice] Nonetheless everyone here has as a first goal to do the right thing by the patient I do not think that anyone is cold enough to reduce liability at the expense of mistreating or not adequately treating the patient a second concern, and a close second is creating a scenario that makes it less likely that the patient will sue "
- "A lot of defensive procedures that are incorporated in our practice are not consciously acknowledged to be defensive procedures."
- "If I have a patient with a gastrointestinal complaint and I think I know what it is I may still be inclined to refer her to a specialist even though I can treat it myself I know that there is back-up here I have not explicitly taught this to residents but they get a sense of it "
- "The minor purpose of the chart [i e the medical record] is to inform other practitioners about the care of the patient The major purpose is to defend physicians in lawsuits."

Residents:

- "Being a product of a medicolegal climate, I know that I practice very defensive medicine and frankly I think this is good medicine."

Obstetrics and Gynecology Training Program, Medical Center B

Faculty:

- "People here are not obsessed with . . . liability issues But we know that they exist. [The overall philosophy of the department is to]" . . . teach good medicine - good practice in obstetrics and gynecology. That in itself should take care of the majority of potential litigation."
- "Malpractice suit discussion is a daily occurrence. There is an ongoing series for faculty on risk reduction and malpractice We have required attendance It is a constant topic This reflects in our teaching—we try to make everyone aware of malpractice issues."
- "We emphasize accurate records strongly . . . If there is ever a question of medical care in the future, the lack of documentation is noted You do it not because you are worried about litigation, but because it is the best way to practice medicine."

Residents:

- [As a result of one malpractice case at the hospital] "The practice of the [rotational forceps] procedure went down logarithmically There is great hesitation on the part of the faculty to suggest rotational forceps delivery As such there is a whole generation of residents who are not skilled in that obstetric practice. We are told not to do it because of the possibility of a malpractice case."

Internal Medicine Training Program, Medical Center A

Faculty:

- "When I started out as an intern . . . it was expected that I would practice medicine by ordering tests . . . I still fight against it and when I became a senior resident, I told [junior residents] which tests were and which were not appropriate."

Residents:

- "The attendings are academic and very diligent about making smart and rational decisions and not worried much about defensive medicine."

(continued)

BOX 2-1: The Role of Graduate Medical Education in Defensive Medicine: Selected Impressions of Faculty and Residents at Two Training Hospitals[a] (Cont'd.)

Internal Medicine Training Program, Medical Center B

Faculty.

- "1 do not discuss, implicitly explicitly, a defensive posture with patients I view the concept of defensive medicine as poor medical practice. You are doing something unnecessary to cover yourself and we do not stress for our residents that we should do that But I have had residents say I think we are going to be sued, ' and my usual response is to shrug my shoulders and say do the right thing."
- "1 cannot say that after or during a case I do not consider the legal ramifications, but I still try to make my decisions based on the patient and not on the legal system "

Residents.

- "If someone is explicit [about teaching defensive rnedicine], it makes me question it more and say that is a stupid reason and you should not do it If it is implicit, it is insidious "

[a] Center A IS in a large metropolitan area center B IS in a small city

taught to varying degrees during residency. Among these examples, the most commonly mentioned was documentation of patient care.

- Most residents leave training thinking they have to protect themselves against medical malpractice litigation when they go into practice. The effects of graduate medical education on the subsequent practice of defensive medicine by trained physicians vary depending on the degree to which they were exposed to it during training and the length of time elapsed since completion of training.

For some time now, there has been a movement afoot to restructure residency programs (247). It is unclear exactly what direction these reforms might take; however, to the extent that any future reforms affect the relationships between and among hospitals, teaching faculty, and residents, they may also affect the channels through which defensive practices are currently taught to young physicians in training. For example, if more of residency training is shifted to ambulatory care settings, the role of the large medical institution as a source of the standards and values of a resident future professional career may be diminished.

OTA's interviews, as well as literature on the sociology of medical education, suggest that the molding of a student's practice style depends heavily on the practice style of his or her "mentor" as well as the general culture of the particular training program (69). Because it is unclear what type of practice setting—academic, hospital-based, community-based-is most conducive to the practice of defensive medicine, it is difficult to predict whether a shift from one setting to another would on balance increase or decrease the teaching of defensive medicine.

CONCLUSIONS

Under OTA's definition, defensive medicine occurs when doctors order tests, procedures, or visits, or avoid high-risk patients or procedures, pri*marily* (but not necessarily so/e/}') to reduce their exposure to malpractice liability. This definition recognizes that practices regarded as defensive may be motivated by other factors in addition to liability concerns (e.g., medical benefit, financial incentives) and may be either quality-enhancing or quality-reducing. Due to lack of information on the relative effectiveness of many medical interventions. as well as lack of consensus on what level of risk individuals or society are willing to accept. it is difficult if not impossible to classify most instances of defensive medicine as purely "good" or "bad". " I n add i t ion, a substantial proportion of defensive medicine may occur unconsciously-i.e., physicians may follow practices that initially evolved out of liability concerns but later became customary practice.

Physicians receive "signals" from the malpractice system in a variety of ways, including personal litigation experience, the experience of their colleagues, the media, risk management and quality assurance activities, and their malpractice insurance premiums. Although it is unclear whether and to what extent these "malpractice signals" affect physician practice, it has been documented that physicians consistently overestimate their own and their colleagues' risk of being sued. Physicians are concerned about the professional, financial, and psychological consequences of litigation but, on balance, they tend to overestimate the risk of these effects as well.

Young physicians in residency training maybe particularly susceptible to learning defensive practices-either explicitly or implicitly—from their supervisors and faculty. Graduate medical education may thus help perpetuate defensive medicine at both the conscious and unconscious levels.

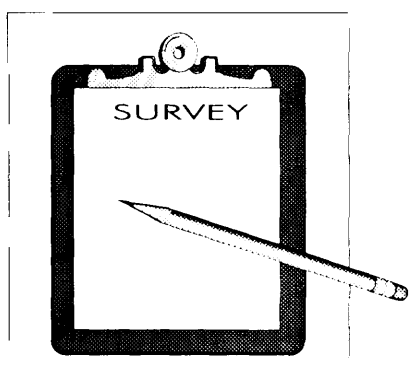
Summary of the Evidence on Defensive Medicine

3

For more than two decades, news stories, interest groups, and witnesses at congressional hearings have quoted estimates of the extent of defensive medicine and its impact on health care costs. Often these statements have been based on anecdotes, which mayor may not represent the general experience of physicians in the United States.

This chapter reviews the evidence regarding the extent of defensive medicine in the United States, including new evidence developed as part of this Office of Technology Assessment (OTA) study. It begins by outlining the major strengths and weaknesses of methods used to measure defensive medicine. It then summarizes the findings of many studies conducted over the past two decades.

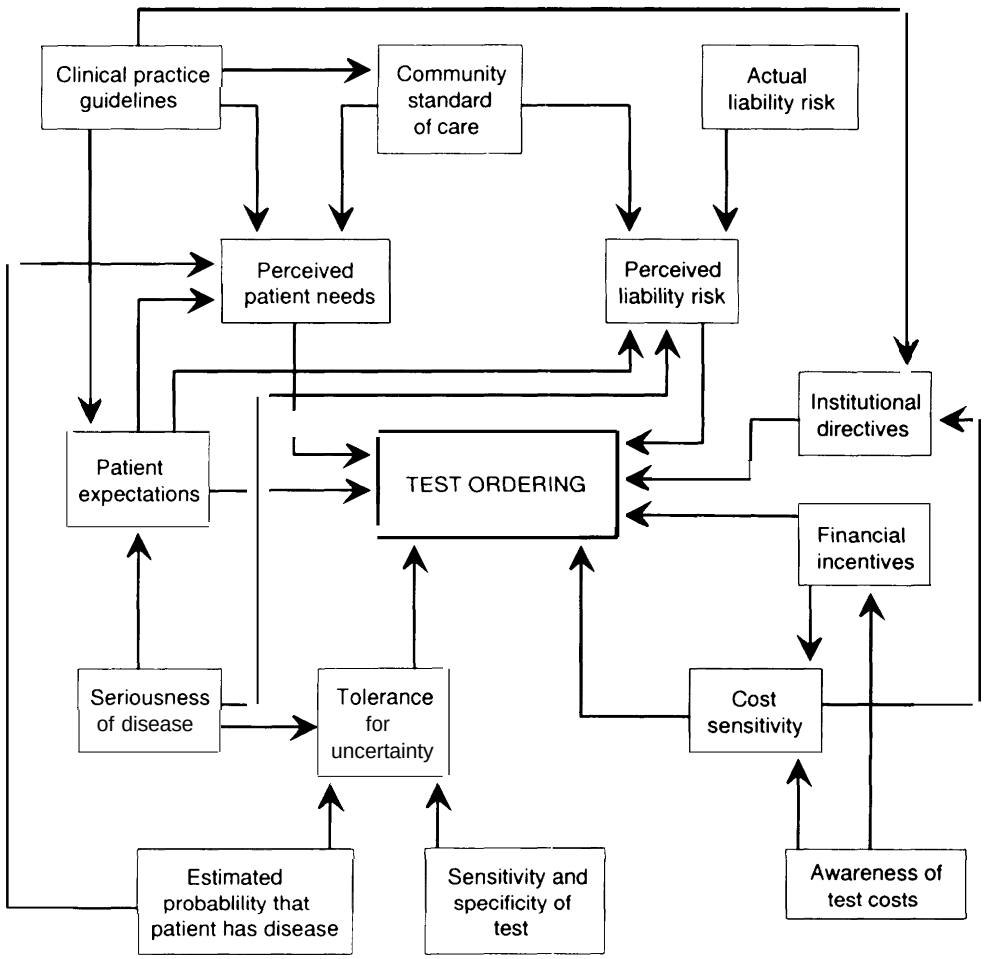
Some studies surveyed physicians directly about the extent of their defensive behavior; others used objective data and more sophisticated statistical analyses. To expand the base of knowledge in this area, OTA undertook four physician surveys and commissioned three additional empirical studies.



APPROACHES TO MEASURING THE EXTENT OF DEFENSIVE MEDICINE

A challenge facing all approaches to measuring the extent of defensive medicine is to isolate the precise contribution that concern about malpractice liability makes to medical practice decisions. Defensive medicine typically operates in tandem with other forces to motivate clinical practice decisions. Figure 3-1 presents a model of the many influences on physician test ordering or treatment decisions. Some of these influences are clinical:

FIGURE 3-1: A Behavioral Model of Physician Test Ordering



SOURCE Off Ice of Technology Assessment, 1994 Adapted from unpublished work of RichardKravitz, MD, Assistant Professor of Medicine, University of California, Davis, School of Medicine, Sacramento, CA

- patient symptoms,
- seriousness of the suspected disease,
- degree of certainty about diagnosis,
- accuracy of the available diagnostic tests, and
- risks and benefits of treatment.

Other influences, in addition to the fear of malpractice liability, are nonclinical: 1

- availability of technology,
- physician specialty and training,
- practice organization (solo, group, hospital-based),
- familiarity with the patient,
- awareness of and sensitivity to test costs,
- financial incentives,
- patient expectations, and
- insurance status of the patient.

Sometimes these other factors dominate malpractice liability concerns; some, such as patients' insurance coverage and financial incentives under fee-for-service medicine, may enable physicians to act on their fear of liability.

There are four major methodologic approaches to measuring defensive medicine:

- direct physician surveys,
- physician clinical scenario surveys,
- statistical analyses of the impact of malpractice liability risk on utilization of procedures, and
- case studies.

The strengths and weaknesses of each of these approaches are discussed below.

Direct Physician Surveys

The simplest way to gauge the extent of defensive medicine is to ask physicians how their medical practices have been affected by the threat of malpractice liability. Questions typically asked in such surveys include whether malpractice concerns have caused the physician generally to use additional diagnostic or therapeutic procedures (positive defensive medicine) or to avoid high-risk patients or procedures or quit medical practice altogether (negative defensive medicine).

The major problem with this approach is that people do not always accurately report what they do. Most physician surveys of this sort inadvertently prompt respondents to think about malpractice liability and its potential effects on their medical practices. This "prompting'" may lead physicians to respond in ways they would not if they were simply asked how and why their practices have changed—without asking directly about liability concerns. For example, the attention paid to defensive medicine by physic i an organizations, the news media, and policy makers might cause physicians to exaggerate the impact of liability concerns on their practices in the hope of eliciting a favorable political response,

An additional problem of most surveys of this kind is that they do not ask about the extent to which respondents practice defensive medicine—only *whether or not* they practice it.

Clinical Scenario Surveys

A clinical scenario survey typically presents physicians with a description of a simulated patient and asks them to choose specified clinical actions. Respondents then indicate which of a list of reasons influenced their choices, with one of the choices being malpractice liability concerns.

One advantage of this approach over the more general surveys described above is that prompting may be less direct if malpractice liability is only one among many reasons. Another advantage is that scenarios can focus in on areas where defensive medicine is thought to be a major concern. Finally, because they ask more concrete and precise questions about particular clinical situations, scenarios may permit more reliable estimates of the extent of defensive medicine in those particular areas.

Only one previously published study, conducted by the Duke Law Journal Project in 1970

[1] See appendix C for a review of the evidence linking these and other nonclinical factors to the utilization of services.

(58), has used this approach. OTA conducted four clinical scenario surveys of the memberships of three medical professional societies and contracted for a study of defensive medicine in New Jersey that used this approach.

To succeed in measuring defensive medicine, a clinical scenario survey must succinctly yet thoroughly describe the key features of the simulated case, provide lists of all likely clinical choices and meaningful reasons for making those choices, and blind the respondents to the purpose of the survey.

An open question is whether clinical scenarios that include "malpractice liability concerns" among potential reasons for choice, without any other references to defensive medicine, sufficiently "blind" respondents to the purpose of the survey. But not including a list of reasons (i.e., asking respondents to list their own reasons for each clinical choice) also runs the risk of biased responses. Physicians may regard such an "open-ended" instrument as a test of their medical knowledge and cite only clinical factors.

A critical limitation of clinical scenario surveys is that their results cannot be generalized beyond the specific scenarios, and results of different scenarios cannot be directly compared with one another. Indeed, the more clinical and demographic detail given in a scenario, the less generalizable its results are to other clinical situations. Finally, clinical scenario surveys capture only those defensive practices of which the physician is consciously aware.

Statistical Analyses of the Impact of Malpractice Liability Risk on Service Use

Some studies of defensive medicine employ statistical methods to systematically examine the utilization of one or more procedures (e.g., Caesarean delivery) as a function of the risk of being sued. Such studies, commonly called multivariate analyses, can control for other factors that might also influence physicians' behavior (e.g., patient age and health status, hospital characteristics, socioeconomic factors). These studies usually use existing utilization data gathered for other purposes, such as hospital discharge records or physician health insurance claims. The unit of analysis can be the individual physician, the hospital, or the geographic area.

The major strengths of this approach include the use of more objective data, the potential for large sample sizes, and the ability to control for many different influences on physician behavior. Typical problems confronting such studies include:

- limited generalizability due to the availability of data only for certain health care providers or localities,
- incomplete control for relevant factors other than malpractice liability (e.g., clinical indications),
- limited or problematic data on both independent and dependent variables, and
- small numbers of physicians or hospitals in certain categories or geographic areas.

To the extent that these limitations can be minimized, multivariate studies can provide strong evidence regarding the *incrcmental* impact of *differences* in malpractice liability risk on physicians' use of procedures. They cannot, however, provide a comprehensive estimate of the *extent* of defensive medicine.

For example, a multivariate study might determine that there is a difference in test ordering between physicians who have been sued and those who have not, or between physicians with higher and lower malpractice insurance premiums. It cannot, however, detect the overall level of defensive behavior that results from a generalized fear of malpractice liability among all physicians. Furthermore, even if multivariate studies succeed in finding a statistically significant association be-

[2] A **statistically significant** finding is one that is unlikely to have occurred solely as a result of chance. Throughout (his report, a finding is considered to be statistically significant if the probability that it occurred due to chance alone is no greater than five out of I 00—i.e e., a "p value" of 0.05 or less.

tween levels of malpractice liability risk and physician behavior, the direction of causality still cannot be inferred with absolute certainty.

Case Studies

Case studies describe the impact of malpractice liability concerns on the use of a specific medical technology. Such studies can provide valuable detail on the role of malpractice liability in both the initial diffusion and current use of technologies. As part of this assessment, OTA commissioned a case study examining the influence of malpractice liability concerns on the diffusion of a new diagnostic technology first introduced in 1987: low osmolality contrast agents. (The findings of this case study are described in a subsequent section of this chapter.)

The primary limitation of case studies is that they typically must rely on subjective information and do not permit adequate control for the influence of factors other than defensive medicine on patterns of diffusion and use of technology.

EVIDENCE OF THE EXTENT OF DEFENSIVE MEDICINE

Direct Physician Surveys

OTA identified 47 separate surveys administered between 1983 and the present by state and national medical specialty societies and academic researchers that addressed medical professional liability issues. These surveys generally asked doctors directly how the medical liability climate or "tort signal" was affecting their practices. This section focuses on the survey findings regarding negative and positive defensive medicine. OTA limited its review to 32 surveys in which it was possible to identify the proportion of respondents who had changed their practice *and* had done so at least in part because of liability concerns.[3]

Thirty of the 32 studies addressed negative defensive medicine. Of these 30. eight were national surveys, nine were state-level surveys of all specialties, and 13 were state-level surveys of obstetrics providers. Figure 3-2 presents selected findings of these surveys of negative defensive medic inc. As the figure indicates, surveys were oriented toward different areas of practice and asked questions about negative defensive medicine in a variety of ways. The proportion of respondents indicating restrictions in their practices due to malpractice liability concerns ranged from 1 to 64 percent.4

A series of surveys with similar structures conducted by the American College of Obstetricians and Gynecologists between 1983 and 1992 shows an increase in the proportion of respondents reporting negative defensive medicine between 1983 and 1987 (from 31.8 to 43.7 percent). and then a slight decrease in the following years (from 41.8 percent in 1990 to 39.0 percent in 1992) (see figure 3-2).

Sixteen of the 32 studies reported on positive defensive medicine. Of these, five were national surveys and 11 were state-level. Selected findings are summarized in figure 3-3. Again, a variety of different specialties were surveyed and questions were posed in a number of different ways. Across these surveys, from 20 to 81 percent of physicians indicated that malpractice liability concerns had led them to order additional tests and procedures.

As the variation in question structure and responses in these surveys shows (see figures **3-2, 3-3),** direct physician surveys are a highly questionable source of quantitative information about defensive medicine. In the vast majority of the studies, the respondent was made aware that the survey was about malpractice liability and changes in the malpractice climate.

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[3] Some surveys asked about practice changes and reasons for practice change in separate questions. Unless it was possible to link reasons directly with reported practice changes, OTA eliminated the surveys from this review.

[4] Unless otherwise specified in figure 3-2 or 3-3, the numbers shown reflect the percentage of *all* survey respondents who reported the indicated defensive behavior.

FIGURE 3-2: Selected Results of Direct Physician Surveys of Negative Defensive Medicine[1]

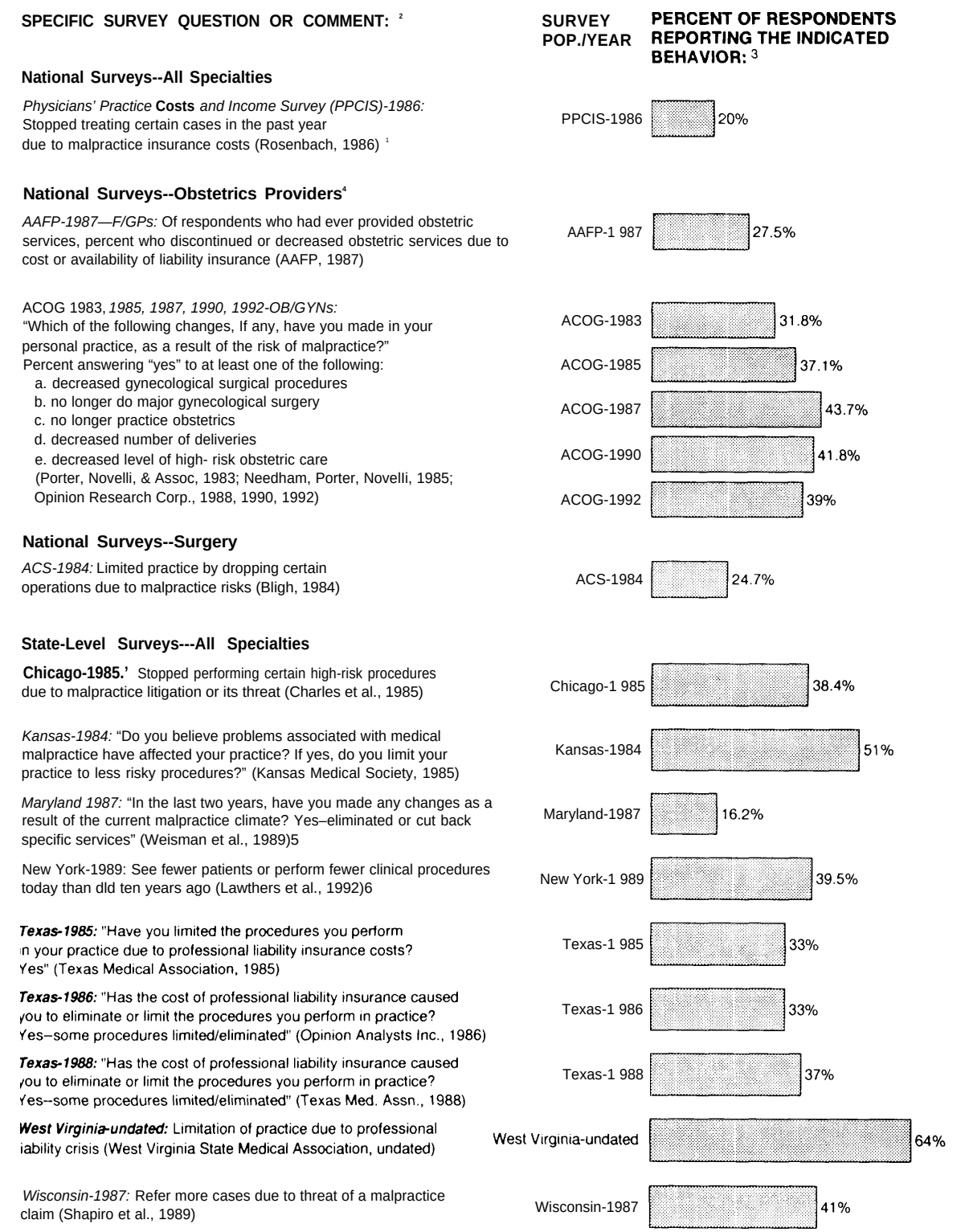

FIGURE 3-2: Selected Results of Direct Physician Surveys of Negative Defensive Medicine[1] (Cont'd.)

SPECIFIC SURVEY QUESTION OR COMMENT: [2]	SURVEY POP./YEAR	PERCENT OF RESPONDENTS REPORTING THE INDICATED BEHAVIOR: [3]
State-Level Survey---Obstetric Providers [4]		
Alabama-1985-F/GPs: Of respondents who had ever practiced obstetrics, percent who quit obstetrics in last five years and listed malpractice risk/fear as a reason for doing so (Alabama Academy of Family Physicians, 1986)	Alabama-1985	30.3%
Georgia-1988-OB/GYNs: Had quit obstetrics in the past three years solely because of malpractice (Georgia Obstet. & Gynec. Society, 1987) [7]	Georgia-1986	5.6%
Illinois-1987-OB/GYNs & F/GPs: Of respondents who had ever practiced obstetrics, percent who discontinued or planned to discontinue obstetrics and cited fear of a malpractice suit as a reason for doing so (Ring, 1987)	Illinois-1987	20%
Iowa-1985-F/GPs: "Have you made any recent changes in your practice because of medical liability insurance (either its cost or availability)~ Yes–stopped doing obstetrics" (Iowa Medical Society, 1987)	Iowa-1985	15%
Kentucky- 1986-OB/GYNs & FIGPs: Of respondents who had practiced obstetrics any time during 1978-86, percent who had quit obstetrics and done so at least in part due to "liability problems" (Bonham, 1987)	Kentucky-1986	25.2%
Louisiana 1988-OB/GYNs: Practice changes resulting from malpractice crisis-stopped obstetrics (Begneaud, 1988)	Louisiana-1988	11%
Michigan- 1985-OB/GYNs: "Have you changed your method of practice because of medical-legal implications? Yes--avoid care of high risk patients" (Block, 1985)	Michigan-1985	48.7%
Michigan-1986--F/GPs: Of respondents who practiced obstetrics in 1986, percent who had quit or planned to quit and cited "malpractice liability risk" as a reason (Smith et al., 1989)	Michigan-1986	12.3%
Minnesota 1984-OB/GYNs: Had quit obstetrics due to litigation (Meader, undated)i	Minnesota-1984	1%
Rural Nevada-1985-OB/GYNs & F/GPs: Of respondents who had ever practiced obstetrics, percent that quit or had definite plans to quit and cited malpractice problem/cost/fear as a reason (Crow, 1985)	Rural Nevada-1985	36.6%
Oregon- 1986-OB/GYNs & F/GPs: Of respondents who had practiced obstetrics in past two years, percent restricting their practice in ANY way who cited "malpractice exposure too risky" as a reason (OR Med. Assn., 1986)	Oregon-1986	47.3%
Washington- 1985-F/GPs: Quit or limited obstetrics practice PRIMARILY because of malpractice concerns (either increased premiums or fear of lawsuits) (Rosenblatt and Wright, 1987)	Washington-1985	23.6%
Washington- 1988-OB/GYNs, F/GPs, Nurse Midwives: Of respondents who had ever practiced obstetrics, percent who limited or discontinued obstetrics PRIMARILY because of "fear of suit" (Rosenblatt and Detering, 1988)	Washington-l 986	9.6%

[1] See appendix I for full citations and descriptions of surveys reported in this figure

[2] If the actual question was available it is given in quotation marks Otherwse a brief description of reported behavior is provided

[3] Unless otherwise specified numbers are adjusted to reflect the percentage of ALL respondents who reported the indicated behavior

[4] F 'GP - family/general practice OB GYN obstetrics gynecology

[5] Maryland 1987 survey included only F GPs OB GYNs arid internists

[6] In the Lawthers survey physicians were asked to report practice changes made over the past ten years for any reason However the [] uestion was asked in the context of numerous questions regarding malpractice

[7] In the 1985 Georgia survey respondents were given a choice between age health malpractice and other pre fy as reasons

SOURCE Off Ice of Technology Assessment 1994

FIGURE 3-3: Selected Results of Direct Physician Surveys of Positive Defensive Medicine[1]

SPECIFIC SURVEY QUESTION OR COMMENT:[2]	SURVEY POP./YEAR	PERCENT OF RESPONDENTS REPORTING THE INDICATED BEHAVIOR:[3]
National Surveys--All Specialties		
AMA, *Socioeconomic Monitoring Survey-3rd* quarter 1983: Percent of physicians reporting that they prescribed more tests and procedures in response to increasing professional liability risk (Reynolds et al , 1987)	AMA, SMS-1983	43%
AMA, Socioeconomic *Monitoring Survey-4th quarter* 1984: Percent of physiclans reporting that they had prescribed more tests or treatment procedures *during the past* 12 months in response to the growth in malpractice claims (Reynolds et al., 1987)	AMA, SMS-1983	20%
National Survey s--Obstetrics/Gynecology		
ACOG-1983, 1985: *"As a result of* your professional liability **claim** experience(s), has your practice changed the frequency with which any of the following activities are performed? Yes-Increased testing and diagnostic procedures" (Porter, Novell\ & Assoc., 1983, Needham, Porter, Novelli, 1985)	ACOG-1983	76.2%
	ACOG-1985	67.8%
National Surveys--Surgery		
ACS-1984:Increased diagnostic testing as a result of the national rise in the number of malpractice suits (Bligh, 1984)	ACS-1984	60%
State-Level Surveys-All Specialties		
Chicago-1985: Due to malpractice litigation or its threat, ordered more diagnostic tests that that clinical iudgment deemed unnecessary (Charles et al., 1985)	Chicago-1985	64.1%
Kansas-1984:"Do you believe problems associated with medical malpractice have affected your practice? Yes–prescribe additional diagnostic tests" (Kansas Medical Society, 1985)	Kansas-1984	76%
Maryland-1987; "In the last two years, have you made any changes in your practice as a result of the current malpractice climate? Yes–increased the use of tests or monitoring procedures" (Weisman et al., 1989)[4]	Maryland-1987	39.7%
New York- 1989: Order more tests and procedures today than dld ten years ago (Lawthers et al., 1992) [5]	New York-1989	81.2%
Texas-1985:"Because of the threat of malpractice suits, do you feel compelled to order more lab tests? –Yes" (Texas Medical Association, 1985)	Texas-1985	21%
Texas-1986: "Because of the threat of malpractice suits, do you order more lab tests?" (Percent indicationg they sometimes or always order more tests) (Opinion Analysts Inc., 1986)	Texas-1986	77%
Texas-1988:"How much, if any, have you Increased [diagnostic testing] in your practice because of the threat of liability suits/clalms?" (Percent indicating moderate or significant increase) (Texas Mad Assn , 1988)	Texas-1988	45%
West Virginia-undated: Increased testing due to professional liability crisis (West Virginia State Medical Association, undated)	West Virginia-undated	34%
Wisconsin-1987: Order more diagnostic tests due to a malpractice claim or threat of a malpractice claim (Shapiro et al., 1989)	Wisconsin-1987	51.2%
State-Level Surveys---Obstetrics/Gynecology		
Louisiana-1988: Practice change resulting from malpractice crisis--order more diagnostic tests (Begneaud, 1988)	Louisiana-1988	57%
Michigan-1985: "Have you changed your method of practice because of medical-legal implications? Yes--ordered more tests" (Block, 1985)	Michigan-1985	74.8%

[1] See appendix I for full citations and descriptions of surveys reported in this figure

[2] If the actual question was available it is given In quotation marks Otherwise, a brief description of reported behavior is provided

[3] Unless otherwise indicated numbers have been adjusted to reflect percentage of ALL respondents who reported the indicated behavior

[4] The Maryland 1987 survey Included only obstetrics gynecology, family/genera practitioners and internists

[5] In the Lawthers survey physicians were asked to report practice changes made over the past ten years for ANY reason However the question was asked in the context of numerous questions regarding malpractice

SOURCE Off Ice of Technology Assessment 1994

Many of the reported surveys had poor response rates. In 18 of the 32 studies, 50 percent or less of the surveyed physicians responded; in another study, the response rate was not reported (see appendix I). Low response rates raise concern about possible response bias—i.e., physicians with greater concern about malpractice liability might be more likely to respond and would indicate greater levels of defensive medicine than truly exist in the study population. For example, in one study for which the response rate was 40.5 percent, respondents were more likely to have been sued (51 percent) than nonrespondents (36 percent) (1 23).

Survey-Based Estimates of the Cost of Defensive Medicine

Results of physician surveys occasionally have been used to develop quantitative estimates of the national cost impact of defensive medicine or of the malpractice system as a wholes The most widely quoted estimate of the net national cost of the medical malpractice system was published in 1987 by Reynolds and his colleagues at the American Medical Association (AMA) (194). More recently, researchers at Lewin-VHI, Inc., published a range of estimates for the aggregate cost of defensive medicine based largely on the Reynolds study (125).

Once created, estimates such as these tend to be quoted and requoted-and sometimes misquoted —in the press and political debates. Consequently, OTA assessed whether the methods these researchers used provide the basis for a reliable measure of the extent of defensive medicine. The estimates are reviewed briefly here and are critiqued in greater detail in appendix J of this report.

Reynolds' Estimate of the Net Costs of the Malpractice System

Reynolds and his colleagues (194) at the AMA sought to measure the total cost of professional liability for the health care system, not just the cost of defensive medicine. They estimated the net impact of the medical malpractice system on the 1984 cost of physicians' services. These costs included the direct costs to physicians of malpractice insurance premiums and defending against claims, and the indirect costs of practice changes made in response to increasing malpractice liability risk. Practice changes included, but were not limited to, increases in defensive medicine as defined by OTA.

The authors used two separate methods of estimation: one based primarily on a survey of physicians" reported behavior changes in response to malpractice risks; the other based on the statistical relationship between physicians' 1984 malpractice premiums and the prices and volumes of services they reported rendering in 1984. The resulting estimates were $13.7 billion and $12.1 billion, respective] y.

Although the authors acknowledged that "both of our methods rely on several assumptions and are necessarily less than perfectly precise," they concluded that the "similarity of the estimates increases confidence that they provide a reasonable sense of the general order of magnitude of medical [malpractice liability] costs" (1 94).

OTA reviewed each method for its validity as a measure of the total cost of t he malpractice system and for its ability to provide an estimate of the portion of these costs accounted for by defensive medicine. OTA concluded that the agreement between the two estimates does not increase confidence that they are reasonably accurate. The true costs of defensive medicine may be either higher or lower-and possibly substantially so-than the costs estimated by Reynolds.

The first of the two methods has several sources of inaccuracy, resting as it does on the results of a direct physician survey, and therefore provides very little useful information about either the true costs of malpractice 1iabilit y or the costs of defensive medicine. (See appendix J for details.)

[5] A report recently published by Lewin-VHI, Inc., summarizes these estimates (125).

The second estimate is based on well-known statistical methods, but the results may be sensitive to the way the statistical model was specified and the data available to estimate it. Without reliable corroborating evidence from the first method or from other estimates, it is impossible to know how much error the statistical method may include. Finally, even if it does give a reasonable estimate of the total costs of malpractice, the statistical method does not permit one to conclude anything about the cost of defensive medicine. The results are consistent with either very high or very low frequency of defensive medicine. (See appendix J for details.)

Lewin-VHI Estimate of Defensive Medicine Costs

Lewin-VHI, Inc. (1 25) took the Reynolds estimates as a starting point for its analysis of the national cost of defensive medicine. First, it averaged together the $12.1 billion and $13.7 billion estimates and updated them to 1991 constant dollars, which yielded a total cost of $18.8 billion in physician services in 1991. It added to the $18.8 billion in physician costs an additional $6.1 billion for hospital costs (using a method described in appendix J) to arrive at a preliminary total cost of $24.9 billion in 1991.

Then, because Lewin-VHI researchers believed the Reynolds number overestimated the cost of defensive medicine,[6] they reduced the $24.9 billion figure by three percentages (80, 60, and 40) to arrive at "low" ($5 billion), "medium" ($1 0 billion), and "high" ($ 14.9 billion) final estimates of the net costs of defensive medicine to the health care system in 1991.

In one respect, Lewin-VHI defined defensive medicine very restrictively compared with OTA's definition, including only those practice changes motivated **solely** by liability concerns. (Recall that OTA's definition allows other motivations as long as the avoidance of a malpractice suit is the primary reason.) On the other hand, Lewin-VHI's definition was broader in that it included certain practice changes not embraced by OTA's definition (e.g., extra documentation of care, more time spent with patients). Consequently, to the extent that it can be measured precisely, the defensive medicine estimate of Lewin-VHI does not necessarily describe defensive medicine as defined by OTA.

Recognizing the impossibility of precise measurement of defensive medicine, however defined, Lewin-VHI estimated a wide range of values. The question for OTA is whether the reported range of defensive medicine costs is reasonably accurate. OTA concluded that, due to the questionable accuracy of the Reynolds estimate, which Lewin-VHI used as a starting point, and the weak evidence for the assumptions applied in their adjustments, the Lewin-VHI estimate is not a reliable gauge of the possible range of defensive medicine costs (see appendix J for details).

■ Surveys of Physicians' Reasons for Ordering Tests and Procedures

A few studies have asked physicians about their reasons for ordering selected diagnostic tests or procedures without singling out liability concerns or focusing on clinical situations likely to involve them. Three such studies are reviewed in this section.

Epstein and McNeil (65) examined the frequency of and reasons for test ordering among 27 internists practicing at six community hospitals in the Boston area. They presented the physicians with a questionnaire about ordering four specific tests for patients with chronic hypertension and independently obtained data on the physicians' actual use of those tests in a sample of 324 patients who met the study's clinical criteria. For two of the tests—urinalysis and electrocardiography—physicians were asked to estimate the importance of various listed factors in their decision to test.

[6] The adjustments were made because Lew in-V HI researchers wanted to exclude that portion of defensive medicine not caused solely by liability concerns.

The reasons most frequently cited by respondents included (in decreasing order of importance): establishing a baseline, assessing prognosis, reassuring patients. and helping with treatment decisions. Minimizing risk of a malpractice suit was a relatively minor influence on test-ordering behavior (65).[7] Evaluation and management of hypertension is not a particularly high-risk area of practice and is not associated with high litigation rates: hence, the influence of malpractice liability concerns in these clinical situations might be expected to be low (73).

In a study of common diagnostic laboratory tests in a California medical training center, medical staff and residents were asked to indicate which of a 1ist of reasons for testing had influenced their decisions (256). The most common] y cited reasons were diagnosis (37 percent of all cases), monitoring (33 percent), screening (32 percent), and previous abnormal test result (12 percent). Very few physicians cited educational purposes (2 percent) or medicolegal concerns (1 percent) as a contributing factor (256).

In another study, residents (N= 13) and faculty (N=53) in internal medicine at a university hospital and a random sample of community physicians (N=93) in the same area were asked about their perceptions of the major reasons for overutilization of diagnostic tests among their peers (258). Residents and faculty internists were asked about factors they thought influenced residents' overuse of diagnostic tests. Community physicians were asked about factors causing overuse of testing by physicians in practices similar to their own.

Residents cited the following as the top five of 19 reasons for test overuse: inexperience; pressure from peers or superiors: habit; confirming initial abnormal results; and correction of lab processing mistakes. delays, or duplications. Faculty internists cited the following as the top five of 19 reasons for test overuse by residents: inexperience: habit: pressure from peers or superiors; reliance on lab results to follow daily progress: and use of laboratory rather than good history and physical exam or clinical judgment. Both residents and faculty internists ranked malpractice concerns last out of 19 factors influencing test overuse. Community physicians cited routine screening, habit, malpractice concerns, compulsion to document or explain all abnormalities, and pressure from peers or superiors as the top 5 of 19 reasons for test overuse among their peers (258).

Clinical Scenario Surveys

Only one previously published study used c1inical scenarios to assess malpractice-related issues (58). OTA expanded on this approach and conducted four clinical scenario surveys in cooperation with national physician professional organizations. Finally, OTA commissioned an additional c1inical scenario survey of physicians in New Jersey. The results of all these surveys are reviewed below.

The Duke Law Journal Study

In a 1970 study by the Duke Law Journal (58), 827 randomly selected physicians in 10 specialties in California and North Carolina were sent specialty-specific questionnaires asking about the use of particular procedures in brief clinical scenarios. The scenarios were selected from a 1ist of practices that a group of Duke University Medical Center physicians described as meeting the following criteria: 1) they are frequently followed. 2) they are prompted at least in part by concern about possible malpractice litigation. and 3) they are not of sufficient medical benefit to justify the added costs and risks. Recipients were asked to indicate:

1. how often they would follow the practice (with five responses ranging from "never" to "alWays");

[7] The reasons for ordering tests were rated on a 10-point scale ranging from "not important" to "very important." The mean rating for minimizing the risk of a malpractice suit was 2.6 for electrocardiogram and 3.0 for urinalysis, which tied for the lowest ratings along with "financial reimbursement (for doctor)."

2. whether the practice was of medical benefit to the patient (with five response categories ranging from "useless" to "useful and certainly worth the cost"); and
3. why they would have followed the practice described (with eight response categories, including "to add to a record which might be helpful in defense of a malpractice suit''—see table 3-1).

Significantly, the survey cover letter disclosed the malpractice liability-oriented purpose of the survey, because an earlier survey not stating this purpose had a very low response rate.

In three out of 17 clinical actions described in the Duke questionnaire,[8] over 20 percent of respondents cited "to add to a record which might be helpful in defense of a malpractice suit" as the most important reason for following the specified practice (see table 3-1). Yet, among the procedures for which malpractice liability concerns were cited most frequently as an important motivating factor, few respondents indicated they would follow the practice. Furthermore, in all but one of the 17 scenarios, the percentages of respondents citing medical reasons (namely, either "rule out undetected disease" or "facilitate further treatment") as the most important reason for following a practice were much larger than the percentages citing malpractice concern as most important.

The estimates of defensive medicine from the Duke study are questionable for a number of reasons, and it is impossible to say whether they are too high or too low. First, because respondents were aware of the purpose of the survey and were "prompted" by both the cover letter and the questionnaire to think about malpractice issues, they may have exaggerated their defensive responses.

Second, the wording of the question regarding reasons for choosing may have led some respondents to answer it as a hypothetical question. Some physicians who indicated they would not follow the practice may have nonetheless offered reasons for doing so, thereby inflating the apparent level of defensive response.

Third, other reasons listed on the Duke questionnaire (e.g., ● 'patient's peace of mind," "complete chart") might indirectly reflect some degree of malpractice liability concern, and their presence in the list of reasons may have led to an underestimation of defensive response.

Fourth, among physicians who cited "defense of a malpractice suit" as their chief reason for following the practice, many indicated they would follow the practice only some of the time. Thus, a simple frequency of citing defense of a malpractice suit as the most important reason does not translate directly into a "rate" of defensive practice.

Finally, both clinical practice and the medic: o-legal environment have changed dramatically since the Duke Study was conducted, possibly rendering the study results obsolete.

OTA Clinical Scenario Surveys

Goals and data collection

The leadership of three medical professional societies agreed to collaborate with OTA in the conduct of clinical scenario surveys of each society's members by mail during 1993.[9] The three associations were the American College of Cardiology (ACC), the American College of Obstetricians and Gynecologists (ACOG), and the American College of Surgeons (ACS).

Practicing physicians were selected through stratified random sampling of each association's membership roster. ACS agreed to conduct two separate surveys: one for general surgeons; the other for neurosurgeons.

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[8] OTA eliminated from its review four scenarios (one each from dermatology, obstetrics/gynecology, psychiatry, and plastic surgery) that did not meet OTA's definition of defensive medicine. For example, one scenario read: "'A female nurse is present during all gynecological examinations of the patient.'"

[9] Jeremy Sugar-man, M. D., and Russell Localio, M. S., J.D., served as primary consultants to OTA on the design of the survey instruments and the survey analysis plans, respectively.

TABLE 3-1: Defensive Medicine Responses to 17 Clinical Scenarios Included in the Duke Law Journal Study, 1970[a]

Specialty/ Hypothetical clinical situation	Percent of respondents listing "defend against a possible malpractice suit" as most important reason for following practice [a,c]	Number in sample (N)
Dermatology		
1 Even though removed nevi appear clinically benign dermatologist orders a hlstopathological examination	31%	106
Internal medicine		
1 Upon entering the hospital with a preliminary diagnosis of carcinoma of the lung the patient undergoes certain routine tests One of these is "admissions hemistries " or the full battery of serum electrolytes	o	76
2 The patient is admitted to the hospital with nonspecific abdominal complaints On the day of admission he undergoes electrocardiography	0	74
3 Same situation as in 2 above Patient undergoes an upper gastrointestinal (GI) series	0	73
4 Same situation as in 3 above Patient undergoes a lower GI series	0	73
5 Same situation as in 4 above Patient undergoes proctoscopy	0	73
Neurology		
1 A student appears at campus health office with the complaint of headache for duration of three days Physician orders skull x-rays	5	56
2 In a work-up for probably Intra-cranial tumor, the patient has undergone skull x-rays cerebral arteriography, echoencephalography, and ventrlculography The neurologist orders an electroencephalogram	2	56
Obstetrics-gynecology		
1 The gynecologist performs a dilatation and curettage on a 20-year-old miscarriage patient who is otherwise healthy	5	112
Orthopedics		
1 After taking history and performing a physical examination the orthopedic specialist determines that the patient– a 20-year-old male in otherwise good health has bruised three ribs laterally He orders x-rays to confirm his diagnosis	18	107
2 A fracture of the tibia is reduced and cast applied The orthopedic specialist requests that the patint return the following day for a reexamination of circulation and sensation in the leg	9	108
Otolaryngology		
1 When the patient complains of dizziness present several months following trauma the otolaryngologist initially orders x-rays of the mastoids	11	71
2 In evaluating all forms of dizziess, the specialist initially performs audiograms	5	73
Pediatrics		
1 After making a preliminary diagnosis of "hyperkinetic child, " the pediatrician requests psychiatric consultation	1	99
Psychiatry		
1. Before prescribing psychoactive drugs, the psychiatrist performs a physical examination of the patient.	29	85

(continued)

TABLE 3-1: Defensive Medicine Responses to 17 Clinical Scenarios Included in the Duke Law Journal Study, 1970[a] (Cont'd.)

Specialty/ Hypothetical clinical situation	Percent of respondents listing "defend against a possible malpractice suit" as most important reason for following practice [a,c]	Number in sample (N)
Urology		
1. The patient is to undergo renal arteriography. The urologist orders an intradermal skin test in order to evaluate whether the patient is allergic to the radio-opaque solution used.	25	109
2. Following urinary bladder instrumentation, the urologist administers antibiotics to combat possible genitourinary system infection.	5	109

[a] Percentages in this table reflect the proportion of all respondents from both California and North Carolina who reported the indicated reason.

[b] Scenarios were selected from a list of practices that a group of Duke University physicians described as meeting the following criteria: 1) are frequently followed, 2) are prompted at least in part by concern about possible malpractice litigation, and 3) are not of sufficient medical benefit to justify the added costs and risks. OTA eliminated from this table and from its review of the results of the Duke study four scenarios (one each from dermatology, obstetrics/gynecology, psychiatry, and plastic surgery) that did not meet OTA's definition of defensive medicine.

[c] All respondents were asked, "If you would have followed that practice, please answer why" and were then asked to choose, in order of importance, from a list containing the following reasons: "to add to a record which might be helpful in defense of a malpractice suit," "comply with routine practice," "peace of mind of patient," "rule out undetected disease," "facilitate future treatment," "complete chart," and "research purposes." Some respondents who indicated they would not follow the practice may have responded to this part of the questionnaire. The percentages in this table reflect the percentage of *all* respondents, regardless of whether they answered the question, who indicated defense of a malpractice suit as the most important reason.

SOURCE: U.S. Congress, Office of Technology Assessment, 1994, based on data presented in Duke Law Journal, "The Medical Malpractice Threat: A Study of Defensive Medicine," *Duke Law Journal* 1971: 939-993, 1971.

Introductory letters from both the society president and OTA's director described the surveys as a study of clinical decisionmaking, without mentioning malpractice or defensive medicine.

The high degree of cooperation provided by these physician associations resulted in response rates that were reasonably high for surveys of busy professionals, ranging from 56.6 to 62.3 percent. Nonetheless, these response rates leave open the possibility of response bias, Details of the survey methods are presented in appendix D and selected detailed results are presented in appendix E.

The clinical scenarios were developed by expert panels selected by each of the three physician associations. Panel members were asked to identify as many clinical scenarios as they could in a two-hour "brainstorming" session. They were instructed to identify scenarios in which defensive medicine was likely to play a major role. These candidate scenarios were then assessed, and two or three scenarios were selected for use in the final survey.

Panel members were then asked to create a '-control" version of each selected scenario by adding or deleting one or more key clinical indicators (e.g., a positive result from a laboratory or radiologic test) that would substantially reduce the likelihood that malpractice concerns would be cited as the primary reason for choosing a test or procedure. OTA staff and consultants revised the final questionnaires and, with input from association staff and panel members, selected one scenario in each survey that would have both a "case" and "'control" version.

Box 3-1 shows (he full text of all clinical scenarios used in the surveys. Figure 3-4 reproduces the questionnaire for a sample scenario. Questionnaire format differed Slightly across the four surveys.10

[10] All survey instruments are presented in a technical appendix that is available from OTA upon request.

BOX 3-1: Clinical Scenarios Used in OTA Surveys

ACC-1: Chest Pain Case

Patient history: A 42-year-old man arrives at the emergency room complaining of chest pain The pain is on the left side and is worse when he changes position While it is sore to the touch, he states that it feels "deep." The pain has persisted for one hour He has not experienced chest pain previously He jogs three times a week and does not smoke He had a normal routine physical examination a week ago

Physical examination: The patient is tense and anxious His BP [blood pressure] is 140/80 heart rate 80. The anterior chest wall is tender over the left sternal border Examination of the heart and lung is normal

Additional data: A 12-lead ECG [electrocardiogram] and CXR [chest x-ray] are normal Laboratory tests including a cbc [complete blood count], electrolytes and cardiac enzymes are normal

ACC-2: **Chest Pain Control**

Patient history: A 52-year-old man presents to the emergency room with retrosternal chest pressure There is no chest soreness The pain has been recurrent for the past three weeks, it comes on with physical activity and subsides with rest He smokes two packs of cigarettes a day He had a normal routine physical examination one week ago

Physical examination: The patient is tense and sweating BP is 160/1 00, heart rate is 95 There is no soreness on palpitation of the chest wall Examination of the heart and lungs is normal

Additional data: A 12-lead ECG shows T-wave flattening in the lateral leads Laboratory tests including a complete blood count, electrolytes and cardiac enzymes are normal

ACC-3: **Syncope (Fainting) Case:**

Patient history: A 50-year-old woman collapsed in a crowded, warm church in the summer Her husband states that she was unconscious for about two minutes and recovered quickly There was no seizure activity reported and no attempt was made to see if she had a pulse or respiration at the time of the event She has never had a similar episode The patient was taken to the emergency room by ambulance for evaluation The emergency room physician refers the patient to you for care

Physical examination: The patient appears well She is on no medication and was previously healthy Her BP is 150/80 sitting and 130/70 standing Her heart rate is 74 sitting and 85 standing Her exam is remarkable only for a 11/VI systolic murmur best heard at the left sternal border without radiation

Additional data: Monitoring in the emergency room reveals isolated PVCs [premature ventlcular contractions] Complete blood count, electrolytes panel, routine blood chemistries, chest x-rays and 12-lead ECG are normal

ACS-1: Breast Pain Case

History of present illness: A 38 year-old woman G2P2 [gravlda 2, para 2] is referred to you from her gynecologist for evaluation of left breast pain for one month She had her first child at age 29, and her second at age 31 She has been taking oral contraceptives subsequently Her gynecologist remarked that she has fibrocystic breast disease on annual routine examination. She has a family history of breast cancer A baseline mammogram done at age 35 showed no evidence of cancer She anticipates that her next menstrual period will begin in five days

Physical examination: Slight thickening in the upper outer quadrant of her left breast with some tenderness There are no nipple changes There is no axillary adenopathy

Clinical course: Following the exam you order a mammogram A radiologist's report states "There is dense, dysplastic breast tissue bilaterally Vague shadows bilaterally are consistent with possible

(continued)

BOX 3-1: Clinical Scenarios Used in OTA Surve

cysts No dominant masses or abnormal microcalcifications are present These breasts are very dense and difficult to evaluate Clinical correlation is Indicated "

ACS-2: **Rectal Bleeding Case**

History of present illness: A 35-year-old man comes to your office complaining of bright red blood per rectum Over the past four days he has observed a few drops of blood in the toilet and on the toilet paper after having a bowel movement He denies any recent change in bowel habits and has otherwise been in good health

Physical examination: Rectal examination reveals one small, external hemorrhoid which is not thrombosed. Otherwise the exam is within normal limits

Clinical course: Anoscopy reveals non-bleeding Internal hemorrhoids A hemoglobin, hematocrit, CEA [carcinoembryonlc antigen], and flexible sigmoidoscopy are all within normal limits

ACS-3: **Rectal Bleeding Control**

History of present illness A 35-year-old man comes to your office complaining of bright red blood per rectum Over the past four days he has observed a few drops of blood in the toilet and on the toilet paper after having a bowel movement. He den es any recent change in bowel habits and has otherwise been in good health

Physical examination: Rectal examination is normal

Clinical course: Anoscopy reveals non-bleeding internal hemorrhoids A hemoccult is positive A hemoglobin, hematocrit, CEA, and flexible slgmoidoscopy are all within normal limits

ACS-4: **Neurosurgeons Head Trauma Case**

History of present illness: A fifteen-year-old boy fell from his skateboard after riding over a crack in the sidewalk. He hit his head, got up and skated home Thirty minutes after the fall he told his mother about the Incident and she brings him to the ER. In the ER, the patient admits to light-headedness and some tenderness at the site of impact.

Physical examination There is an area of tenderness and swelling at left parietal area Mental status and neurological exam are normal.

ACS-5: **Neurosurgeons Back Pain Case**

History of present illness: A 52-year-old man is seen by you in your office, He complains of back pain and numbness of his right great toe for the past week He attributes the injury to driving over a pothole in his pick-up truck He has been able to continue to work since the Injury.

Physical examination: The patient has decreased range of motion of his back There is lumbosacral spasm Straight leg raising produces right leg discomfort at 70 degrees Ankle jerks are slightly diminished bilaterally, however, there are no other motor or sensory deficits revealed on exam There are no bowel or bladder complaints The rest of the physical examination is normal.

ACS-6: **Neurosurgeons Back Pain Control**

History of present illness: A 52-year-old man is seen by you in your office, He complains of back pain and numbness of his right great toe for the past week He attributes the injury to driving over a pothole in his pick-up truck He has been able to continue to work since the injury

Physical examination: The patient has decreased range of motion of his back There is lumbosacral spasm He has decreased sensitivity along medial aspect of right lower leg Straight leg raising produces right leg discomfort at 70 degrees. Ankle jerks are slightly diminished bilaterally, however. there are no other motor or sensory deficits revealed on exam There are no bowel or bladder complaints The rest of the physical examination is normal

(continued)

BOX 3-1: Clinical Scenarios Used in OTA Surveys (Cont'd.)

ACOG-1: Breast Lump Case

History: A 31 -year-old nulliparous woman comes to your office complaining of a breast lump. Her last visit was 1 year ago At that time she had no complaints and her physical examination was normal Her last menstrual period was 3 weeks ago She is currently on oral contraceptives and has a family history of breast carcinoma

Physical examination: There is a 1 cm mass in the upper outer quadrant of her right breast that is tender to palpation The nipple is normal without retraction and there is no discharge There is no skin dimpling or axillary adenopathy The left breast and the remainder of the exam are normal

ACOG-2: **Complicated Delivery Case**

History: A 36-year-old primigravida presents at 39 weeks gestation after an uncomplicated pregnancy

Clinical course: The patient has had 12 hours of labor, and is now 3 hours into the second stage She has been receiving oxytocin augmentation for secondary arrest of dilatation since 7 cm She is completely dilated and effaced at +2 station, ROP [right occiput posterior position] There has been no change in the exam for over an hour Moderate variable decelerations have been present for the last 30 minutes with good beat-to-beat variability Estimated fetal weight is 75 lb and clinical pelvimetry is adequate The patient is fatigued and can no longer push

ACOG-3: **Perimenopausal Bleeding Case**

History: A 51 -year-old sexually active nulliparous woman reports that her last menstrual period lasted 2 weeks It was heavier than her usual periods and there were some clots Her previous menstrual period occurred approximately 3 months ago For the prior 2 years her periods had occurred every 2 to 3 months She is on no medications, and has not used any contraception in more than 10 years

Physical examination: Vital signs are normal She is markedly obese The general physical exam is otherwise normal The pelvic exam is normal, but it is difficult to outline the uterus due to the patients weight

ACOG-4: **Perimenopausal Bleeding Control**

History: A 51 -year-old sexually active nulliparous woman reports that her last menstrual period lasted 2 weeks It was heavier that her usual periods and there were some clots Her previous menstrual period occurred over 1 year ago For the prior 2 years her periods had occurred every 2 to 3 months She is on no medications, and has not used any contraception in more than 10 years

Physical examination: Vital signs are normal She is markedly obese The general physical exam is otherwise normal The pelvic exam is normal, but it is difficult to outline the uterus due to the patient's weight

KEY ACC - American College of Cardiologists ACS - American College of Surgeons ACOG - American College of Obstetricians and Gynecologists

SOURCE Office of Technology Assessment 1994

Each survey also included an attitude questionnaire comprising three attitude scales: malpractice concern, cost consciousness, and discomfort with clinical uncertainty.[11] Finally, the surveys asked for data on selected demographic and professional characteristics of the respondents (e.g., practice setting).

Results: extent of defensive medicine

OTA constructed six measures of defensive medicine based on specific patterns of reasons given for choosing selected clinical options. These six response patterns involved particular combinations of checkmarks for '-malpractice concerns" and other reasons (see figure 3-4).

This section reports the results for the measure that most closely fit OTA's definition of positive defensive medicine: ordering additional procedures primarily, but not necessarily solely, out of fear of malpractice Iiabili y risk. The measure corresponding to this definition required the respondent to double-check "malpractice concerns," but allowed single checks for any other reasons. Appendix E contains results for all six measures of defensive medicine, which span a range from nonrestrictive (requiring only a single check for malpractice concerns with single or double checks allowed for any other reasons) to highly restrictive (requiring that ● 'malpractice concerns" be the only reason checked).

Table 3-2 shows the extent of defensive medicine in the "case" scenarios (i.e., those scenarios designed to elicit high levels of defensive medicine). The proportion of respondents citing "malpractice concerns" as the most important reason for choosing to perform at least one clinical action in a scenario ranged from 4.9 percent (ACS back pain scenario) to 29.0 percent (ACS head trauma scenario). The relatively high percentage in the ACS head trauma scenario is noteworthy, especially in contrast with the relatively low percentage for the back pain scenario within the same survey.

Overall, these figures suggest that, if physicians actually practice as they say they would in these surveys, positive defensive medicine does exist-although not to the extent suggested by anecdotal evidence or direct physician surveys. They also suggest that defensive medicine varies considerably across clinical situations.

Across the scenarios, "malpractice concerns" was cited considerablyess frequently than ● *medical indications" as the most important reason for choosing procedures.[12] Moreover, the majority of respondents who ever cited "malpractice concerns" as the most important reason for choosing a procedure did so for only one procedure, and very few did so for several procedures in the same scenario (data not shown).

Table 3-3 further demonstrates how the citing of "malpractice concerns" varied across the specific clinical options given in the scenarios. Across all 54 of the '*interventionist" clinical actions (i.e., actions other than waiting or doing nothing), of those who would choose the action, the percentage who would do so primarily because of malpractice concerns ranged from O to 53, with a median of 8 percent.

Because these scenarios were specifically designed to increase the likelihood of defensive response by physicians, they are not generallyrepresentative of all diagnostic procedures. Thus, one would expect the percentage of *all* diagnostic[13] procedures done consciously for defensive reasons to be less than 8 percent.

Because not all physicians chose a given procedure, a *smaller* percentage of the clinical encounters described in the scenarios involved the performmance of a defensive medical procedure. For example, although 30 percent of surgeons who

[11] Items in the attitude scales were adopted from previously used scales developed by Goold and colleagues at the University of Michigan (77),

[12] These data are presented in a separate technical appendix that is available from OTA upon request.

[13] All of the scenarios involved diagnosis of a medical condition, with the exception of the complicated delivery case.

FIGURE 3-4: Example of Survey Form from OTA's Clinical Scenario Surveys

History:

A 31-year-old nulliparous woman comes to your office complaining of a breast lump. Her last visit was 1 year ago. At that time she had no complaints and her physical examination was normal. Her last menstrual period was 3 weeks ago. She is currently on oral contraceptives and has a family history of breast carcinoma.

Physical Exam:

There is a 1 cm mass in the upper outer quadrant of her right breast that is tender to palpation. The nipple is normal without retraction and there is no discharge. There is no skin dimpling or axillary adenopathy. The left breast and the remainder of the exam are normal.

QUESTION 1.

Would you choose the following option? (Circle Yes or No)			Reasons for Decision: Check ALL the *reason(s)* for your decision (check all that apply). DOUBLE CHECK (✓✓) the single most important reason, even if you answered NO.				
			Medical indications	Concerns about cost vs. benefit	Malpractice concerns	Patient expectations	Other reason:
Do nothing now, schedule follow-up after next menstrual period	Yes	No					

If you answered NO to Question 1, go to Question 2. Otherwise go to next page.

QUESTION 2.

If you answered No to Question 1 above, which actions(s) would you recommend now? Circle Yes or No for EACH Decision.			Reasons for Decision: Check (✓) ALL the reason(s) for your decision (check all that apply). DOUBLE CHECK (✓✓) the single most important reason for EACH decision, even of you answeded NO.				
			Medical indications	Concerns about cost vs. benefit	Malpractice concerns	Patient expectations	Other reason:
Breast sonography	Yes	No					
Mammography	Yes	No					
Needle aspiration	Yes	No					
Fine needle biopsy	Yes	No					
Open biopsy	Yes	No					
Refer to a surgeon	Yes	No					
Other (Specify):							

Comments:

SOURCE Off Ice of Technology Assessment 1994

TABLE 3-2: Extent of Defensive Medicine in the OTA Clinical Scenario Surveys: Percent of Physicians Citing Malpractice Concern as Primary Reason for Choosing One or More Clinical Actions, by Scenario[a]

Scenario[b]	Number	Physicians citing malpractice concerns as the primary reason for choosing one or more clinical actions: Percent of all physicians	95% confidence limits
American College of Cardiology			
Syncope	346	14.2%	(10.4, 18.0)
Chest pain	162	12.4	(7.2, 17.6)
American College of Surgeons			
General surgeons			
Breast pain	1,412	5.7	(4.5, 6.9)
Rectal bleeding	738	7.0	(5.0, 9.0)
Neurosurgeons			
Head trauma	503	29.0	(25.2, 32.8)
Back pain	252	4.9	(2.3, 7.5)
American College of Obstetricians and Gynecologists			
Breast lump	1,230	10.4	(8.6, 12.2)
Complicated delivery	1,230	7.8	(6.4, 9.2)
Perimenopausal bleeding	634	9.9	(7.5, 12.3)

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details).
[b] Numbers reflect responses to "case" versions of the scenario only. See text of chapter 3 for explanation.

SOURCE: Office of Technology Assessment, 1994. Data analyzed in collaboration with Dr. Russell Localio of Pennsylvania State University.

would order a computed tomography (CT) scan in the ACS back pain case would do so for defensive reasons. only 3 percent of all respondents indicated they would order the CT scan. Thus, malpractice concerns led to CT scans in only 1 percent of all responses.

What do these results imply about medical practice? They support the large body of evidence (hat there is a great deal of variation in how physicians practice medicine. Furthermore, in these scenarios, beliefs about the medical appropriateness of procedures were far more influential in physicians' practice choices than were concerns about malpractice liability.

Case vs. control versions of scenarios

In each survey, a "case" version of one scenario was given to a random subgroup of respondents, and a "control" version of that same scenario was given to the remaining respondents. The two versions were identical, except that the control version contained one or more additional clinical features designed to increase the clinical appropriateness of an intervention and hence reduce the relative importance of malpractice concerns. Higher rates of intervention were thus expected in the control scenarios, and the frequency of defensive medicine was expected to be lower. (See box 3-1 for text of case and control versions of scenarios.)

OTA did find, generally, higher rates of use of tests and procedures in the control scenarios. Table 3-4 compares the percentage of physicians choosing each procedure in the case and control scenarios. Rates of use appeared to be higher in the control scenario, especially for more invasive procedures. For example, in the ACOG perimenopausal bleeding scenario, the percentage of respondents indicating they would perform an endometrial biopsy was virtually identical in the case and control versions. But much higher

TABLE 3-3: Extent of Defensive Medicine in OTA Clinical Scenario Surveys: Physicians Citing Malpractice Concerns as the Primary Reason for Choosing a Clinical Action[a]

Scenario/ clinical action	Percentage of *all physicians* who chose the clinical action: Percent	Percentage of *all physicians* who chose the clinical action: 95% confidence limits	Percent of *all respondents* who chose the clinical action primarily for malpractice concerns: Percent	Percent of *all respondents* who chose the clinical action primarily for malpractice concerns: 95% confidence limits	Of *clinical actions* chosen, the percent done primarily for malpractice concerns: Percent	Of *clinical actions* chosen, the percent done primarily for malpractice concerns: 95% confidence limits[b]
American College of Cardiology						
Syncope (N=346)						
Hospital admission	66.3%	(61.3,71.3)	7.2%	(4.4,10.0)	10.8%	(6.8,14.8)
Stress tests:						
Exercise ECG	29.8	(25.0,34.6)	2.1	(0.5,3.7)	7.1	(2.9,11.3)
Stress thallium	10.7	(7.3,14.1)	0.3	(0.0,1.5)	2.3	(0.0,7.1)
Echocardiograms:						
2 D/M mode	83.0	(79.0,87.0)	0.9	(0.0,1.9)	1.1	(0.0,2.3)
Doppler	67.0	(62.0,72.0)	1.4	(0.2,2.6)	2.2	(0.2,4.2)
Color flow doppler	56.2	(51.0,61.4)	1.8	(0.4,3.2)	3.2	(0.6,5.8)
Transesophageal echo	0.8	(0.0,1.6)	0.0	(0.0,1.1)	0.0	(0.0,7.6)
Holter monitor	83.5	(79.7,87.3)	2.8	(1.0,4.6)	3.3	(1.1,5.5)
Tilt table	39.6	(34.6,44.6)	0.0	(0.0,1.1)	0.0	(0.0,0.3)
Carotid doppler	26.5	(21.7,31.3)	3.6	(1.6,5.6)	13.7	(6.1,21.3)
EEG	23.1	(18.5,27.7)	3.4	(1.4,5.4)	14.9	(6.7,23.1)
Brain MRI	7.6	(4.6,10.6)	1.5	(0.1,2.9)	20.3	(3.9,36.7)
Chest pain (N=162)[c]						
Discharge home w/NSAID	67.8	(60.6,75.0)	0.0	(0.0,2.3)	0.0	(0.0,3.3)
Admit to hospital:[d]	27.1	(19.5,34.7)	4.4	(1.2,7.6)	16.1	(4.3,27.9)
Admit and observe	8.8	(4.2,13.4)	0.8	(0.0,3.6)	8.7	(0.4,35.7)
Admit and obtain cardiac enzymes	21.5	(14.9,28.1)	3.0	(0.4,5.6)	13.9	(4.6,29.9)
Admit and obtain ECG	22.4	(15.6,29.2)	4.4	(1.2,7.6)	19.5	(8.3,36.0)
Stress tests:						
Exercise ECG	50.2	(42.2,58.2)	8.6	(4.2,13.0)	17.2	(9.7,27.2)
Stress thallium	8.5	(4.1,12.9)	0.8	(0.0,3.6)	9.0	(0.4,36.6)
Echocardiograms:						
2 D/M mode	18.8	(12.6,25.0)	1.4	(0.0,3.4)	7.6	(1.2,23.2)
Doppler	7.8	(3.4,12.2)	1.4	(0.0,3.4)	8.4	(2.9,49.4)
Color flow doppler	8.4	(4.0,12.8)	0.8	(0.0,3.6)	9.1	(0.0,36.9)
Transesophageal echo	0.6	(0.0,1.8)	0.0	(0.0,2.3)	0.0	(0.0,97.1)
Angiogram	0.6	(0.0,1.8)	0.0	(0.0,2.3)	0.0	(0.0,97.4)

(continued)

TABLE 3-3: Extent of Defensive Medicine in OTA Clinical Scenario Surveys: Physicians Citing Malpractice Concerns as the Primary Reason for Choosing a Clinical Action[a] (Cont'd.)

Scenario/ clinical action	Percentage of *all physicians* who chose the clinical action: Percent	95% confidence limits	Percent of *all respondents* who chose the clinical action primarily for malpractice concerns: Percent	95% confidence limits	Of *clinical actions* chosen, the percent done primarily for malpractice concerns: Percent	95% confidence limits[b]
American College of Surgeons						
General Surgeons						
Breast pain (N=1 ,412)						
Needle biopsy	13,3Y0	(11 5,15 1)	2.7%	***(1 .9,35)***	20370	(14 1,26 5)
Open biopsy	8 4	(7 0,9,8)	2 1	(1.3,2.9)	24.5	(16 5,32 5)
Other	145	(12 5,16 5)	1,0	(O 4,1 .6)	6 6	(2 8,104)
Rectal bleeding (N=738)[c]						
Air contrast barium enema	19,2	(16 2,22 2)	2 3	(1 3,3.3)	11.8	(6.2,1 7.4)
Colonscopy	26,2	(22.8,29.6)	5.0	(3 4,6.6)	19.0	(1 3.0,25.0)
Other	9.7	(7.5,1 1 .9)	0.3	(0.0,07)	2.8	(o 3,97)
Neurosurgeons						
Head trauma (N=503)						
Skull x-ray	337	***(29 9.37.5)***	100	(74,126)	29.6j	22.2,37.0)
C-spine x-ray	21,1	***(17.7,24.5)***	11.2	(8 6,13.8)	52,9	42.5,63.3)
CT of head	48.8	***(44.8,52.8)***	21.8	(18,4,25,2)	44.7	38.1,51.3)
Other	3.9	***(2.3,5.5)***	0.4	(0.0,1 .4)	9.3	(1.0,31.0)
Back pain (N=252)[c]						
Lumbosacral x-ray	24.4	(19.0,29.8)	***3.4***	1.2,5.6)	139	(4,9,22.9)
CT	3.4	(1 .2,5.6)	1 0	0.0,2.2)	298	(5.5.68.0)
MRI	12.6	(8.4,16.8)	2 0	0.2,3.8)	16.0	(5.8,33.3)
Other	9.4	(5.6,13.2)	0 0	0.0,1.5)	0 0	(0.0,14.4)
American College of Obstetricians and Gynecologists						
Breast lump (N= 1,230)						
Breast sonography	23.6%	21.2,26.0)	2.3%	(1 .5,3 1)	9.7%	(6.3,13.1)
Mammography	45.6	42.8,48.4)	5.6	(4,2,7.0)	12.3	(9.5,15.1)
Needle aspiration	24.6	21.8,27.4)	1.1	(0.5,1 .7)	4.5	(2.1 ,6.9)
Fine needle biopsy	7.0	(5.6,8.4)	0.5	(0.1 ,09)	6.5	(2.3,14.0)
Open biopsy	1.0	(0.4,1.6)	0.0	(0.0,03)	0.0	(0.0,26,0)
Refer to surgeon	29.2	26.6,31.8)	5.3	(4,9,7,7)	21.4	(17.0,25.8)
Other	2.0	(1.2,2.8)	0.0	(0.0,0.3)	0.0	(0.0,141)

(continued)

TABLE 3-3: Extent of Defensive Medicine in OTA Clinical Scenario Surveys: Physicians Citing Malpractice Concerns as the Primary Reason for Choosing a Clinical Action[a] (Cont'd.)

Scenario/ clinical action	Percentage of *all physicians* who chose the clinical action: Percent	950/o confidence limits	Percent of *all respondents* who chose the clinical action primarily for malpractice concerns: Percent	95% confidence limits	Of *clinical actions* chosen, the percent done primarily for malpractice concerns: Percent	95°/0 confidence limits[b]
Complicated delivery (N= 1,230)						
Continue pushing now	8 8	(7 2,104)	0 2	(o 00 4)	1 9	(O 2,66)
Rest for 30 minutes	81	(65 97)	0 2	(o 0,04)	2 1	(o 3,72)
Operative vaginal delivery	67.7	(65 1,70.3)	1.4	(0.8.2.0)	2.0	(1.0.3.0)
Caesarean delivery	23.8	(21.4,26.2)	6.0	(4.6.7.4)	25.0	(20.0.30.0)
Other	4.8	(3.6.6.0)	0.2	(0.0.0.4)	3.7	(0.5.12.1)
Perimenopausal bleeding (N=634)[c]						
Hematocrlt/hemoglobin	734	(69 8,77 O)	1 3	(o32 3)	1 8	(O 8,35)
Pregnancy test	495	(45 5,53 5)	5 5	(3 7,73)	11.1	(7 5,147)
Endometrial sampling	854	(82 6,88 2)	1 6	(O62 6)	1 9	(o ***9,35)***
Pelvic ultrasound	543	(50 358 3)	4 2	(2 6,58)	7 6	(46, 106)
Hysteroscopy	143	(11 5,17 1)	0 6	(o 01 2)	4 4	(1 2,109)
D & C	4 2	(2 6,58)	0 5	(o 01 1)	109	(2 2,289)
Hysterectomy	0 2	(O 0,06)	0 0	(O 0,06)	0 0	(o 0,94.4)
Other	4 5	(2 9,6 1)	0 0	(O 0,06)	0 0	(o 0,121)

KEY C-spine = cervical spine CT = computed tomography D & C = dilation and curettage 2 D/M Mode = two dimensional and !Ime-motion mode EEG = electroencephalogram, ECG = electrocardiogram, MRI = magnetic resonance image NSAID = nonsteroidal anti-mflammcitory drug

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based See appendix D for details

[b] The confidence Intervals for the "percentage of clinical actions' tend to be wide due to the small numbers of respondents who chose each procedure

[c] Numbers reflect responses to "case" versions of the scenario only See text of chapter 3 for further explanation

[d] 'Admit' was not listed in the questionnaire as an Isolated option This composite category reflects respondents who chose at least one of the three admit' option S and did so primarily for malpractice reasons

SOURCE Off Ice of Technology Assessment 1994 Data analyzed in collaboration with Dr Russell Localio of Pennsylvania State University

TABLE 3-4: Comparison of Case and Control Versions of OTA Clinical Scenarios: Percentage of Physicians Choosing Each Clinical Action[a]

Scenario/ clinical action	Percentage of physicians who indicated they would take the action		Difference	95 "/0 confidence
	Case	Control	[[case] - [control])	limits
American College of Cardiology				
Chest pain	(N= 162)	(N=182)		
Discharge home with NSAID	67 8%	1.8%	66.0*	(58 4, 73.6)
Admit to hospital [b]	271	97.5	-70 4*	(-77 8,-63 O)
Admit and observe	8 8	87.8	-79.0*	(-85 6, -724)
Admit and obtain cardiac enzymes	215	93.3	-71 8*	(-79 2, -644)
Admit and obtain ECG	224	685	-461 *	(-55 6, -366)
Stress tests				
Exercise ECG	502	400	102	(-O 5, 20.9)
Stress thallium	8 5	272	-18 7*	(-26 6, -10.8)
Echocardiograms				
2 D/M mode	188	408	-22 0*	(-31.5, -12.5)
Doppler	7 8	129	-5.1	(-11.6, 1.4)
Color flow doppler	8 4	123	-3.9	(-10.4, 2.6)
Transesophageal echo	0 6	0 6	0.0	(-1.7, 1.7)
Angiogram	0 6	587	-58.1*	(-65.5, -50.7)
American College of Surgeons				
General Surgeons				
Rectal bleeding	(N=738)	(N=673)		
Air contrast barium enema	19270	26.5%	-7 3*	(-1 1.8,-2 8)
Colonoscopy	262	37.3	-11 1 *	(-16 0,-6 2)
Other	9 7	6.1	3 6*	(O 7,65)
Neurosurgeons				
Back pain	(N=252)	(N=251)		
Lumbosacral X-ray	24.4%	26.0%	-1.6	(-9.3,6.1)
CT	3.4	9.6	-6.2*	(-10.6,-1.8)
MRI	12.6	19.4	-6.8*	(-13.3,-0.3)
Other	9.4	8.5	0.9	(-4.2,6.0)
American College of Obstetricians and Gynecologists				
Perimenopausal bleeding	(N=634)	(N=596)		
Hematocrit/hemoglobin	73.4%	70 4%	3.0	(-2 1,8 1)
Pregnancy test	49.5	36 4	13.1*	(7 5,187)
Endometrial sampling	85.4	85 5	-0.1	(-4 1,3 9)
Pelvic ultrasound	54.4	50 7	3.7	(-2 0,9 4)
Hysteroscopy	14 3	22 8	-8.5*	(-12.9,-4 1)
D & C	4 2	11 5	-7.3*	(-lo 4,-4 2)
Hysterectomy	0 2	0 5	-0.3	(-1 0,0 4)
Other	4 5	3.0	1.5	(-o 7,3 7)

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based See appendix D for details

[b] "Admit' was not listed in the questionnaire as an isolated option This composite category reflects respondents who chose at least one of the three 'admit" options and did so primarily for malpractice reasons

* Statically significant at the p < 05 level

KEY CT - computed tomography, D & C - dilation and curettage, 2 D/MMode - two dimensional and Ilme-motion mode, ECG - electrocardiogram, MRI - magnetic resonance image

SOURCE Off Ice of Technology Assessment 1994 Data analyzed in collaboration with Dr Russell Localio of Pennsylvania State University

proportions of respondents in the control scenarios said the y would perform hysteroscopy or D&C (dilatation and curettage), both of which are more invasive procedures.

For the vast majority of procedures, OTA found no significant differences between case and control scenarios in the percentage of respondents who chose the procedure mainly for defensive reasons. However, the majority of procedures in the case scenarios were chosen by relatively few respondents. Therefore. the sample sizes on which to base comparisons of the frequency of defensive response were very low. The surveys were simply too small to detect such differences with adequate statistical confidence if they did exist. (Detailed results of case and control comparisons are available in a tcchnical appendix upon request to OTA.)

Open-ended vs. structured questionnaires

To assess how the structure of the questionnaire might affect responses, a supplemental sample of 600 general surgeons was given “open-ended”’ versions of the same c1inical scenarios used in the regular general surgeon survey. These scenarios listed the same clinical actions as in the regular survey but gave no printed "reasons” from which to choose. Insted, a blank space was provided beside each clinical action in which the surgeon could write out his or her own reasons for choosing it. Open-ended responses were coded by OTA study staff into the same categories of "reasons” as on the closed-ended questionnaire and were then compared with the closed-ended results.

Although the percentage of physicians who chose each action did not differ significantly in the open-ended and closed-ended surveys, a substantially lower proportion of respondents to the open-ended questionnaire cited malpractice concerns as the primary reason for choosing a given action (see table 3-5).

Two alternative explanations for this finding are possible. First, without the “prompting” effect of the closed-ended questionnaire, physicians’ concern about malpractice liability might not enter as readily into their hypothetical clinical decisionmaking.

Alternatively. even though the open-ended questionnaire invited physicians to cite both clinical and nonclinical reasons for their procedure choices. the respondents may have viewed the format and content of the questionnaire as being similar to a medical board examination, Such an interpretation may have reduced the likelihood of citing such nonclinical factors as malpractice concerns. Indeed, most respondents to the open-ended questionnaire gave detailed clinical explanations for their choices of procedures. lending support to this interpretation.

These results highlight the Iimitations of surveys as a method of measuring the extent of defensive medicine. Questionnaire design can affect responses for reasons that are difficult to identify and specify.

Attitudes toward malpractice

OTA examined differences in attitudes regarding malpractice concern between respondents who cited “malpractice concerns” as the most important reason for choosing one or more clinical actions in each scenario and those who did not. The separate items in the attitude survey that addresscd the concerns about malpract ice were combined into a composite scale. (For details, see appendix D.)

OTA compared attitudes toward malpractice of respondcnts who had double-chccktxl “malpractice concerns” as a reason for choosing one or more c1inical actions in four selected scenarios with the attitude scores of those who had not double-checked “malpractice concerns.[14] In only one scenario (ACS head trauma) did respondents who double-checked “malpractice concerns”’ have statistically significantly higher malpractice concern scale scores than those who did not double-check “malpractice concerns .” In two scenarios (ACS breast pain and ACOG breast

[14] See appendix D for an explanation of how scenarios were selected for the analysis of attitude scores

TABLE 3-5: Comparison of Open-Ended and Closed-Ended Versions of OTA Clinical Scenario Survey of General Surgeons[a]

Scenario/ clinical action	Percentage of *all physicians* who chose the clinical action[b]		Of clinical actions chosen, the percent done primarily for malpractice concerns				
	Open-ended	Closed-ended	Open-ended	Closed-ended	Difference[c]	Odds ratio (OR)	95% confidence interval for OR[b]
Breast pain	***(N=381)***	***(N=1412)***					
Needle biopsy	10 6%	1 3.3%	6370	20 .3%	-140	0 20'	(0.02, O 85)
Open biopsy	6 5	8 4	146	245	-99	0 02'	(o 002, 0 07)
Other	126	145	0 0	6 6	-6.6	0.0	(o 00, 1 03)
Rectal bleeding	***(N=381)***	***(N=738)***					
Barium enema	143	192	3.7	11 8	-8.1	025	(o 03, 1 11)
Colonoscopy	**250**	**262**	4 0	190	-150	0 21*	(O 05, 0 60)
Other	10,2	9.7	0 0	2.8	-28	0 0	(0. 00.6. 4)

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based See appendix D for details

[b] With one exception (barium enema), the proportions of respondents choosing a given clinical action were not statistically significantly different between open- and closed-ended versions of the scenario

[c] Confidence intervals were constructed for the odds ratio because of the small number of observations in the denominator and numerator of the calculated percentages

* = statistically significant at the p < 05 level

SOURCE Office of Technology Assessment, 1994 Data analyzed in collaboration with Dr Russell Localio of Pennsylvania State University

lump), malpractice attitude scores were statistically significantly lower among double-checkers compared with nondouble-checkers. 15 (Detailed results of the analysis are included in appendix E of this report).

Costs of selected defensive medicine procedures

Based on the results of the clinical scenario surveys, OTA estimated the potential national costs of positive defensive medicine for two scenarios for which incidence and cost data were readily available: the ACOG complicated delivery scenario and the ACS head trauma scenario. The rationale and methods for deriving these estimates, and their results, are detailed in appendix F.

The aggregate incremental cost of ● 'defensive" Caesarean delivery in the 46,896 cases nationally in 1991 that were similar to the ACOG scenario16 was $8.7 million.

The estimated aggregate cost of "defensive" diagnostic radiology of the head (skull x-ray, cervical spine x-ray, and CT scan of the head) for the roughly 530,000 minor head injuries estimated to occur annually among children and young adults aged 5 to 24 in the United States (i.e., cases similar to that described in the ACS head trauma scenario) was approximately $45 million.

While these estimated costs represent only a small share of total national health care costs, they are not trivial. It is inappropriate to generalize these estimated costs beyond the specific scenarios for which they were derived. Also, the scenarios were designed to be malpractice-sensitive and thus are not representative of clinical practice generally.

Glassman Scenario Survey of New Jersey Physicians

An OTA-sponsored study by Glassman and colleagues (73) conducted a clinical scenario survey in which five of the scenarios developed for OTA's surveys were adapted for use in this study.

The contractors surveyed 835 physicians covered by the Medical Insurance Exchange of New Jersey, which insures 70 percent of all New Jersey physicians. For each scenario, physicians reported the clinical actions they would take (e.g., tests, procedures, referral to other physicians).

Respondents were asked to estimate on a five-point scale (1 = extremely influential, 5 = not at all influential) how strongly their decisions had been influenced by various factors, including "the desire to reduce the possibility of malpractice litigation;""the history, physical, and lab results;" "the standard of patient care in their community;" and "patient or family expectation s."

The physicians were also asked to estimate the probability that the patient had a life-threatening condition and the probability that further testing would identify the cause of the patient's symptoms. The survey also queried physicians about their general attitudes regarding malpractice liability, clinical uncertainty, and cost consciousness using a set of attitude scales similar, but not identical, to those used in the OTA clinical scenario surveys.

Depending on the scenario, between 2.3 and 6.4 percent of the respondents cited the "desire to minimize the possibility of malpractice 1itigation" as either an extremely or very influential reason for their clinical decisions and did not cite any

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15 The only statistically significant difference on the other two attitude scales was in the ACC syncope scenario, Where the mean score for discomfort with clinical uncertainty was statistically significantly *lower* among respondents who double-checked malpractice concerns compared with those who did not.

16 Women aged 30 to 39 experiencing prolonged labor or dysfunctional labor (see appendix F for details)

TABLE 3-6: Percent of New Jersey Physicians Citing Concern About Malpractice Litigation as the Most Influential Factor in Clinical Decisionmaking

Scenario	Percent of physicians who cited "desire to minimize possibility of malpractice litigation" as the *most influential*[a] reason for clinical decision
Cardiologists	
Syncope in 50-year-old woman	
Diagnostic testing	64-29.7%a
Clinical management	57-266
Nonspecific chest pain in 42-year-old man	
Diagnostic testing	57-329
Clinical management	43-310
Internists	
Syncope in 50-year-old woman	
Diagnostic testing	46-305
Clinicall management	53-295
Nonspecific chest pain in 42-year-old man	
Diagnostic testing	57-315
Clinical management	23-275
Surgeons	
Breast pain in 38-year-old woman	*32-241*
Head trauma in 15-year-old	*59-422*
Rectal bleeding in 35-year-old man	*42-289*

NOTE These numbers are based on responses to clinical scenario surveys completed by cardiologists (N- 157) internists (N- 188), and surgeons (N- 187) practicing in New Jersey Overall survey response rates were 49 percent for cardiologists 51 percent for Internists and 59 percent for surgeons

[a] In this survey respondents were not asked to rank their reasons, therefore It IS impossible to infer the primary motivation in cases where a respondent listed two reasons as equally Important The percentages are presented as a range The lower bound of the range includes only those respondents who cited malpractice concerns as either extremely Influential" or "very Influenlal and cited no other reason as that Important The upper bound also includes respondents who cited malpractice concerns as either 'extremely influential or "veryj influential and listed another reason as equally but not *more* important

SOURCE PA Glassman RAND Santa Monica. CA unpublished data from a study prepared under contract with the Off Ice of Technology Assessment U S Congress Washington, DC, January 1994

other reason as equally or more influential (table 3-6). However, if respondents who cited malpractice concerns as extremely or very influential but also cited mother reason as equally important are included, the defensive response across scenarios could be as high as between 24 and 42 percent (see table 3-6). 17

In contrast, medical indications were cited as the most influential factor (i.e., very or extremely important, with no other reasons as important) by 42.8 to 60.9 percent of respondents, depending on the scenario (data not shown).

The study found no statistically significant relationships between physicians' tendencies to cite malpractice liability concerns as a factor in their decisions and either their malpractice attitude scale scores or their past malpractice litigation exposure (73).

17 Unlike the OTA surveys, Glassman and colleagues' survey did not require respondents to rank reasons. Thus, for cases In Which respondents cited malpractice liabil ity concerns and medical indications as equall y important, it was not possible to infer which was the primary motivation. If one assumes that malpractice liability concerns were the primary motivation in those cases, however, the percentage 01" respondents displaying defensive behavior increases to between 24 and 42, depending on the scenario (see table 3-6).

Conclusions

The results of clinical scenario studies suggest that conscious positive defensive medicine does exist, although not to the extent suggested by anecdotal evidence or by some other physician surveys (see figure 3-3).

Despite using somewhat different methods and measures, the three clinical scenario studies found roughly comparable levels of defensive medicine: the percentage of respondents who cited malpractice concerns as the primary reason for ordering tests or procedures ranged from zero to over 30. However, all of the studies also found that this percentage was considerably lower than the percentage of respondents who cited c1inical factors as the primary reason for choosing procedures-even though most scenarios were designed to enhance the probability y that the respondent would cite malpractice concerns. Because scenarios were also designed with the implicit assumption that conservative management was acceptable. these findings suggest that many physicians who choose to be more aggressive in diagnosis and treatment do so primarily because they believe it is medically appropriate, and not because they are conscious y concerned about liability.

In the OTA clinical scenario surveys, the median defensive response across 54 "interventionist" clinical actions was only 8 percent. Because the scenarios were designed to be malpractice-sensitive, the percentage of clinical actions arising from conscious defensive medicine is certainly lower than this figure.

The estimates of defensive medicine from clinical scenario surveys are still limited in that they are based on what physicians say they would do rather than what they actually do. Furthermore, reasons such as compliance with community standards and patient expectations, although not labeled malpractice liability concerns as such, may indirectly reflect potential liability concerns. To the extent that such reasons were listed alongside "malpractice concerns" as options in the questionnaires, they may have deflated the apparent influence of malpractice liability in these studies. On the other hand, the structured questionnaires may have prompted physicians to overreport true levels of defensive medicine.

Statistical Analyses of Defensive Medicine

Direct physician surveys and clinical scenario surveys examine the extent to which physicians report that fear of malpractice liability influences their behavior. Whether physicians actual] y do behave the way they say they do in surveys remains an open question, and the potential problems with such surveys argue for analyzing data on actual use of procedures to identify the frequency of defensive medicine.

Three past studies have tried to document the existence of defensive medicine through analyses relating physicians actual exposure to malpractice claims to their actual clinical practices. As part of this assessment of defensive medicine. OTA commissioned three additional studies of this type in the areas of both positive and negative defensive medicine.

The hypothesis common to such studies is that physicians with greater exposure to malpractice liability (either past personal experience or vicarious exposure through colleagues within a hospital or geographic area) will practice more defensive medicine than physicians with lower malpractice claims exposure. This section discusses the results of five studies of this type.[18] Three looked at positive defensive medicine: the other two examined negative defensive medicine in obstetrics-namely, the decision to withdraw from obstetrics

[18] OTA excluded two other studies on Caesarean deliveries—one in New York by Rock and colleagues (198) and another in Michigan by Goyert and colleagues (78)—because these studies did not control for clinical variables or had small sample sizes.

practice due to liability concerns. The studies used varying combinations of actual and self-reported data on malpractice claims exposure and physician practice patterns.

Studies of Positive Defensive Medicine

Caesarean deliveries in New York State, 1984

Localio and colleagues (128,129) examined the relationship bet ween malpractice 1 iabilit y risk and rates of Caesarean delivery in a sample of New York State hospitals in 1984. The study examined eight different measures of malpractice liability risk: malpractice premiums by region; physicians' perceived risk of litigation as measured in a survey, by region; three measures of actual physician malpractice claims experience aggregated to the hospital level; and three measures of actual malpractice claims experience of the individual physicians (129).

When patient severity and other factors known to affect the Caesarean rate were controlled, higher rates were associated with both higher area-level malpractice liability risk (premiums and perceived risk of litigation) and hospital-level malpractice claims risk. The estimated incremental effect of higher area- and hospital-level malpractice liability risk on the Caesarean delivery rate was quite large. For example, a patient in a hospital with a high frequency of physician obstetric malpractice claims was 32 percent more likely to undergo a Caesarean delivery than a patient in a hospital with a low claim frequency. The study did not find a statistically significant association between the physician's individual malpractice claim experience and his or her Caesarean rate (128).

Analyses of patients classified at various levels of expected risk of Caesarean delivery (based on clinical factors alone) showed that malpractice liability risk had the strongest influence in births with moderate clinical risk. For low-risk births (i.e., births in which clinical factors alone predicted a less than 5 percent chance of Caesarean), hospital- and premium-level malpractice liability risk measures were either slightly negatively or not statistically significantly associated with Caesarean delivery. For medium risk births (between 5 and 75 percent chance of Caesarean), they were positively associated with Caesarean delivery. For high-risk births (greater than 75 percent chance of Caesarean), they were also positively associated, but to a lesser degree than for medium-risk births. These findings suggest that malpractice liability risk may play a greater role in situations where clinical factors alone do not clearly point out the appropriate course of action (128).

Use of services in low-risk prenatal cases, Washington State, 1989

A study jointly funded by OTA and the Robert Wood Johnson Foundation and undertaken by Baldwin and colleagues examined the association between physicians' malpractice claims experience and their use of technology for low-risk obstetric patients (10). A stratified random sample of Washington State physicians was evaluated by linking both personal and area-level malpractice claims exposure data with data on physicians' use of services for their low-risk obstetric patients. 19 Utilization measures included:

- ultrasound early in pregnancy (prior to 20 weeks' gestation),
- ultrasound throughout pregnancy,
- type of delivery (vaginal or Caesarean),
- referral and consultation with specialists, and
- total prenatal care resource use.[20]

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[19] The study sample included 54 urban obstetricians, 29 rural obstetricians, 59 urban family physicians, and 67 rural family physicians. Patient records were selected for up to I I low-risk obstetric patients pcr physician. Patients were randomly selected from the case records of each physician, and those cases presenting with selected risk factors in their initial prenatal care visit were excluded from the analysis.

[20] The total prenatal care resource use for a case was based on a standardized average charge for specific prenatal services obtained from Blue Cross of Washington State.

Independent variables in the study included individual physicians' self-reported malpractice histories and the "malpractice defendant rate"21 in the county in which the physician practices. These rates were obtained from Washington's largest malpractice insurance carrier.

After controlling for both patient and physician practice characteristics, the researchers found no statistically significant differences in prenatal resource use or Caesarean delivery rates between physicians with higher and those with lower malpractice claims exposure (10). Table 3-7 shows the results of the analysis that used the county malpractice defendant rate as the independent variable of interest. There were no statistically significant associations between the county defendant rate and any of the five measures of resource use.

Use of clinical services in New Jersey, 1993

An OTA contract study undertaken by Glassman and his colleagues at RAND (73) used clinical scenarios to test whether New Jersey physicians' personal malpractice claims experience was associated with their reported use of resources.

The study population comprised 1,540 physicians[22] insured by the single largest malpractice insurance company in New Jersey. The insurance company provided data on individual physicians' malpractice histories from 1977 through 1992 (both open and closed claims). The great majority of physicians surveyed had at least one claim filed against them, with some specialties as high as 93 percent.

Study participants were asked to respond to two or three clinical scenarios (a total of five were used), rate their reasons for choosing among certain clinical choices, and answer a questionnaire on attitudes toward clinical uncertainty, malpractice, and cost consciousness.23 In relevant scenarios, physicians were asked to estimate the probability that the patient had severe disease. Physicians were blinded to the purpose of the study and were unaware that scenario results would be 1inked to their personal malpractice claims histories.

The researchers found no statistically significant associations between resource use in the five clinical scenarios and the physician's own malpractice claims experience.24 The only study variables consistently correlated with resource use were physicians self-reported attitudes toward cost consciousness (negative correlate, and physicians subjective estimates of the probability of severe disease (positive correlation). Physicians' self-reported attitudes toward uncertainty. cost consciousness, and malpractice were not consistently correlated with their persona] malpractice claims histories. The study did not utilize area- or hospital-level measures of malpractice claims risk.

Studies of Negative Defensive Medicine

Decision to withdraw from obstetrics, New York, 1980-89

An OTA contract study conducted by Grumbach and colleagues (81) examined whether New York physicians who experienced high absolute increases in malpractice insurance premiums between 1980 and 1989 were more likely than physicians with lower premium increases to withdraw from obstetrics practice during the same period. The study sample included obstetrician/gyncolo-

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[21] The *malpractice defendant rate* in a county was defined as the number of physicians in that county who had been involved in malprac [ice claims divided by the total number of physician-years insured in the county by Washington's largest carrier.

[22] A total of 835 of the 1,540 eligible physicians (54.2 percent) responded to the survey.

[23] Scenarios for this study was modeled after scenarios developed for the OTA clinical scenario surveys (see above, appendix [)).

[24] Physicians' claims experience was measured in two ways" 1) categorically (no claims, any past claim without negligence or payment, any past claim with negligence or payment, one recent claim, and more than one recent claim); and 2) overall physician claims rates coil.ipwxl into tertiles.

TABLE 3-7: Factors Associated with Obstetric Resource Use in Low-Risk Patients in Washington State, 1989: Results of Linear Regression

Independent variable	Obstetric Resource Use Measure: Mean no. of early ultrasounds per patient	Total no. of ultrasounds per patient	Mean no. of consults or referrals per patient	Mean standardized resource use per patient ($)	Percent Caesarean deliveries (70)
	- - - Regression coefficients - - -				
County malpractice defendant rate	-23	-156	-79	***$-1,094***	-11%
Urban obstetrician	27*	15	02	***554****	.004
Rural obstetrician	.42*	.53'	08	***335***	7
Rural family physician	15	**009**	-02	***158***	-9
Urban family physician (ref.)	—	—	—	—	
% male	-04	-02	-05	-118	-2
Physician age	-003	-004	-003	-14	3
HMO practice	-19	-.46*	.25*	128	-3
Community clinic practice	-11	-24	04	-161	-7
Hospital practice	-07	-25	-08	-314	-6
Private practice (ref.)	—	—	—	—	
% high-risk patients	002	**.007***	0009	14	**.2***
% Medicaid patients	.002'	**.004***	0005	3	-.008
Obstetric volume	-001	-.0009	-0002	-1	-04
Median county household income	-000005	.000002	.00001'	***03***	**-.0009***
Nursery care:b level i	-03	.03	-11	***352***	.7
Level II	-03	.06	-03	196	-3
Level III (ref.)	—	—	—	—	
Consult available	05	03	-.13*	-83	-7
Distance to tertiary hospital	-001	-.004'	0001	-1	01
Physician is residency trained	15	12	-02	-62	13
Physician is board certified	22 —	07	-05	-14	14
Intercept	.019	.981	.184	745	-21.4
Adjusted R^2	**.11***	**.18***	**.11***	**.25***	**.12***
Total no. of MDs in sample	205	205	205	205	205
Mean value of dependent variable	.50	1.1	.14	1,563	15%

* = significant at $p < .05$

[a] County malpractice defendant rate analyzed as a continuous variable.

[b] Level of nursery care available in hospital. I=least technology, III=most technology.

[c] Obstetric consultant available within 10 miles of physician's practice.

SOURCE: L. M. Baldwin, L. G. Hart, M. Lloyd, et al., Department of Family Medicine, University of Washington, Seattle, WA, "Malpractice Claims Exposure and Resource Use in Low Risk Obstetrics," prepared under contract to the Office of Technology Assessment, U.S. Congress, Nov. 21, 1993, unpublished data, revisions provided to OTA by authors, May 1994.

gists **(OB,GYNs) and** family practitioners (FPs) who were active in obstetrics in 1980,

The main explanatory variable was the absolute change in malpractice insurance premiums for physicians practicing obstetrics in each specialty between 1980 and 1989 in each of New York's five premium rating areas. Dependent variables included complete withdrawal from medical practice and withdrawal from obstetric practice alone during the study period. Other factors associated with withdrawal from obstetrics practice (e.g., volume of deliveries in 1980. years since 1icensure) were controlled for in the multiple regression analysis (81).

Medical malpractice insurance premium increases were not associated with physician withdrawal from obstetrics practice for either OB/GYNs or FPs (81).25 Physician factors that *had a* statistically significant association with withdrawal from obstetrics included years since licensing (positive dissociation), " volumc of deliveries in 1980 (negative association), and specialty (FPs more likely to stop than OB/GYNS) (81).26

Volume of obstetric deliveries, United States, 1987

An unpublished working paper by Kington (112)27 examined the relationship between liability risk (measured at both the state and individual physician Ievel) and OB/GYNs " volume of obstetrics practice. The analysis used self-reported data on obstetric volume, malpractice claims history. and physician characteristics from a 1987 national survey of members of ACOG: state -level data on liability insurance premiums: and a variety of independent factors such as socioeconomic and geo - graphic characteristics of the community in which the physician practiced.

The study looked at whether OB/GYNs reported that they were practicing obstetrics at all. and also at the volume of obstetric care they reported during 1986.

The study found that OB/GYNs in states with greater liability threats and who reported higher personal malpractice claims exposure were more likely to be practicing obstetrics and had higher volumes of obstetric care than their counterparts.

These findings are consistent with one of the study hypotheses; namely, that obstetrics services become more concentrated among OB/GYN specialists under a worsening 1iability climate because other providers of obstetric care (e. g.. family practice physicians and nurse-midwives) reduce their obstetric practices (112). This study, however, did not examine the effect of the liability climate on these other providers.

OTA Case Study of Low Osmolality Contrast Agents

Jacobson and Rosenquist undertook a contract case study for OTA to examine the diffusion and use of low osmolality contrast agents (LOCAs)—a recently developed alternative to traditional contrast agents for radiologic imaging procedurcs (105 **).28** LOCAs present an opportunity to examine the relationship between legal liability and the diffusion of a new technology into medical practice. A common perception, expressed informally at professional society meetings debating the use of LOCAs, is that the widespread use of LOCAs can be explained largely as a function of

[25] Premium differentials between OB/GYNs who practice obstetrics and those who practice only gynecology were not instituted statewide until late in the study period. However, one carrier offered differential rates as early as 1982, and the largest carrier began offering them in 1984.

[26] Grumbach et al. also examined changes in access to obstetric services during the study period, as measured by changes in the distance traveled from a patients' residence to the hospital where delivery was performed and changes in the concentration of deliveries among physicians. They found no major changes in either measure, with the exception of an increased concentration of Medicaid patients among a smaller number of physicians in the Long Island area (81).

[27] This is a study in progress; thus, the model and findings may change on further revision.

[28] The full report of this case study will be made available as a separate document at a later date.

defensive medicine. The case study focused on the extent to which concerns over legal liability influenced the diffusion and use of LOCAs.

Description and Current Use of LOCAs

Radiologists and cardiologists use contrast agents to enhance a variety of radiologic imaging procedures, including angiography, intravenous urography, CT scans, and cardiac catheterization procedures. Traditional contrast agents have very high osmolality (that is, concentration of dissolved particles in solution) compared with normal body fluids, and have been associated with mild to moderate adverse reactions such as nausea and vomiting in some patients, as well as with rare but more serious adverse reactions in certain patients. The osmolality of LOCAs more closely approaches that of normal body fluids.

LOCAs were first approved for the U.S. market in 1986. LOCAs and traditional contrast agents are equally effective in enhancing diagnostic images. The primary benefits of LOCAs are greater comfort for the patient due to reduced risk of mild and moderate adverse reactions and, hence, potentially better patient cooperation in the procedure. It is not clear whether LOCAs reduce the risk of more serious, but far more rare, reactions.

The contractors surveyed hospitals in five regions. They found that use of LOCAs varied considerably across geographic regions and different kinds of hospitals. Some institutions reported universal use of LOCAs, while others reported using LOCAs for as few as 30 percent of patients. Some institutions had implemented selective use guidelines, although the particulars of the guidelines differed among institutions.

Costs of and Reimbursement for LOCAs

According to most reports and the survey information gathered for the OTA case study, LOCAs cost 10 to 20 times as much as traditional contrast agents. There has been only minimal change in the price ratio between them since LOCAs were introduced in the mid-1980s (95,104). The incremental cost of using LOCAs instead of traditional contrast agents for a specific procedure may amount to $150-$200.

Reimbursement for LOCAs varies widely. Hospital prospective payment systems give hospitals incentives to use less expensive alternatives on inpatients. Reimbursement for LOCAs used in outpatient diagnostic x-ray procedures varies by type of insurance coverage. Since January 1992, Medicare has reimbursed for outpatient LOCA use in selected high-risk patients.[29] Private insurers have had a more liberal reimbursement policy, generally reimbursing at close to the full invoice price of the agent, depending on type of coverage. The variation in reimbursement policies for LOCAs makes it difficult to systematically compare their importance with that of malpractice concerns in explaining LOCA diffusion or use.

Legal Issues Affecting the Diffusion of LOCAs

In the absence of established legal precedent or professional consensus, it would appear that hospitals and physicians are confronted with a difficult choice in how to utilize LOCAs: how to balance the high costs of universal LOCA use with potential legal liability for improperly limiting their use. However, despite the common perception that liability fears have been driving LOCA diffusion, actual liability claims or litigation involving contrast agents are very limited. OTA's contractors were unable to identify a single court case involving the issue of whether the use of a traditional contrast agent for a low-risk patient constitutes negligence or whether the availability of LOCAs as an alternative must be disclosed to the patient. However, because LOCAs are now used almost universally for certain high-risk patients, the failure to use LOCAs for these patients might be considered negligent. At the very least, the physician would have the burden of justifying the failure to use LOCAs.

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[29] Medicare reimbursement policy is based on selective use guidelines published by the American College of Radiology (3,170).

Only a few of the health professionals interviewed by OTA's contractor-s were aware of any existing litigation regarding contrast agents. Only one had been sued or had a claim filed over the use or choice of contrast agents. None of the risk managers interviewed had received any claims, and two of them asserted that there was no good risk management rationale for universal LOCA use.

Survey Methods and Results

In an effort to gain a better understanding of physician decisionmaking regarding LOCAs, knowledgeable health care providers at a variety of different institutions in metropolitan areas in five different geographic regions of the country were interviewed about their reasons for- using LOCAs. Personal interviews were conducted with 46 indi - viduals—29 physicians (primarily radiologists and cardiologists) and 17 hospital administrators (including risk managers). Telephone interviews were conducted where the individual was not available in person. The trends reported are believed to reasonably reflect the current state of LOCA use.

The survey included questionnaires asking respondents to indicate the importance of 11 different factors thought to influence the decision between traditional contrast agents and LOCAs. When asked to rank the factors in descending order of importance, physicians ranked “legal concerns” 7th out of 11 factors, and administrators ranked them 5th (table 3-8). Physicians ranked ‘-reducing adverse reactions” as the most important factor in choosing between LOCAs and traditional agents, and administrators ranked “clinical indications" as the most important factor. 30) “Cost of the agents” was ranked as the 4th most important factor by physicians and as the 3rd most important factor by administrators (table 3-8).

Thus, despite anecdotal information from the interviewees about the role of malpractice 1iability concerns in the decision to use LOCAs, their written responses suggest medical factors and cost considerations play a greater role than liability concerns in current decisions about the use of LOCAs. It is possible, however. that survey respondents underrated the influence of 1iability concerns because the y felt this was a more socially desirable response.

While liability considerations are important to radiologists and cardiologists and might explain some of the LOCA market penetration, factors relating to general technological] advances. such as enhanced patient safety and comfort, appear to be more important in explaining LOCA use. Due to the small number of respondents and other 1imita-

TABLE 3-8: Physicians' and Hospital Administrators' Perceptions of Factors Influencing the Choice Between Traditional and Low Osmolality Contrast Agents (LOCAs)

	Average relative rank of factor[a]	
	Physicians (N=29)	Administrators[b] (N=17)
Patient safety/comfort	1	1
Reductions in adverse reactions	1	3
Clinlcal indications	3	2
costs	4	3
Guidelines	5	7
Physician preference	6	5
Hospital policies	7	7
Legal concerns	7	5
Reimbursement policy	9	9
Competitive factors	10	10
Manufacturer marketing	11	11

a The question put to respondents was “What criteria did you use to make a decision on use of low- vs high-osmolar contrast agent s,? Can you rank each of the following [11] factors in order of importance? This column represents the mean rank assigned for each ‘actor Where two factors bave the same mean rank they are given the same value
b)ncludes some hospital risk managers

SOURCE P D Jacobson and C J Rosenquist The Diffusion of 1 ow Osmolality Contrast Agents Technological Change and Defers ve Medcine contract report prepared for the Off ice of Technology Assessment U S Congress Wdst'ir'glen DC November 1 '733

30 Physicians were also asked to rate each of the 11 factors individually on a scale of 1 to 10 (1 = very important, 10 = not important). This process yielded similar results for the relative importance of factors in decisionmaking. For physicians, “legal concerns” still ranked 7th out of 11 factors; for administrators, however, “legal concerns” ranked 9th out of 11 factors.

tions of the case study design, however, these findings should be regarded as tentative.

CONCLUSIONS

Although direct physician surveys suggest that fear of malpractice liability is widespread among physicians and that many of them practice defensive medicine, the validity of these results is highly questionable for a number of reasons—in particular, the ● *prompting" of physicians to cite malpractice liability concerns and response bias due to low response rates. Consequently, the results of many of these surveys probably considerably overestimate the extent of defensive medicine.

Survey-based estimates of the national cost of defensive medicine advanced by researchers at several organizations are unreliable and potentially biased. The true costs of defensive medicine may be either higher or lower than predicted by such studies.

In clinical scenario surveys designed specifically to elicit a defensive response, malpractice concerns were occasionally cited as an important factor in clinical decisions; however, physicians' belief that a course of action is medically indicated was the most important determinant of physicians' clinical choices. These findings suggest that many physicians are more aggressive in diagnosis not because of fear of malpractice liability, but because they have come to believe that such practices are medically necessary.

One large, well-designed study found a statistically significant relationship between Caesarean delivery rates and hospital- and area-level measures of malpractice liability risk (based on malpractice insurance premiums and claims) in New York State. However, to date these findings have not been replicated in other clinical situations or geographic areas. Two smaller studies commissioned by OTA failed to find similar relationships between liability risk and increased resource use in other areas of clinical practice, although limits of sample size and study design may have precluded positive findings in these studies. Neither of the two empirical studies of negative defensive medicine found a statistically significant positive relationship between liability risk and withdrawal from obstetrics practice.

A major limitation of such statistical studies is that they cannot measure the overall level of defensive medicine; they can detect only incremental differences in defensive behavior between groups of physicians with higher and lower levels of malpractice liability risk.

Taken together, the findings from studies reviewed in this chapter suggest that defensive medicine is a real phenomenon that has a discernible influence in certain select clinical situations. OTA was able to document defensive practice in several isolated clinical situations, most notably the use of diagnostic radiologic examinations for young patients presenting with head injuries in emergency rooms (see table 3-3).

There are probably other clinical situations not studied by OTA or others in which defensive medicine plays a major role in physicians' diagnosis and treatment decisions. However, in the majority of clinical scenarios used in OTA's and other surveys, respondents did not report substantial levels of defensive medicine, even though the scenarios were specifically designed to elicit a defensive response.

Based on the limited evidence available, OTA estimates that a relatively small proportion of all diagnostic procedures-certainly less than 8 percent overall—is performed primarily due to conscious concern about malpractice liability risk. OTA did not attempt to make similar rough estimates of the proportion of therapeutic procedures performed for defensive reasons; in part because there was no outside information to draw on.

The studies reviewed in this chapter illustrate the great difficulty of accurately measuring the true extent of defensive medicine. Although it is possible to identify particular clinical situations in which defensive medicine plays a relatively major role, it is impossible in the final analysis to draw any conclusions about the overall extent or cost of defensive medicine.

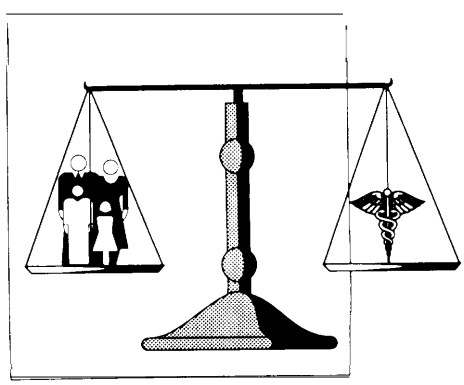
Impact of Malpractice Reform on Defensive Medicine

4

Although it is impossible to measure with much Precision the extent of defensive medicine, the evidence summarized in Chapter 3 implies that it is neither a trivial nor a major contributor to health care costs. This chapter examines how different approaches to reforming the medical malpractice system might affect the frequency of defensive medicine. The chapter examines the potential for tort reforms (i.e., changes in the legal rules for resolving malpractice claims) to reduce defensive medicine.

This is a limited policy analysis; other impacts of tort reform may be equally or more important, including:

- *Quality of care:* A principle objective of medical malpractice law is to deter physicians from rendering lower-quality care, but the effect of the malpractice system on quality of care has hardly been studied. Although there is reason to believe it may have some positive effect on quality (e.g.. increased investment in risk management and quality control), the scant empirical evidence available does not support the contention that the malpractice system as it is presently configured does improve quality of care. 1 Nonetheless, tort reforms that limit physicians' 1iability could adversely affect the quality of care.



[1]For example, in an attempt to estimate the deterrent effect of medical malpractice, researchers at Harvard University recently analyzed the relationship between the number of malpractice claims per negligent injury and the rate of negligent injuries in New York State hospitals in 1984. They failed to demonstrate a significant relationship between malpractice claim activity and the rate of negligent injury in a hospital (254). The analysis was limited by a small sample size (less than 50 hospitals) and a single year of data. Thus, the analysis may not have had sufficient statistical power to detect a deterrent effect if it did exist.

- *Plaintiffs' access to the legal system:* Evidence exists that the vast majority of patients injured by negligent medical care do not file a claim (130),2 and tort reforms could either make it easier or more difficult, especially for patients with 1imited financial resources;
- *Cost of compensating victims of malpractice:* Some reform proposals promise lower administrative costs (e.g., lower lawyers fees) but also would compensate a greater number of individuals. The Office of Technology Assessment (OTA) has not examined whether the overall impact of these changes would be to increase or to save costs.
- *Physician-patient relationships:* Physicians claim that their concern about malpractice liability causes their relationships with patients to suffer. Depending on its configuration, tort reform could either improve or hurt the physician-patient relationship.

More general discussions of the range of potential impacts of tort reforms are available in a number of review articles (12,2 1,37,122,208a). In this chapter OTA focuses mainly on the effects of malpractice reforms-both conventional approaches and new proposals-on defensive medic inc.

Since the first malpractice insurance crisis in the mid- 1970s, almost every state has reformed one or more aspects of malpractice law (22,236). The tort reforms implemented in the states were designed primarily to reduce malpractice insurance premiums by limiting the frequency of suits, payments per paid claim, or the cost of resolving claims. Conventional tort reforms us implemented in the states have maintained the malpractice liability system while tinkering with one of more aspects of the claim resolution process.

Newer reform proposals would substantially alter the process for resolving malpractice claims or would limit the physician's personal liability and substitute other quality control systems. Since most of these newer reform proposals have not been implemented, it is difficult to predict their impact on defensive medicine.

THE IMPACT OF CONVENTIONAL MALPRACTICE REFORMS ON DIRECT MALPRACTICE COSTS

Most of the traditional tort reforms retain the courts as the forum for resolvi ng malpractice suits but change certain legal rules, such as imposing limits on the time after an injury or its discovery in which a suit can be filed, or limiting the damages that can be awarded.

These "conventional" tort reforms have been labeled pro-defendant, because they often restrict plaintiffs' access to courts or limit the amounts plaintiffs can recover (254). For example, requiring a plaintiff to obtain a "certificate of merit''—an affidavit by a physician that the claim is valid—prior to filing a suit can make it more difficult for low-income plaintiffs to sue (see box 4-l) (166).3 Box 4-2 contains a brief description of the traditional legal reforms.

In a separate background paper, OTA reviewed the results of six multistate studies that used statistical techniques to estimate the impact of specific malpractice reforms on four indicators of direct malpractice costs: 1) frequency of suit, 2) payment per paid claim, 3) probability of payment, and 4) insurance premiums (236). The six studies were selected because they used the most methodologically rigorous approaches to isolating the impact of malpractice reform on malpractice costs.

OTA also identified several studies that either examined trends in malpractice activity in states with malpractice reforms or compared trends in such a state with those in other states without the same reforms.

The results of OTA's review of the six multistate study and of' the more compelling single-

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[2] A recent study of New York State hospital stays revealed that approximately one in 50 negligently injured plaintiffs brought a malpractice claim (I 30).

[3] Low income plaintiffs are already' less likely to sue than more affluent plaintiffs (.? 1,230,239).

BOX 4-1: Impact of Maryland's Certificate of Merit on Low-Income Plaintiffs

Many tort reforms explicitly limit the amount the plaintiff or his or her attorney can recover from a malpractice case (e g caps on damages, collateral source offsets or limits on attorney fees) or increase the costs of bringing a suit (e g certificates of merit) Such reforms make filing a malpractice suit less attractive for all plaintiffs. Whether these reforms disproportionately affect people's ability to sue has not been studied

As part of this study OTA was asked to examine whether low-income obstetric patients are more litigious than privately Insured patients OTA issued a background paper on this issue which found that Medicaid and Medicare patients sue physicians less often than would be expected given their relative proportion of the population (Medicaid patients) or heavy use of health services (Medicare patients) (239) OTA also commissioned a study by Morlock and Malitz to examine the impact of Maryland's tort reforms on claim filings by Medicaid, Medicare and self-insured plaintiffs

In July 1986 Maryland Implemented a package of tort reforms

- a requirement that a certificate of merit be obtained within 90 days of filing a malpractice claim,
- a $350 000 cap on noneconomic damages,
- a provision for periodic payment of damages,
- a shortened statute of limitations for minors and
- administrative reforms to Improve the pretrial screening process

Of these reforms the requirement that a certificate of merit be obtained within 90 days of fliling is most likely to pose a differential barrier based on the plaintiff's income. Obtaining such a certificate costs $600 to $1 000 and some attorneys may require that these costs be paid by the claimant in advance of settlement or other disposition

Morlock found a substantial drop in the number of claims filed by patients with no Insurance and by Medicaid patients following the Implementation of the Maryland reforms The following table shows the number of malpractice claims filed per 100000 hospital discharges in Maryland The rates are displayed by Insurance status of the Injured party A certificate of merit was required beginning in July 1986 but the legislation requiring the certificate was passed during the legislative session from January to April, 1986

Malpractice Claims Filed in the Legal System as a Result of Hospital Incidents per 100,000 Discharges in Maryland, 1979-89

Insurance Status	1979-1985 (Pre-reform)	Jan. '86 - June '86 (Transition)	July '86 - June '87 (Post-reform)	July '87 - Dec. '89 (Post-reform)
Total number of claims	401	599	**366**	**297**
Claims by **privately insured** patients	491	759	467	44 1
Claims by **Medicare** patients	289	51 9	326	263
Claims by **Medicaid** patients	291	671	395	7.4
Claims by **uninsured** patients	552	83	59	154

SOURCE L L Morlock and F E Malitz *Short-Term Effects of Tort and Administrative Reforms on the Claiming Behavior of Privately Insured Medicare Medicaid and Uninsured Patients* prepared for the Office of Technology Assessment U S Congress (Washington DC U S Government Printing Off Ice September 1993)

BOX 4-2: Traditional Tort Reforms

Aimed at the Number of Lawsuits:

1. Attorney *fee limits:* Plaintiff attorneys are paid on a contingency basis, that is, they are paid a portion of the plaintiff's damages as a fee but receive no fee when the plaintiff loses The typical contingent fee IS 33-1/3 percent of the award Some states Iimit the contingency fee percentage in large damage cases

2 *Certificate of Merit* Some states require that a plaintiff obtain an affidavit from a physician or other expert attesting that the plaintiff's malpractice claim has merit prior to filing the suit

3 Costs awardable If a plaintiff files a claim that IS subsequently judged to be without any merit, a judge may force the plaintiff to pay the defendant's court costs, and in some states the defendant's legal fees

4 *Pretrial* screening panels: As a prerequisite to filing a suit in a court, parties may be required to submit the malpractice claim to a hearing before a panel consisting of one or more attorneys and health care providers, and, In certain states, a judge or Iay person. The panel wlll render a decision on Iiability and sometlmes damages The parties may choose to accept the panel's findings and settle the case or file a suit in court In some states, the panels findings may be entered into a subsequent legal proceeding Some states offer panels as a voluntary option.

5 Statutes *of* limitations: The statute of Iimitations prescribes the time period after the injury in which a legal claim may be brought In medical malpractice this time period IS either measured from the date of the negligent treatment or from the date the injury could have reasonably been discovered (the "discovery rule') Some states have shortened the time period in which a claim can be brought or Iimited the application of the discovery rule

Aimed at Size of Recovery (Payment Per Paid Claim):

1 *"Caps" on* damages (noneconomic, total) Damages in medical malpractice consist of 1) economic damages, which are monetary awards for incurred and future costs arising from the injury (primarily medical and rehabilitative expenses and lost wages), and 2) noneconomic damages, consisting of monetary awards to compensate for the pain and suffering associated with the injury Certain states have placed Iimits (i. e , "caps") on the amount the jury can award for noneconomic damages, or for total damages (I e , economic and noneconomic damages)

2 *Collateral source offset (mandatory, discretionary,)* Certain states require or permit the jury to reduce the plaintiffs malpractice award by the amount the plaintiff is entitled to receive from collateral sources, such as health and disability insurers

3 *Joint and several liability changes:* Traditionally, when multiple defendants were responsible for a plaintiff's injury, the plaintiff had the right to collect from each defendant in the amount of their responsibility (jointliability) or the plaintiff could collect the entire amount from a single defendant (several Iiability), forcing that defendant to sue the other defendants for the amount that they were responsible for Some states have eliminated several Iiability, usually with respect to noneconomic damages only.

4 Periodic *payments of damages ("structured" awards)* Damages awarded to pay for future economic and noneconomic losses may be paid on a periodic basis, rather than in one lump sum

Aimed at Plaintiff's Difficulty (or Costs) of Winning:

1 *Expert witness requirements:* Expert witnesses are used to establish the standard of care in a malpractice trial Some states impose specific requirements on the expert's qualifications for example, requiring that the physician have practiced in an area of medicine that is related to the subject of the case

(continued)

BOX 4-2: Traditional Tort Reforms (Cont'd.)

2. Informed consent limits: Physicians must obtain informed consent from patient before performing a procedure. Some malpractice cases allege that the physician did not provide adequate information for the plaintiff to make an informed judgment The adequacy of the information provided can be judged on the basis of whether a reasonable patient would consider the Information provided adequate, or by looking at the practice o fother physicians The former standard is often characterlzed as pro-plaintiff, and some states restrict the use of this patient-oriented standard
3. *Res ipsa loquitur restrictlons* In medical malpractice, when the incident causing the injury was under the exclusive control of the physician and it is obvious to an nonmedically trained person that the plaintiffs injury would not have occurred in the absence of negligence, a plaintiff will not be required to offer expert testimony of negligence Some states restrict the use of this doctrine

SOURCE S R Bovbjerg Legislation on Medical Malpractice Further Developments and a Preliminary Report Card *University of California Davis Law Review 22* -199-557(1989) U S Congress Off Ice of Technology Assessment *Impact of Legal Reforms on Malpractice Costs* OTA-BP-H- 119 (Washington DC Government Printing Office 1993)

state studies are summarized below. (See appendix G for a complete summary of the single-state studies).

Statistical Studies Using Multistate Data

The six empirical studies reviewed in OTA's background paper examined the impact of a number of different reforms, but not every study examined the same set of reforms, The majority of the studies looked at the following reforms;

- shortening the statute of I imitations.
- limiting plaintiffs' attorney fees,
- requiring or allowing pretrial screening of' claims,
- caps on economic and noneconomic damages.
- amending the collateral source rule to require offsets for the portion of damages covered by health or disability' insurane, and
- periodic payment of damages.

Across all studies, only caps on damages and amending the collateral source rule consistently reduced one or more indicators of direct malpractice costs (236).

Shortening statutes of limitations and implementing pretrial screening showed inconsistent results across studies (236). Limits on attorney fees and periodic payments showed no statistical - ly significant results in reducing one or more malpractice costs indicators (236).

Several of the studies looked at the impact of legislation authorizing agreements for voluntary binding arbitration. Only one found that arbitration reduced malpractice costs, but this finding is suspect because arbitration was not used often in the states studied (236).

Although each of the six studies reviewed by OTA suffered from methodological and data limitations, taken together their results suggest that malpractice reforms involving caps on damages or restricting payment when collateral sources have paid do, indeed, reduce the direct costs of medical malpractice. The effects of other reforms, as they have been implemented in the states, may have only modest effects on direct malpractice costs.

Single-State and Small Multistate Studies

The Indiana Study

Gronfein and Kinney studied the impact of Indiana's 1975 tort reforms on average payment per paid claim for large claims (those with paid damages of $100,000 or more) (79). Indiana passed a $500,000 cap on total damages and created a Patient Compensation Fund (PCF), a state-run insur-

ance fund that paid damages exceeding $100,000, up to the **$500,000** cap.[4]

Gronfein and Kinney found that the average payment per large paid claim was 33 and 40 percent higher in Indiana than in the neighboring states of Michigan and Ohio, respectively. This outcome probably resulted from the operation of the PCF, which gave the insurer an incentive to settle large claims when the issue of negligence was unclear, thereby shifting a portion of the liability to the PCF. On the other hand, Indiana had no payments over $500,000, whereas in Michigan and Ohio the few cases in which more than $1 million was awarded accounted for 21 and 14 percent of all malpractice payouts, respectively (79). Therefore, overall payments for malpractice may be higher in those states despite the fact the average payment is less.

The California Studies

Supporters of malpractice reform often point to Califomia as an example of the impact tort reform can have on malpractice costs. In 1975, California passed the Medical Injury Compensation Reform Act (MICRA), which included a $250,000 capon noneconomic damages, limits on attorney fees, discretionary collateral source offsets, and periodic payments for future damages in excess of **$50,000.**

Two studies concluded that MICRA significantly lowered malpractice insurance premiums or claims costs5 in California (32,34). One study found that the average malpractice insurance premium (adjusted for inflation) declined by over 60 percent from 1976 to 1991 (34), but this result in and of itself is inconclusive because 1976 marked a peak and 1991 a trough in the national cycle of malpractice premiums (236).[6] More compelling is evidence that California malpractice premiums declined at a compound annual rate of 0.4 percent between 1976 and 1991 compared with a national average annual rate of increase of about 12 percent over the entire period.[7] Although critics of MICRA point out that the average 1992 California malpractice premium was only slightly below the national average premium (200), California's average malpractice premium was 65 percent above the national average as recently as 1985 (261).

Not all of the relative savings can be attributed to MICRA, however, because a simple pre-post comparison does not control for other changes in the malpractice and health care markets in California over the study period. For example, physician-owned malpractice insurance companies replaced commercial malpractice insurers shortly after MICRA was passed. Also, the largest California health maintenance organization (HMO), Kaiser Foundation, with over 4 million enrollees (141), initiated arbitration for all medical malpractice cases in the early 1970s (236). California has experienced rapid growth in HMOs over the past 10 years.[8]

Still, it is likely that MICRA's stringent cap did reduce California malpractice insurance premiums to some extent. The observation that malpractice insurance premiums increased more

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[4] The Indiana cap on total damages was raised to $750,000 in January of 1990 (79).

[5] Claims costs Include payments made to plaintiffs and the insurer's direct costs attributable to the claim (fees for investigative work, expert witness fees, and legal defense work).

[6] Trends in insurance premiums are characterized by cycles. These cycles are tied to some extent to the investment climate, because insurers earn part of their income from investing premiums in income-producing assets. As the interest rate expected from capital investments rises and falls, premiums are adjusted accordingly to assure a competitive rate of return to investors (2 I ()).

[7] The comparis-is based on premiums in current dollars. OTA calculated the change in California premiums from data reported in a study by the Coalition to Preserve MICRA (34). In that study the 1976 premium (adjusted for inflation to 1991 dollars) was $18,000 and the 1991 premium was $7,000, Using the consumer price index-unadjusted (CPI-U) for 1976 and 1991, the 1976 premium unadjusted for inflation is $7,427. The national estimate is based on increases in malpractice insurance reported by the U.S. Health Care Financing Administration (5 I F.R. 28772, 28774; 57 F.R. 55903).

[8] Approximately 34.4 percent of the population is enrolled in HMOs in California, compared with 17.3 percent nationwide (141).

slowly in California after MICRA is consistent with the finding that caps on noneconomic damages lower malpractice costs. California has one of the lowest caps on noneconomic damages in the country, and it has not been adjusted since 1975 **(236).**

Pretrial *Screening Studies*

Five separate studies of pretrial screening panels (three of Arizona, one of Hawaii, and one of 15 different states including Arizona) found that most plaintiffs did not appeal adverse panel decisions, which may indicate that pretrial screening led to early resolution of cases (see appendix G). Because most of the studies failed to report claim frequency before and after the screening panel was initiated, however, it is possible that pretrial screening prompted filing of more nonmeritorious claims, which were dropped after adverse panel decisions. In add it ion, almost every study found that pretrial screening panels caused significant delays in claim resolution (see appendix G). These delays may have led some plaintiffs to drop or settle cases because of the added expense of the pretrial screening process.

The Impact of Changes in Direct Malpractice Costs on Defensive Medicine

The empirical literature discussed in chapter 3 suggests that physician behavior may be influenced in certain clinical situations by the strength of signals that the malpractice system sends about the risk of being sued. If tort reforms reduce the direct costs of malpractice, they may soften the signal and therefore also reduce defensive medicine.

The best evidence for this association comes from a single study of the impact of malpractice signals on Caesarean delivery rates in New York State (129, 131). Localio found a strong association between the strength of the malpractice signal (i.e., high claim frequency and insurance premiums) and Caesarean delivery rates (129). This study supports the hypothesis that malpractice reforms that reduce claim frequency and premiums reduce defensive behavior. Yet, it is not known whether Localio's findings for obstetricians and Caesarean delivery rates are generalizable to other procedures, other specialties, or other states. especially in light of the failure of other studies funded by OTA to find such a relationship (see chapter 3).

There are reasons to be skeptical that traditional tort reforms can reduce defensive medicine. Physicians may not react to mere reductions in malpractice risk. Instead, they may try to limit their personal risk of suit to as close to zero as possible. In the absence of any financial penalties for doing so, such an objective is a rational response to any level of malpractice risk.

The long-standing concern about defensive medicine suggests that traditional tort reforms may not do much to reduce defensive medicine. In the early 1970s, when direct malpractice costs were quite low and when the malpractice signals were much weaker than they are today, there was still considerable concern about defensive medicine (14,20,58,243).

IMPACT OF NEWER MALPRACTICE REFORMS ON DEFENSIVE MEDICINE

Recent reform proposals either expand on traditional reforms-for example, redefining the standard of care using practice guidelines-or call for more sweeping changes, such as removing medical malpractice from the judicial system, relieving the physician of malpractice liability or eliminating the fault-based malpractice system completely. These reforms all seek to make the claims resolution process more timely and less costly. Some of them would provide greater access to compensation for deserving plaintiffs. All seek to decrease the impetus for defensive medical practices. The new reform proposals fall into four categories:

- *Clinical practice guidelines as the standard of care.*. At present, clinical guidelines may sometimes be entered into malpractice trials as evidence of the standard of care along with expert testimony. Several states tire developing programs in which certain clinical guidelines will be used as the definitive statement of the stan-

dard of care, replacing expert opinion when applicable.

- *Enterprise liability:* Enterprise liability would retain the current malpractice system, but the physician would no longer be a named defendant. Instead, the enterprise in which the physician practices would assume the liability for medical negligence (1). As originally conceived, the enterprise would be the hospital or HMO in which the physician practices(1). Under a managed competition system, liability could rest with the health insurance plan (16 1).
- *Alternative dispute resolution:* Alternative dispute resolution (ADR) removes the claim from the legal system to reduce the time and money involved in its resolution and to make the proceeding less public and adversarial. In *binding* ADR the dispute is heard and decided through a nonjudicial procedure, and opportunities for appeal are very limited. Because state constitutions guarantee the right to trial, binding ADR to date has been a voluntary procedure, agreed to by both parties.
- *Selective no-fault malpractice compensation:* Proposals for a selective no-fault malpractice compensation system envision a process similar to workers' compensation. The leading proposal would designate certain adverse medical events that are generally avoidable as compensable under a no-fault system (221). More patients could receive compensation for medical injuries that are generally avoidable, even if there is no evidence that the injuries were caused by negligent care.

The potential impact of each of the proposed reforms on defensive medicine is examined below. OTA has not attempted to address in detail other potential benefits or limitations of these reforms, including the cost of implementing a reform compared with the present system, the impact on quality of care, or the potential impact on plaintiffs.

Clinical Practice Guidelines[9]

A handful of states has passed legislation to make it easier to introduce clinical practice guidelines or to increase their evidentiary status in medical malpractice litigation. These changes are recent and there is as yet no evidence of their impact on medical liability or practice. The Medical Liability Demonstration Project in Maine has become a model for such efforts (230,229,236).

In an ongoing demonstration project in Maine, selected guidelines can be used by physicians as an affirmative defense[10] in medical malpractice cases (24 M.R.S. Secs. 2971 *et seq* (1993)). Minnesota, Florida, and Vermont have also passed laws that change the role of guidelines in legal proceedings, and a number of other states have begun developing guidelines with an eye toward using them as legal standards.

The Maine project demonstrates how guidelines can be used to target defensive medicine. Maine developed guidelines to reduce the inappropriate use of procedures thought to be practiced defensively (e.g., Caesarean deliveries, cervical spine x-rays for minor head injury, and preoperative testing).

For example, one guideline provides emergency room physicians with explicit criteria for when it is *not* necessary to obtain a cervical spine x-ray. Under the demonstration project, if a physician did not do an x-ray on a patient who met those criteria, then that patient could not successfully sue the physician for failing to do the test—even if a fracture was subsequently discovered.

What impact on defensive medicine can we expect from increasing the evidentiary weight of guidelines in court? The impact will vary depending on how explicitly the guidelines can be writ-

[9]See appendix H for a more detailed discussion of the legal use of clinical practice guidelines, including a review of state initiatives in this area.

[10]An affirmative defense is a response by the defendant in a legal suit which, if true, constitutes a complete defense against the plaintiff's complaint.

ten. In cases where the criteria in the guideline are clear, it should reduce defensive medicine. For example, there is some early evidence that adoption of the Maine guideline has substantially reduced cervical spine x-rays in emergency rooms (11 5).

In cases where criteria for doing or not doing a procedure are less clear, the impact is more questionable. In Maine, for example, if a plaintiff proves that the guideline was not relevant given the clinical circumstances. the physician cannot use it as an affirmative defense. Because much of medical practice is subject to uncertainty, opportunities may be limited for developing guidelines explicit enough to be truly protective and to reduce defensive medicine.

Physicians have also expressed concern that, if given greater weight in courts. guidelines could be used against them by patients for whom they had decided not to perform certain procedures. This concern might be particularly valid in cases where the guideline itself left considerable room for phy - sician judgment—and many guidelines do. In these cases, the court would presumably defer to expert testimony to determine whether the physician exercised fair judgment.

Maine addressed this concern by including a provision that specifically denies plaintiffs the right to introduce guidelines developed under the demonstration project as evidence of the standard of care. Some critics have questioned the constitutionality of this provision and the feasibility y of actually preventing plaintiffs from introducing the guidelines as evidence (155.1 79).

In the absence of specific legislation to give guidelines more evidentiary weight. the continued development of guidelines will probably help to make practice in certain areas of medicine more uniform and hence help to clarify the legal standard of care (236). Recent evidence that guidelines are playing an increasing (though still small) role in medical malpractice litigation supports this conclusion (see appendix H) (100). Howe\'er. there are a number of factors that could limit their impact on medical liabi1ity and defensive medicine (see box 4-3).

A major limitation is thc ability to write sufficiently explicit guidelines. Many clinical conditions involve so much medical uncertainty that specific recommendations on appropriate use of technology will not be possible. For example, the National Cancer Institute (NC I) recommends routine mammography screening for women over 50 years of age but notes that "[e]xperts do not agree on the role of routine screening mammography for women ages 40 to 49" (172). Thus. the appropriate frequency of mammography screening for women under age 50 is left to physician judgment. Indeed, the majority of clinical practice guidelines written to date--including those developed by the federal Agency for Health Care Policy and Research—list several diagnostic and therapeutic options for addressing specific medical conditions, leaving consider-able room for physician judgment.

A guideline that leaves substantial room for physician judgment may be no more helpful in defining the proper standard of care than expert witnesses. In addition. in the absence of specific legislative changes such as those in Maine (i e., where only certain guidelines are afforded elevated legal status), juries may choose to disregard guidelines or may be asked to make judgments about conflicting guidelines, just as they are now sometimes presented with conflicting expert testimony.

Despite the limitations of guidelines, they offer several potential advantages over other malpractice reforms. Tort reforms are predicted to alter physician behavior because the> dull the tort signal and therefore allow physicians to make clini - cal judgments with less anxiety about the risk of being sued. Yet. with a reduced malpractice signal, there could be a reduction in beneficial defen - sive medicine as well as defensive medicine that has less clinical value. Softening the tort signal will also changc only those practices that are consciously motivated by fear of liability.

Guidelines, on the other hand, can selectively target defensive medicine that does not improve the quality of care. Also. guidelincs present an opportunity for experts to reevaluate clinical practices that are performed routinely but with little evidence that they make a real difference to patient car-e. Therefore, guidelines have the potential to

BOX 4-3: Factors That May Limit the Extent to Which Guidelines Influence Defensive Medicine

Guidelines factors

- Extent to which guidelines are targeted to address defensive medical practices
- Comprehensiveness of guidelines (i,e. , how much of medical practice is now or can be expected m the near future to be addressed by guidelines?)
- Ability of guidelines to keep pace with advances in medical technology and practice
- Existence of multiple conflicting guidelines
- Criteria and process used in guidelines development (e g , medical effectiveness versus cost-effectiveness; broad consensus versus expert opinion)
- Source of guidelines (e g , national medical specialty society, state or federal government, Insurance company)

Legal system factors

- Extent to which practice guidelines are admitted as evidence in medical malpractice litigation
- Evidentiary weight accorded to guidelines in litigation process
- Court's willingness to accept cost-effectiveness and other measures of social utility as basis for the legal standard of care

Physician factors

- Physicians' awareness of guidelines
- Physicians' perceptions of the impact of guidelines or their professional liability (i.e , their confidence in the protective effect of guidelines)
- Physicians' willingness to adopt guidelines into pract ce

Patient factors

- Patients' awareness of guidelines
- Patient demand for services

SOURCE: Office of Technology Assessment, 1994.

get at both conscious and unconscious defensive medicine.

Alternative Dispute Resolution

ADR can take many forms, but its basic characteristic is that disputes are heard by one or more arbitrators or mediators rather than by a jury. The arbitration proceeding is often less formal, less costly, and less public than a judicial trial. In *nonbinding* ADR, if a party is not satisfied with the result, he or she can continue to pursue the claim through the legal system. Therefore, nonbinding ADR may not eliminate physicians' anxiety about a potential malpractice trial. *Binding* ADR may be the most effective approach to eliminating the physician's anxiety about a trial. The two leading binding ADR proposals are: voluntary binding arbitration under pretreatment contracts between patient and providers (or health plans), and the American Medical Association/Specialty Society Medical Liability Project's (AMA/SSMLP's) fault-based administrative system, which would remove all malpractice cases from the judicial system.

Voluntary Binding Arbitration

To implement voluntary binding arbitration, the parties must agree to waive their right to trial and instead retain one or more arbitrators to render a decision. In medical malpractice the patient and

[1] In addition nonbinding ADR may not lead to reductions in direct "malpractice costs" (i.e., the costs directly associated with resolving a malpractice claim) because of the potential for two proceedings (42.75,209).

physician (or insurer) may agree to arbitrate either after an injury has occurred or before the treatment is even provided. An agreement made before treatment is rendered is called a pretreatment arbitration agreement. From the physician perspective, pretreatment arbitration agreements can provide upfront assurance that the case will be arbitrated. After an injury has occurred, the physician-patient relationship may not be conducive to negotiation of an arbitration agreement.

Arbitration has several potential advantages. Arbitration replaces the lay jury with professional decisionmakers, who may have previous experience with malpractice cases. Many arbitrators are ex-judges or otherwise legally trained individuals. Though there is no good empirical evidence that jury decisions are worse than or very different from arbitration decisions,[12] physicians may perceive this to be the case. Arbitration proceedings are also less public and often may be scheduled sooner than trials.

Binding arbitrat ion has not been used frequently in malpractice cases, but it is used extensively in commercial settings. Companies claim significant savings in legal costs (2 16). The very limitcd data available on malpractice arbitration indicates that arbitration may be less costly for resolving disputes. [13]

Arbitration may be infrequent in medical malpractice for several reasons. Some plaintiff and defense attorneys believe that the jury is an appropriate dispute resolver, especially when factual issues are involved (159). Yet the reluctance to accept arbitration may also result from a lack of experience with arbitration.[14] Attorneys familiar with arbitration also claim that arbitrators tend to reach compromise decisions in which the physician is held partially responsible (42, 158, 185). Because physicians take malpractice claims so personally, compromise decisions may not satisfy their desire to "vindicate their conduct" (159). On the other hand, arbitrators are very unlikely to award large damages, as juries sometimes do. This may be seen as a disadvantage to arbitration for plaintiffs (42, 158, 185).

Pretreatment arbitration agreements also have limitations. Some states permit the patient to revoke the pretreatment agreement within a certain time after signing the contract usually 30 to 60 days) (23 1). In states without such statutory rules, the enforceability of pretreatment contracts is governed by case law. The courts often closely scrutinize such contracts, because the health care provider may have superior bar-gaining power (236). 15 For example, a health care provider could refuse to enter into a physician-patient relationship unless the patient relinquished his or her right to a trial. 16 Statutes that allow patients to revoke pretreatment agreements and court scrutiny of such contracts render pretreatment contracts of uncertain value, especially to health care providers.

Whether arbitration would reduce defensive medicine depends upon the extent to which the threat of a court trial drives physicians to practice

[12] For a review of the strengths and weaknesses of juries as decisionmakers, including a review of the empirical literature on this subject, see works by Litan and Saks (127,202).

[13] A comparison of 65 arbitrated malpractice claims with more than 400 litigated malpractice claims (claims filed in court) in Michigan found that the mean time to resolution for an arbitrated claim was 26 months (median, 19 months), compared with a mean of 37 months (median, 35 months) for a litigated claim. The average payment was $135,591 for arbitration (median $43,120), compared with $148,862 for litigated claims (median $69,500) (233). However, because the decision to arbitrate is voluntary, it is possible that smaller claims or less difficult claims were self-selected for arbitration (see app. G).

[14] In a recent study of mandatory nonbinding arbitration in federal courts, the overwhelming majority of attorneys found the process to be fair, and 37 percent of attorneys who had gone through arbitration preferred an arbitrator over a jury or judge (157). A RAND study surveyed attorneys who had just gone through nonbinding arbitration for small personal injury cases (damages < $15,000) arising from automobile accidents. Attorneys were almost evenly split on the question of whether arbitration or a judicial trial was fairer, but most attorneys agreed that arbitration is much more efficient than either a jury or judge-only trial (139).

[15] See, e.g., *Madden v. Kaiser Foundation Hospitals*, 552 P.2d 1178 (CA. 1981).

[16] *Broemmer v. Abortion Services of Phoenix, Ltd.*, 840 P.2d 1013 (Az. 1992).

defensive medicine. If the small risk that a suit will proceed to trial drives physicians to practice defensively, then ADR should reduce defensive medical practices. If the real driver of defensive medicine is the desire to avoid any process that judges the physician's actions, then arbitration may not affect physician behavior. It is also possible that pretreatment arbitration provisions might increase the frequency of suits, because plaintiffs may prefer arbitration over a jury trial.][7] Plaintiffs who would otherwise have settled their case because of the expense of trial may also decide to arbitrate.[18] The resulting increase in malpractice liability proceedings could lead to more defensive medicine.

AMA/SSMLP Administrative System

The AMA/SSMLP proposed a mandatory administrative system to replace the civil jury system for malpractice claims. The AMA/SSMLP administrative system would be part of the state medical licensing organization and would be run by a seven-member state medical board, which would include at least two physicians and possibly another health care professional.

Damages awarded under this system would be limited to economic damages as determined by guidelines and reduced by collateral sources, and noneconomic changes limited to an amount equal to one-half of the average annual wage in the state multiplied by the life expectancy of the plaintiff (approximately $700,000 for a person with a 70-year life expectancy and $150,000 for someone with a 15-year life expectancy) (9).

Plaintiffs would not need an attorney to file a claim. If a claim were found to have merit by a claims examiner, the plaintiff would be provided an attorney for further proceedings. If the claims examiner were to reject the claim, the claimant would have the right to appeal to one member of the medical board. If the claimant prevailed, an attorney would then be provided to him or her. If at any subsequent point in the process the claim is determined not to have merit, the plaintiff would have to obtain his or her own counsel and a certificate of merit to appeal the adverse decision.

Because the proposal contemplates limiting damages, the requirements of personal counsel and a certificate of merit would discourage appeals of adverse decisions, and many cases would probably be eliminated with a single review by a claims examiner or one member of the medical bow-cl.[9]

For physicians, the AMA/SSMLP proposal promises quicker claim resolution, with few claims decided in a formal proceeding resembling a trial, or even in an arbitration process.

The AMA/SSMLP also proposes a number of legal changes, including: moving from the customary standard of care to a standard that accepts a physician's action if it is "within a range of reasonableness;" adding new requirements for expert witnesses; admitting practice guidelines and medical 1iterature without requiring that an expert witness validate its usefulness; changing informed

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[17] Muchismadeinthemalpracticeliteratureaboutthe impact of thetrialon a physician, but many plaintiffs may alsofind the prospect of a legalbattle unappealing.Indeed, this prospect has been found to be one factor that discourages plaintiffs fromfiling suits (145).

[18] InMichigan811 claims were filed for arbitration and 247 (30 **percent)** went to **an arbitrator** (233). **Only** 1**O** to 20 **percent** of litigated claims typically go to trial (171,222,235).

[19] Claims proceeding beyond the initial review would be subject to peer review by an expert retained by the board in the health provider's field of expertise. If the first expert decided the claim had no merit, a second expert would be retained. If two independent expert reviewers determined that the claim did not have merit, it would be dismissed. If the claim were determined to have merit by a health care provider, the par-tics would proceed through a settlement procedure w ith the assistance of a hearing examiner (9). To promote settlement, the system would include financial penalties for parties refusing a settlement offer that a hearing examiner determines is reasonable (9). Very few claims w ould get a full hearing before the medical board.

consent law; and limiting noneconomic damages. The new standard of care would also be amended to take into account the resources available to the physician, a factor not explicitly considered today (9,23).

Though many claims would be resolved with minimal physician involvement, the proposal would increase patients' access to compensation. Thus, physicians may find themselves subject to more claims. Some experts believe, however, that claims might not increase without a consumer outreach program (23).

The proposal retains the negligence standard and establishes a stronger link between malpractice claims and professional licensing. Each finding of negligence would be investigated by the medical board. This investigation might consist merely of a review of the file maintained by the medical board on that physician (e.g., previous liability determinations, settlements, disciplinary actions) to determine if a disciplinary investigation were warranted. The proposal also requires malpractice insurers to report to the medical board all cancellations, terminations, and decisions not to renew coverage (9).

It is difficult to predict how physicians' behavior might change in response to such an administrative system. The elimination of trials (indeed, the limits on any type of formal hearing) might reduce physicians' anxieties about being sued. Physicians should also have greater confidence in the fairness of the system, because it would be run by a medical board with substantial physician representation. Yet a large increase in claims could dampen physicians' enthusiasm for the proposal, and stronger links between malpractice decisions and disciplinary actions could create additional pressure to practice defensively.

Enterprise Liability

In a system of enterprise liability, the physician would no longer be personall y liable for his or her malpractice. Instead, the institution in which he or she practices. or the health plan responsible for paying for the services, would assume the physician 1iability. Although some hospitals and staff-model HMOs already assume liability for their physicians' malpractice claims, few health care institutions today are fully liable for all claims originating within their organizations.

Enterprise liability would eliminate the costs associated with multiple defendant suits and thereby facilitate settlement. It would promote stronger quality control within institutions and health plans while relieving physicians of some of the psychological burdens of a malpractice suit. Institutions bearing the liability risk would have a greater incentive to evaluate physicians' performance. Institutional quality control programs may be a more effective deterrent to poor quality of care than the current malpractice system, because the vast majority of negligently injured plaintiffs do not sue (130).

A model of an enterprise liability program exists today at the hospitals owned and operated by University of California. Under California law, university hospitals are 1iable for the actions of physicians practicing within their hospitals. When a claim is filed against a staff physic i tin, the general counsel office requests the plaintiff attorney to drop the physician as a party to the suit and make the Regents of the University of California the sole defendant (137). In virtually all cases this request has been granted. Consequently, the physician does not play as great a role in the pretrial discovery process, but if the case goes to trial the physician is the primary witness and is required to defend his or her actions (1 37). Other institutions, particularly some teaching hospitals, have similar arrangements (74),

Some large teaching hospitals have an arrangement known as "channeling," in which the institution and the physicians practicing in the hospital are insured under the same malpractice insurance policy. The physician pays the hospital for the insurance and is often required to agree to a joint defense. In return, the physicians receive favorable malpractice insurance rates and often high coverage limits (108, 142,197). Therefore, even without true enterprise liability, some of the administrative efficiencies of a joint defense already exist in these settings.

The impact of enterprise liability on physician practice is difficult to predict. Because enterprise liability retains the fault-based system and still calls upon physicians to defend their actions, it is unclear whether the psychological benefits of not being personally named in a claim would lead physicians to practice less defensively. To the extent that enterprise liability induces greater oversight of outcomes of care or review of malpractice claims by the enterprise, physicians may still feel pressure to practice defensively so as to avoid at all costs a poor outcome or a claim. To the extent that physicians are good judges of how to improve outcomes, this kind of defensive behavior would be beneficial to patients, though it might also be very costly.

The medical profession has not seized the opportunity offered by enterprise liability to be excused as a party to malpractice suits. Some critics claim that enterprise liability threatens professional autonomy (148,149). Others doubt that physicians' autonomy is really threatened by enterprise liability, because physicians have a great deal of influence over hospital and HMO policies, especially with respect to clinical practices (46).

Yet if enterprise liability were implemented at the insurance plan level, the quality control function would be one step removed from the institution in which care is provided. The insurance plan would need to understand the quality control issues at many different institutions. Physicians might resent the suggestions or dictates of "'outside" insurers. Finally, insurers would not be as aware of the physician abilities, skills, and other contributions to the institution, possibly leaving physicians feeling unfairly judged.

Enterprise liability could increase the number of suits if patients felt more comfortable suing a corporate enterprise rather than physicians (148, 149). In return for no personal liability, physicians might therefore find themselves witnesses in a greater number of cases and subject to greater scrutiny from the enterprise in which they provide care. It is difficult to predict the resulting impact on practice.

No-Fault Proposals

Some malpractice reform proponents seek to replace the fault-based system with a no-fault system, because they consider the current malpractice system ineffective in reaching its two primary goals: deterrence of poor quality care and compensation of victims of negligent injuries. Presently, very few injured patients receive compensation, and judgments about negligence can be costly and time-consuming. Certain no-fault proposals promise more equitable compensation and create other mechanisms for quality control. Other no-fault proposals address compensation issues only.

Limited no-fault systems for birth-related injuries already exist in Florida and Virginia. The Virginia and Florida programs provide compensation for a limited number of obstetric injuries; they do not focus on improving the quality of care. In part this is because many injuries removed from the malpractice system by the Florida and Virginia programs may not be preventable by better quality care.

A selective no-fault proposal that would cover a broader range of medical practices is in development. This proposal, which is as yet untested, would use certain adverse medical outcomes called *avoidable classes of events* (ACES) as a mechanism for determining liability for selected injuries. ACES could be used both to promote high-quality care and to quickly and objectively determine which patients should be compensated. When an ACE occurred, the patient could be quickly compensated through a nonjudicial insurance process, so ACES are also known as *accelerated compensation events.* (221).

The Virginia and Florida Birth-Related Injury Compensation Programs

Virginia and Florida have implemented an accelerated compensation program for a selected set of severe neurological birth related injuries. 20 The Virginia program was conceived out of necessity when Virginia malpractice insurers stopped writing any new obstetric policies following a Virginia Supreme Court decision upholding an $8 million obstetric award (236). Florida initiated its program shortly thereafter. Both programs came about in part because high malpractice insurance rates were thought to be responsible for a decline in the availability of obstetric services, especially for low-income people (57).21

Severe neurological injuries were chosen because the issue of causality was so muddled and malpractice insurers were frustrated by the difficulty of defending against allegations that the injury resulted from the physician's actions (or inactions) during the delivery. Many of these claims involve very large damages.

Both programs stop short of being true no-fault systems. In both states, there must be evidence that the injury resulted from deprivation of oxygen or a mechanical cause during delivery (Va. Code Sec. 38.2-5008 (1989); Fla. Stats. Sec. 766.302 (1991)).22

The Virginia and Florida programs have been operational for approximate] y 5 years. Many more claims have been brought under the system in Florida than in Virginia, probably because Florida promotes its program more aggressively (174, 236).23 Malpractice insurance for obstetricians is now readily available in both Virginia and Florida; at least in Virginia, the program can be credited with keeping malpractice insurers in the market.

The impact on malpractice insurance premiums is unclear (57,90). No studies have documented whether these programs have increased the availability of obstetric care, but the Virginia act successfully required participating physicians to work with the commissioner of health to develop a program to provide obstetric services to low-income patients (Code of Va. Sec. 38.2-5001 (1987)).24

Because the subset of injuries that falls under these programs is so small and the link between these injuries and physician practices so unclear, removing personal 1iability for the specified birth-related injuries probably has very little impact on defensive medicine and may have little impact on the quality of care as well.

Accelerated Compensation Events

Under this system, medical experts would identify categories of medical injuries that are generally avoidable when a patient receives good medical care. Patients experiencing an ACE would be automatically compensated through an administrative system. Compensation would be paid either by the physician's insurer or another responsible organization.

Because ACES would not account for all claims, the ACE proposal would have to operate within a larger injury compensation system, which could be the existing fault-based malpractice system or some alternative fault-based approach. Non-ACE claims could be resolved through the tort system or ADR (220).

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[20] For a detailed description of the Florida and Virginia no-fault programs, see OTA's background paper (236).

[21] *Coy v. Florida Birth-Related Neurological Injury Compensation Plan*, 595 So.2d 943 (Fla. 1992).

[22] There is debate in the medical literature as to whether deprivation of oxygen during the delivery is always the cause of severe neurological impairment (236).

[23] Florida had approximately 92 claims in the first 5 years of operation, compared to eight claims in Virginia (174).

[24] A plan was developed by obstetricians and endorsed by the commissioner of health in 1988 (44). It delegates the responsibility for program implementation to local health departments. A number of local health departments have implemented programs that provide low-income women with obstetric care by private physicians. However, some of the impetus for the programs also came from increased Medicaid reimbursement for obstetric care (44).

Experts have developed 146 ACES for general surgery, orthopedic surgery, and obstetrics, but the list is still being revised.[25] Examples of ACES include:

- complications secondary to anticoagulant therapy in preparation for surgery,
- consequences of misdiagnosis of breast malignancy,
- complications from failure to diagnose and treat hypoglycemia in a newborn,
- complications to infant(s) from syphilis during pregnancy that was unrecognized during prenatal care,
- complications to infant(s) from fetal distress (including brain damage) that was unrecognized or untreated during attended delivery, and
- certain complications or injuries resulting from surgical procedures, including failing to remove a foreign body from the surgical site (221).

In a sample of 285 hospital obstetric claims in 24 states, the obstetric ACES accounted for 52 percent of claims, with a disproportionate number of serious injury claims and paid claims involving ACES (25).

The primary benefit of ACES may be to promote predictability and consistency in the disposition of claims. ACES are developed by medical experts using epidemiologic concepts of "relative avoidability" on a population basis (221). In conventional malpractice cases, negligence is based on a lay jury's judgment about an individual incident. It is quite possible that the same adverse outcome will be compensated by one jury but not by another because juries will differ on whether the standard of care was met.

Under a system using ACES, the primary analysis would be whether a covered adverse outcome occurred as a result of certain clinical actions (e.g., the patient is blind following the occurrence of air embolism during a surgical procedure to remove acoustic neuroma). Compensation would be provided once a factual finding was made that certain clinical events have occurred. There would be no judging of whether an individual physician's actions were clinically acceptable or met a standard of care.

Use of ACES should allow a greater number of injured patients to be compensated more quickly and for less administrative expense[26] (221). It would not be necessary to determine anew in each case the proper standard of care and to evaluate the physician's behavior against this standard. The proposal also contemplates 1imiting noneconomic damages, which are often high and sometimes inconsistent because of (he difficulty of assigning monetary values to injuries such as pain and suffering (236). Limiting these damages would decrease the open-endedness of damage awards and perhaps ease physicians' anxieties about medical malpractice (see chapter 2).

ACES could also have an impact on defensive medicine. ACES could relieve physicians of the psychological burden of a process that retrospectively judges their actions. Using ACES would eliminate the process of finding that the physician's actions did not meet the standard of care. Without the threat of a trial in which personal blame is assigned by a finding of negligence, there could wel1 be less motivation to practice defensive medicine in the clinical situations surrounding ACES.

Because ACES are based largely on the occurrence of bad outcomes in certain clinical situations, physicians should have little incentive to perform tests or procedures that they know will not improve outcomes but merely document care

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[25] The unpublished list of research ACES were provided to OTA for review only; OTA was not permitted to publish the list or any ACES that have not been published previously.

[26] According to one estimate, $0.50 to $0.60 of every dollar spent on the malpractice system goes to administrative expenses, the majority of which are legal expenses (106). The elimination of a proceeding to establish fault and causation should lead to ii significant reduction in admin istrative costs.

in these cases (221). Thus, ACES should reduce the occurrence of certain wasteful defensive medi - cal procedures.

ACES could also promote good defensive medicine (i.e., defensive medicine that improves outcomes). Implicit in the development of ACES is the judgment that the injury could probably have been prevented with good medical care. Thus, physicians and institutions would have incentives to change their practices and implement quality control systems to prevent the occurrence of such events. Because ACES are based on outcomes, however, they might not always provide the physician with upfront guidance on the clinical decisions necessary to avoid these outcomes. In addition, because ACES are based on statistical avoidability y, a single ACE event would not necessarily be a sign of poor care.

The authors of ACES say that use of the concept would not stimulate defensive medicine, because most ACES do not involve adverse events that can be avoided by diagnostic testing (20.2 18). Indeed, one of the criteria for- designation of certain adverse medical outcomes of an ACE is that doing so will not distort medical practices or lead to unnecessary testing.

Yet some ACES developed to date do involve omissions of care, including missed diagnosis. For example, complications resulting from misdiagnosis of early breast malignancy has been specified an ACE. In designating this situation tin ACE, the developers of the proposal made an explicit judgment that physicians should have strong incentives to diagnose breast cancer. even if there are many false negatives.

Any determination that such an ACE occurred implies that the doctor omitted necessary procedures: thus, the physician may still feel personally responsible.27 In such situations, some physicians may feel compelled to do tests of marginal medical benefit to reduce the risk of an adverse outcome to as close to zero as possible. On the other hand, if the physician is already practicing defensively because he or she believes that any adverse outcome might lead to litigation. then having this situation removed from the fault-based liability system might reduce some of this concern. In other words. if physicians are more comfortable with an ACE compensation system than with the tort system, designation of complications from certain missed diagnosis as an ACE could relieve some anxiety about potential liability.

Finally. the impact of ACES on defensive medicine might depend upon how they fit into the larger system of compensation for medical injuries. ACES will not cover all medical practices. If an ACE compensation system were layered onto the existing malpractice system, physicians might not know whether particular clinical situations could result in ACE liability or tort 1iability.

More importantly, ACES might not address the c1inical situations that trigger the most defensive medicine. Since the claims that remain in the tort system might still trigger defensive medicine, the developers of ACES have suggested that an ADR system for the remaining cases would eliminate some aspects of the tort system that may drive defensive behavior+. g., adversarial proceedings, juries. or potential] y large damage awards (24). As discussed earlier, however, the impact of ADR on defensive medicine is not at all clear.

DEFENSIVE MEDICINE AND HEALTH CARE REFORM

Economic them-y predicts that the threat of liability will drive individuals (or organizations) to invest in activities to prevent 1iability until the cost of prevention exceeds the expected cost of 1iability (255). In a fee-for-service system, physicians

[27] Indeed, compensation under ACEs may have economic consequences for the physician if health care purchasers base their purchasing decisions on providers' experience under ACEs. This may be desirable if ACEs are true markers of quality of care, but potential for misuse exists if the concept of statistical avoidability gets confused with negligence.

often do not bear the costs of extra tests and procedures and may sometimes get paid more money when they order them.

Without counterincentives to investment in prevention of liability, extra tests or procedures would be ordered even when their marginal benefit to the patient is extremely low. As long as the "investment" in 1iability prevention is free or even remunerative, reducing the threat of liability might do little to change the incentive to practice defensive medicine. On the other hand, changes in health care payment that increase the cost to the clinician (or to the organization) of avoiding liability would probably reduce defensive medicine.

Several current health care proposals embrace the concept of managed competition.[28] Under such a system, health plans would have strong incentives to limit total expenditures on behalf of their enrollees. Plans and their physicians would weigh the cost of performing a test or procedure against the potential savings in liability costs that performing such tests can be expected to provide. Without the threat of liability, or some other effective method of quality assurance, managed competition could create too great an incentive to "do less" for the patient, leading to lower quality of care.

Under certain health care reform proposals, physicians could find themselves in the position of not being reimbursed for delivering care they believe is appropriate. Since the legal system does not now and probably will not recognize negative reimbursement decisions as evidence of the standard of care, physicians could be caught between competing pressures of bearing the cost of procedures or bearing the risk of liability (84).

CONCLUSIONS

Conventional tort reforms that tinker with the existing process for resolving malpractice claims while retaining the personal liability of the physician are more likely to be successful in limiting the direct costs of malpractice-claim frequency, payment per paid claim, and insurance premiums-than in altering physician behavior. Indeed, 20 years ago, when the frequency of malpractice suits, payments per paid claim, and premiums were much lower than today, physicians still claimed to practice defensive medicine frequently.

Greater use of practice guidelines in malpractice proceedings may reduce defensive medicine, because practice guidelines may offer physicians specific guidance about what the courts will accept as the standard of care. Although guidelines will not be a panacea, they are likely to play an increasingly important role in malpractice proceedings. Under a payment system that seeks to reduce costs, guidelines can be used both to specify appropriate clinical actions and to shield physicians from liability for adverse outcomes occurring when the guidelines have been followed. The overall impact of guidelines on defensive medicine will probably be 1imited, however, because of the tremendous uncertainty in medical practice.

Alternative dispute resolution relieves the physician of the prospect of a trial. An arbitrator may possess greater technical expertise in malpractice than a lay jury, and the process may be less adversarial and quicker. If concern about the competency of juries and the trial process is the primary motivator of defensive medicine, then this reform may have an impact on behavior. Physicians may find the process more rational and fair and therefore more readily accept the result. However, the process still involves judgments about the appropriateness of the physician clinical decision. In addition, ADR may increase the number of claims and strengthen the link between malpractice claims and professional licensing. Both of

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[28] *Managed competition* in this report refers to a system in which each consumer chooses among competing health plans that offer a standard set of benefits at different prices (i.e., premiums). Competition among plans for patients on the basis of price as well as qua] ity would presumabl y force plans to look for opportunities to eliminate wasteful or only marginally useful services. In addition, the Admin istration's proposal imposes caps on increases in premiums. It is expected that plans will exert greater influence on their participating doctors and hospitals to be more cost-conscious in making clinical decisions.

these factors could offset the psychological benefit of eliminating a trial.

Enterprise liability removes personal liability, but the physician is still likely to be called as a witness to defend his or her clinical decision if the case goes to trial. The main advantages of this concept are reduction in administrative costs associated with multiple defendants and the prospect for better quality control systems. In addition, physicians may have less anxiety when they know they will not be named in any suit.

Selective no-fault using ACES would probably limit physicians' involvement in the claims process, and a payment to the plaintiff would not necessarily imply that the physician was negligent. However, the criteria used to develop ACEs—i.e., generally avoidable adverse events does leave some notion of personal responsibility in the system. As for defensive medicine, it is not clear that ACES would address many of the situations in which much defensive behavior occurs. If these situations are left in the tort system, the motivation to practice defensively may not change, Consequently, the impact of selective no-fault on defensive medicine is unpredictable.

The projected impacts of these new malpractice reform proposals on physician behavior are based on logic, not experience. Missing is information about what aspects of the malpractice system drive physician behavior. If physicians mainly want to avoid jury trials, then ADR may be sufficient to reduce defensive medicine. On the other hand, if physicians are distressed about any process that questions their clinical judgment, then reforms retaining a fault-based system may not result in changes in physician behavior.

Health care reform may also have an impact on defensive medicine. A different health care financing arrangement may create financial disincentives for practicing defensive medicine, making tort reform unnecessary or even unadvisable.

Appendix A: Method of Study

This assessment grew out of the debate over the role of medical malpractice in increasing health care costs. Specifically, Congress was concerned that the threat of medical malpractice liability was leading physicians to order many unnecessary tests and procedures. According to some estimates, these extra tests and procedures were adding $20 billion to national health care expenditures.

Congressman Bill Archer, Ranking Republican Member of the House Ways and Means Committee, and Senator Orrin Hatch, member of the Office of Technology Assessment's (OTA's) Technology Assessment Board, requested that OTA provide an independent estimate of the cost of defensive medicine. Additional request letters were received from Senator Edward Kennedy, Chairman of the Senate Committee on Labor and Human Resources; Senator Hatch, Member of the Senate Committee on Labor and Human Resources: Congressman John Dingell, Chairman of the Committee on Energy and Commerce; and Senators Charles Grassley and Dave Durenberger, members of OTA's Technology Assessment Board. In addition, the Congressional Sunbelt Caucus requested that OTA examine the question of whether Medicaid obstetric patients were more likely than other obstetric patients to sue their physicians.

OTA submitted a proposal to the Technology Assessment Board in September 1991, which the Board approved in September 1991, for start in February 1992.

The project had four components:

- analysis of the empirical literature on the causes of defensive medicine,
- original empirical research on the extent of defensive medicine,
- analysis of the impact of malpractice reform on physician practices,
- analysis of whether Medicaid patients are more likely to sue their physicians than non-Medicaid patients.

PLANNING WORKSHOP

OTA often convenes workshops of experts in the field to assist in devising a research plan and to provide technical assistance. On November 26, 1991, before the project staff was dedicated to the assessment, OTA held a workshop to devise a method for assessing the extent of defensive medicine. The workshop included primarily academicians who had extensive knowledge of medical malpractice and defensive medicine. (Participants are listed at the end of this appendix.)

This half-day workshop led OTA to a working definition of defensive medicine. The workshop

also led OTA to conclude that it would be impossible to come up with a single point estimate of the cost of defensive medicine. Instead, OTA decided to focus on a more qualitative estimate. It was also decided that physician surveys using clinical practice scenarios would not only be a feasible way to quantify defensive medicine but would also be a significant empirical contribution to research on defensive medicine.

ADVISORY PANEL

Every major OTA assessment is advised by a panel of outside experts and representatives of relevant interest groups. The role of the advisory panel is to provide guidance in project planning and to review OTA's findings. The panel is not responsible for the final contents of an OTA assessment and OTA does not attempt to get a consensus from the panel.

OTA chose a 17-member advisory panel with representatives from medical and legal academia; physician organizations, including representatives of the American Medical Association; a consumer advocacy group; and a practicing plaintiffs' attorney. Randall Bovbjerg, senior research associate at the Urban Institute, a Washington research organization, served as panel chair.

The panel convened twice during the project-once on August 13, 1992, to give advice about research priorities and directions for the project; and again on September 27, 1993, to review our empirical findings and to finalize the analysis plan. The panel was subsequently provided a draft of our final report for review.

CLINICAL SCENARIO SURVEYS

Having decided to use clinical scenarios to survey physicians about their medical practices and the influence of liability concerns on those practices, OTA contacted several physician professional societies for guidance. The American College of Cardiology, American College of Surgeons, and the American College of Obstetricians and Gynecologists were very willing and enthusiastic to provide assistance. In addition, the American College of Emergency Room Physicians expressed a willingness to cooperate, but limitations of time and resources precluded an extension of the survey to this group. Each College convened an expert panel to help devise clinical scenarios, assisted us in obtaining a sample of its member physicians, supported our survey with a letter of endorsement, helped gather the data for analysis, and generally gave freely of staff time. Without their generous efforts, OTA would not have been able to conduct the physician surveys that make up a large part of the basis for our conclusions about defensive medicine. OTA also retained the services of a clinical consultant, Dr. Jeremy Sugarman.

In total, OTA surveyed 5,865 physicians; the average response rate was 60 percent. For the analysis of the data, OTA worked closely with Russell Localio of the Center for Biostatistics and Epidemiology, School of Medicine, Pennsylvania State University. An analysis plan for the surveys was discussed at the advisory panel meeting in September 1993.

ADDITIONAL EMPIRICAL RESEARCH

In addition to its clinical scenario studies, OTA commissioned several other empirical studies of defensive medicine.

Initially, OTA had hoped to do a large-scale statistical analysis of the relationship between malpractice risk and use of health care services. However, after concerted efforts to identify good sources of data on malpractice claims and health care utilization, it became clear that adequate data were not avail able to conduct such analysis on a national level.

OTA then considered doing a smaller analysis of this type using comprehensive hospital discharge and malpractice claims data from Florida—the only state for which such data were readily available. On June 2, 1993, OTA convened a special workshop to identify indicators of defensive medicine in a hospital setting that could be measured using discharge data abstracts. Workshop participants included seven practicing physicians with expertise in analysis of utilization data, an economist from the Center for Health Policy

Studies at Georgetown University, and an individual familiar with the two Florida databases. (Participants are listed at the end of this appendix.) Although the workshop produced a short list of potentially useful indicators, OTA ultimately decided not to proceed with the analysis because the data available were not adequate to control for a variety of other factors known to affect utilization of the procedures. Without those controls, the results of the analysis would have been highly equivocal.

OTA was able to find several researchers with data that could be used to measure defensive medicine. OTA funded Dr. Laura-Mae Baldwin and other faculty from the Department of Family Medicine, University of Washington, to examine the impact of medical malpractice liability experience on the treatment of low-risk obstetric patients by a sample of obstetricians and family practitioners in Washington State. OTA also funded Drs. Kevin Grumbach and Harold Luft of the University of California at San Francisco to examine whether increases in malpractice premiums in New York State led obstetricians and family practitioners to drop their obstetric practice.

Finally, OTA commissioned several papers on medical malpractice and defensive medicine. The major contract papers prepared under this assessment are listed at the end of this appendix. Almost all of these contract papers were sent out for external review.

BACKGROUND PAPERS

As OTA began its research on defensive medicine and medical malpractice, it became apparent that there were many important issues relating to medical malpractice reform that might be of interest to Congress during the health care reform debate. OTA decided to issue a separate background paper on medical malpractice reform. The background paper, Impact *of Legal Reforms on Medical Malpractice Costs,* was published in September 1993. OTA reviewed statutes and surveyed state attorneys general to document the current status of malpractice reform in the states. The paper also examined the best evidence regarding the impact of malpractice reforms on the indicators of the direct costs of the medical malpractice system—malpractice insurance premiums, payments per paid claim, and frequency of claims.

In addition, in response to the request from the Sunbelt caucus, OTA issued a background paper in August 1992, titled *Do Medicaid and Medicare Patients Sue Physicians More Often Than Other Patients ?* This paper was a review of the available literature on whether Medicaid and Medicare patients were more 1ikely to sue their physicians than patients with private health insurance or patients without insurance.

REPORT REVIEW PROCESS

Prior to completing the draft, the main contract papers were sent out for review. The 10 contract papers were reviewed by a total of 58 outside reviewers. After completing the reviews of the contract papers, a preliminary draft of OTA's report was prepared and submitted for review and critique to the advisory panel in January 1994. The advisory panel was given 10 days to review the draft for problems that were important enough to warrant attention before an outside review draft was prepared. Several panel members sent comments, but very few substantive changes were necessary before the final review draft.

In February 1994, a formal draft for outside review was prepared and sent to both advisory panelists and a selected group of 80 outside reviewers. The reviewers (including the panelists) represented a wide range of expertise and interests. In all, OTA received a total of 47 sets of reviews, including those from advisory panel members. OTA rev iewed and revised the draft as appropriate in re - sponse to these comments.

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Major Contract Papers Prepared for the Defensive Medicine and Medical Malpractice Project

L. M. Baldwin, M.D., M. P. H., L.G. Hart, M. D., M. Lloyd, A. R.M., M. Fordyce, M. A., and R.A. Rosenblatt, M. D., M. P.H., Department of Family Medicine, University of Washington, Seattle WA, "Malpractice Claims Exposure and Resource Use in Low Risk Obstetrics," Nov. 21, 1993.

P. Ehrenhaft, M. P. H., Lake Oswego, OR, "Do Medicaid and Medicare Patients Sue Physicians More Often Than Other Patients?" August 1992.

K. Grumbach, M. D., D. Peltzman-Rennie, B. A., and H.S. Luft, Ph. D., Institute for Health Policy Studies and the Department of Family and Community Medicine, University of California, San Francisco, CA, "Charges for Obstetric Liability Insurance and Discontinuation of Obstetric Practice in New York," Dec. 7, 1993.

P.A. Glassman, M. D., M.Sc., L.P. Petersen, M.S., Bradley, M. A., B.A., J.E. Rolph, Ph. D., RAND, Santa Monica, CA, "The Effect of Malpractice Experience on Physicians' Clinical Decision -Making," Dec. 1993.

M. Hall, J. D., Wake Forest University School of Law and Bowman Gray School of Medicine, "The Effect of Insurance Coverage Law on Defensive Medicine," Aug. 25, 1993.

P. Jacobson, J. D., M. P. H., and C.J. Rosenquist, M. D., RAND, Santa Monica, CA, 'The Diffusion of Low Osmolality Contrast Agents: Technological Change and Defensive Medicine," March 1993.

E. Kinney, J. D., M. P. H., The Center for Law and Health, Indiana University School of Law, Indianapolis, IN, "The Impact of Proposed Tort Reform on the Medical Malpractice System and Physician Behavior," June 1993.

T.B. Metzloff, J. D., Duke University School of Law, "Defensive Medicine and the Use of Medical Technology: Physician Involvement in Medical Malpractice Litigation," Jan. 1994.

L. Modock, Ph. D., and F.E. Malitz, MA.S., School of Hygiene and Public Health, The Johns Hopkins University, Baltimore MD, "Short-Term Effects of Tort and Administrative Reforms on the Claiming Behavior of Privately Insured, Medicare, Medicaid and Uninsured Patients," Sept. 30, 1993.

G. Ruby, Consultant, Garret Park, MD, "The Role of Medical Education in Promoting the Practice of Defensive Medicine," Apr. 28, 1993.

Appendix B: Acknowledgments

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Appendix C: The Impact of Nonclinical Factors on Physicians' Use of Resources

Although clinical factors are still the most important determinants of physicians' clinical decisions (61), research suggests that a number of nonclinical factors also influence physicians' diagnosis and treatment choices, among them malpractice liability concerns.

The influence of malpractice risk on physician behavior is discussed at length in chapters 2 and 3 of this report. This appendix briefly reviews some evidence on the influence of other nonclinical factors in physicians' decisions about resource use.

AWARENESS OF AND SENSITIVITY TO TEST COSTS

A number of studies have suggested that physic cians are sensitive to costs when ordering tests and prescribing treatments (1 1,65,97,1 33,225). For example, one study found that physicians who were given information on test costs ordered 14 percent fewer tests per patient than physicians who are not given cost information (225).

In a study of test use for hypertensive patients, cost to patient was cited as an important reason for not ordering electrocardiograms (65). An OTA-sponsored clinical scenario study found that physicians with greater levels of cost-consciousness (measured by using attitude scales) reported they would use fewer resources than physicians with lower levels of cost-consciousness (73).

FINANCIAL INCENTIVES

Several studies have found that diagnostic testing and other service use is lower in prepaid and salaried practice settings than in fee-for-service systems (64,92, 136, 140,208). Other types of financial incentives have also been shown to have an effect on use.

For example, a study of physicians in a for-profit chain of ambulatory care centers found that use of laboratory tests and x-rays increased substantially (23 and 16 percent, respectively) after physicians were offered bonuses for increasing patient care revenues (91).

Other studies have shown that physicians respond to reduced fees by increasing the volume of services they perform (189,195,205). Finally, physician ownership of testing and treatment facilities has been associated with increased resource use (93,2 14,245).

INSURANCE COVERAGE

Insurance status of patients has also been associated with willingness to use resources. This may reflect physicians' sensitivity to both their own and patients' financial concerns. Research has consistently shown that hospitalized patients with private insurance coverage stay in the hospital longer and receive more procedures (especially more discretionary and high-cost procedures)

than patients with Medicaid coverage or patients who lack health insurance (238).

For example, a recent study of low-income pregnant women in Massachusetts (82) found that public health insurance coverage increased their likelihood of undergoing a Caesarean section. Service-specific financial incentives did not play a role, as the public insurance program paid a global fee regardless of type of delivery. Another study of patients with ischemic heart disease in California hospitals found that, after controlling for demographic, clinical, and hospital characteristics, the frequency of coronary revascularization procedures (coronary artery bypass surgery and coronary angioplasty) was almost two times higher in fee-for-serv ice patients than in health maintenance organization (HMO) and Medicaid patients (121). The same study also found that the rate of coronary revascularization increased more quickly in fee-for-service and HMO patients than in Medicaid patients between 1983 and 1985 (121).

PROXIMITY OF TECHNOLOGY

Some studies have shown that the availability of technologies influences their use. For example, a recent study of acute myocardial infarction (AMI) patients in Seattle found that patients admitted to hospitals with onsite cardiac catheterization facilities were three times as likely as patients in hospitals without those facilities to undergo coronary angiography. After adjusting for clinical factors, the existence of onsite catheterization facilities was the strongest predictor of use of coronary angiography (66). A similar study in New York corroborated these results, finding that AMI patients admitted to facilities offering cardiac catheterization, bypass surgery, and angioplasty services were two to six times as likely as patients in facilities not offering them to receive these services (18).

Another study of physician practice patterns suggested that some of the otherwise unexplained variation may be influenced by differences in physicians ' "enthusiasm" for using certain interventions (39). This enthusiasm may be a byproduct of other related issues, such as greater familiarity with the technique, a role in its pioneering, or availability of technology.

OTHER FACTORS

Other factors associated with physicians' use of tests and procedures include physician specialty and training (62, 123,126, 175,257,259), practice setting (e.g., managed care versus unrestricted private practice) (135, 136) and patient expectations (144).

[1]For example. one study found that internists and family practitioners ordered more diagnostic tests than general practitioners (62).

Appendix D: Methods Used in the OTA Clinical Scenario Surveys

This appendix summarizes the methods used to develop and analyze surveys of three physician professional societies. The Office of Technology Assessment (OTA) cooperated with three physician associations to conduct clinical scenario surveys of association members by mail from February through August of 1993.[1] The three physician associations, listed in the order in which they were surveyed, were:

- the American College of Cardiology (ACC),
- the American College of Surgeons (ACS), and
- the American College of Obstetricians and Gynecologists (ACOG).

The ACS component actually involved two separate surveys: one for general surgeons and the other for neurosurgeons. Thus, four distinct surveys were actually conducted.

The questionnaire for each survey was developed jointly between OTA and the respective association. ACC maintains an ongoing "practice panel" sample of its practicing members and conducted its own mailout, data entry, and initial data editing. For the other two surveys, these tasks were shared between OTA and the respective association. OTA performed all final data editing, processing, and analysis. Strict rules protecting respondent confidentiality were observed by all participating organizations.

SURVEY INSTRUMENT CONTENT AND FORMAT

The main goal of each survey was to ascertain, as unobtrusively as possible, the extent to which physicians would choose "malpractice concerns" from among several reasons for selecting or rejecting specific diagnostic or therapeutic procedures in treating specific hypothetical cases. Respondents were presented two or three specific clinical scenarios appropriate to their respective specialties. Introductory letters from both the physician association and OTA described the purpose of the survey in general terms, without mentioning malpractice or defensive medicine. Two separate instruction pages, including an example scenario, explained how the questionnaire should be

[1] Dr. Russell Localio of Pennsylvania State University and Dr. Jeremy Sugarman of Duke University were consultants to OTA on the design of the survey instruments and statistical analysis. Dr. Localio designed the sampling plan and data analysis components of the surveys and participated extensively in the analysis and interpretation of the survey results. Dr. Sugarman consulted on the development of the format and content of the clinical scenarios used in the surveys.

completed. Copies of a all survey instruments are presented in a technical appendix available from OTA upon request.

Clinical Scenarios

Scenario Format and Content

The clinical scenarios in each of the four surveys were developed by an expert panel containing from seven to 10 members of the relevant physician association (selected by association leadership in cooperation with OTA project staff and consultants). During a one-day meeting at the association headquarters, the panel members were asked to "brainstorm" at least 20 clinical scenarios in which concerns about liability would be expected to strongly influence clinical actions. Then the panel was asked to select from these candidates three or four scenarios that would be expected to elicit the strongest defensive medicine responses for inclusion in the survey.

Panel members were also asked to create a ● 'control" version of each selected case by adding or deleting one or more key clinical indicators (e.g., a result from a laboratory or radiologic test) that would, in the opinion of the panelists, greatly reduce the likelihood that malpractice concerns would be cited as the primary reason for choosing any action. OTA staff and consultants then selected and refined the final scenarios, with input from association leaders and panel members. Each questionnaire was pretested on a small sample of association members who were excluded from the final survey.

Each clinical scenario:

- described the patient's demographic characteristics, symptoms, vital signs, and initial diagnostic test results;
- presented between 3 and 13 diagnostic or therapeutic procedures, including the option of essentially doing nothing; and
- presented four reasons for choosing or rejecting each procedure:
  - —medical indications,
  - —concerns about costs versus benefits,
  - —malpractice concerns, and
  - —patient expectations.

"Other (specify)" was also a choice under both the procedures and the reasons for choosing them.[2]

The respondent was asked to:

- choose "yes" or "no" for each procedure,
- check one or more reasons for that choice, and
- double-check the most important reason for the choice.

Only one double-check was allowed for each procedure. These choices were presented in a grid format, with the procedures as rows and the reasons as columns. The first "procedure" listed was typically "do nothing," and the rest were diagnostic and therapeutic interventions with varying degrees of "invasiveness" or technological sophistication.

Case and Control Scenarios

ACC and ACS respondents each received two scenarios, while ACOG respondents received three (see below). In each survey, the "case" version of one scenario was given to a randomly chosen subgroup of respondents, and the "control" version of that same scenario was given to the remaining respondents. One or two additional scenarios in each survey, referred to here as "common" scenarios, were sent to all respondents. Thus, the first randomly selected subgroup of surveyed physicians received one or two scenarios (all of which were selected because concern about liability was

[2] In place of "other," the ACC survey used "institutional protocols/professional guidelines" as the fifth reason. Although "other" was listed as a procedure on the ACC questionnaire, the association did not code the presence or absence of a written response in that box. Consequently, OTA was unable to Include "other procedure" in its analysis of the ACC data.

expected to be frequent); the other received the control scenario and one or two common scenarios, The specific combination of scenarios presented to each group of respondents is summarized in table D- 1. Special analytical problems posed by this case-control design are discussed later in this appendix.

Open-Ended Version of the ACS General Surgeon Survey

A supplemental sample of general surgeons was sent an "open-ended" version of each ACS clinical scenario used in the main survey of general surgeons (case versions only—see previous section). The open-ended questionnaire offered no specific "reasons" for choosing procedures. Instead, a blank space was provided beside each procedure, in which respondents could fill in their own reasons, in their own words, for choosing the procedure. A senior OTA staff member coded the responses on these open-ended questionnaires into the categories of "reasons" given in the main questionnaire. Responses were coded as citing "malpractice concerns" if they contained any suggestion at all of defensive practice (e.g., ". . . to cover myself").

Attitudinal and Demographic Items

Each survey instrument contained items on two or three professional or demographic characteristics (e.g., practice setting) that were particularly relevant to malpractice issues within that specialty.[3] The instrument also contained a set of attitudinal items provided to OTA by Dr. Susan Goold of the University of Michigan, who had developed and tested three composite scales based on those items (77). For this report those attitude scales were labeled as follows:

TABLE D-1: Combinations of Clinical Scenarios in OTA Surveys of Defensive Medicine

Association	Group	Scenario 1 (case/control)	Scenario 2 (common)
American College of Cardiology	Group 1 (case)	Chest pain case	Syncope
	Group 2 (control)	Chest pain control	Syncope
American College of Surgeons			
General surgeons	Group 1 (case)	Rectal bleeding case	Breast pain
	Group 2 (control)	Rectal bleeding control	Breast pain
Neurosurgeons	Group 1 (case)	Back pain case	Head injury
	Group 2 (control)	Back pain control	Head injury
American College of Obstetricians and Gynecologists	Group 1 (case)	Perimenopausal bleeding case	Breast lump Complicated delivery
	Group 2 (control)	Perimenopausal bleeding control	Breast lump Complicated delivery

SOURCE Off Ice of Technology Assessment, 1994

[3] These characteristics were jointly selected by staff members of OTA and the relevant physician association, considering not only differences among the specialties, but also the unavailability of some characteristics in each association's membership database (also see the section on sampling, below). Most importantly, the following measures were not available: in the ACC survey, the number of years in practice; in the ACS survey, geographic region; and in the ACOG survey, whether the respondent held an academic appointment. Also, the categories of the respondent's usual practice setting differed slightly from survey to survey, reflecting the different categories used by the associations themselves. Finally, as measures of the number of years in practice, ACS used years since board certification, whereas A COG used years of membership m the association. These unavoidable variations in measurement reduced the comparability of results from the four surveys.

- Malpractice Concern,
- Cost Consciousness, and
- Discomfort with Clinical Uncertainty.

Additional items regarding satisfaction with medical practice were developed by OTA and Dr. Goold to serve as decoy items in the surveys.

Each attitude item offered five response categories, scored as 1 through 5 (respectively): strongly agree, agree, unsure, disagree, and strongly disagree. The Malpractice Concern scale contained five items, the Cost Consciousness scale contained six items, and the Discomfort with Clinical Uncertainty scale originally contained three items. However, OTA did not use the entire Uncertainty scale for the ACOG survey (only one Uncertainty item was included in that survey), after receiving written comments from ACS respondents regarding how similarly worded the items were.

Each respondent's scores (1 through 5) on all the items in a given scale were summed to obtain a total scale score.[4] To make a "5" represent agreement rather than disagreement (so that the summed scores would measure agreement), the item scores were reversed by subtracting them from 6, except where an item was worded negatively (e.g., where agreement represented low malpractice concern). The scores for the five-item Malpractice Concern scale thus ranged from 5 (minimal malpractice concern) to 25 (maximal malpractice concern), whereas the six-item Cost Consciousness scale ranged from 6 (minimal cost consciousness) to 30 (maximal cost consciousness). The three-item Uncertainty scale, which ranged from 3 (minimal discomfort with clinical uncertainty) to 15 (maximal discomfort with clinical uncertain y), was computed on] y for ACC and ACS respondents because the ACOG survey contained only one Uncertainty item (see above).

SAMPLING

OTA and its consultant, Russell Localio, developed a sampling plan for each survey, with input from association staff. Sampling fractions were based on statistical power calculations for two-sample comparisons, with rough assumptions about the survey response rate and the number of respondents who would choose clinical procedures primarily because of malpractice concerns. Sampling fractions varied across sampling strata to ensure adequate numbers of respondents in each subclass of physicians. Each physician association then drew a sample from its membership database according to detailed instructions provided by OTA. Population sizes, sample sizes, numbers of respondents, and response rates for each survey are displayed in table D-2. All four surveys targeted only association members who, according to the membership database:

- had earned the degree of either Medical Doctor (MD) or Doctor of Osteopathy (DO).
- were not in residency training,
- were not retired,
- were board certified in the relevant specialty, and
- were currently practicing in the United States.

All four samples were drawn from the association's membership database through systematic stratified random sampling. However, due to 1imitations of the membership databases and special association concerns, the stratification factors differed somewhat from survey to survey. These and other features of the four samples are summarized in table D-3. Other differences also existed among the four samples:

- ACC used its existing "Professional Practice Panel," a standing sample of about 1,500 practicing members who are occasional] y surveyed

[4] Dr. Goold reported that this simple additive approach was most appropriate, given that factor analysis had failed to create satisfactory composite scales with weighted individual items (76).

TABLE D-2: Samples for OTA Clinical Scenario Surveys of Defensive Medicine

Survey	Group	Population	Sample	Respondents[a]	Response rate
American College of Cardiology[b]	Total	11,541	622	352	566
	Case		311	184	591
	Control		311	168	540
American College of Surgeons					
General surgeons	Total	12,972	3,004	1,793	597
	Closed-ended		2,401	1,412	588
	Case		1,196	739	618
	Control		1,205	673	559
	Open-ended		603	381	63.2
Neurosurgeons	Total	1,384	859	503	586
	Case		427	252	59.0
	Control		432	251	581
American College of Obstetricians and Gynecologists[c]	Total	20,832	1,983	1,230	623
	Case		1,002	634	633
	Control		981	596	608

a The numbers of respondents shown In this table may differ silghtly from the scenario-specific numbers of respondents shown in text tables 3-2 through 3-5 in chapter 3 because a few respondents completed one scenarlo but not the other
b The American College of Cardiology sample included only adult cardiologists
c The American College of Obstetrlclans and Gynecologists sample excluded gynecological oncologists and reproductive endocrinologists

SOURCE Office of Technology Assessment, 1994

on various issues regarding the practice of cardiology. This sample is drawn using similar methods to those used in the ACS and ACOG surveys (see table D-3). For this survey, only adult cardiologists on the panel as of February 1993 were included. As with the ACS and ACOG samples, questionnaires were sent to all 622 adult cardiologists on the ACC panel. Their overall response rate was slightly lower than the response rates in the ACS and ACOG surveys (see table D-2). ACC panel members may have been more sensitized to practice issues raised by previous surveys.

- The ACOG survey excluded gynecological oncologists and reproductive endocrinologists. The sample size was limited to 2,000 to meet administrative and budgetary constraints at both OTA and the association.
- In both the ACC and ACOG surveys, a second mailing of the questionnaire was sent to members who had not responded to the first mailing. In the ACS survey, one mailout was used because the association preferred not to track individual respondents. The method of identifying each respondent's sampling stratum is described in the next section.
- The ACS survey included physicians practicing in U.S. territories (Puerto Rico, Guam, etc.), whereas the ACC and ACOG surveys did not.
- The ACC and ACS surveys contained government-employed physicians, including military doctors (except those practicing overseas,), whereas the ACOG sample excluded military physicians.

In the ACS and ACOG surveys, the numbers of case and control respondents were not equal, for two reasons. First, for ease of data processing, random assignment of respondents to the case or control group (every other respondent) was performed within each sampling stratum rather than throughout the entire sample. In the ACC survey, the overall numbers of case and control respondents were equal; however, the case respondents were selected by taking a simple random subsample of the overall sample, without regard to the stratification variable of geographic region. Second. response rates differed slightly between the

TABLE D-3: Features of Sampling Plan for OTA Clinical Scenario Surveys of Defensive Medicine

Feature	American College of Cardiology[a]	American College *of* Surgeons	American College of Obstetricians and Gynecologists[b]
Stratification factors	Census region	Academic appointment yes, no Year of first board certification post-1981, 1972-81, pre-1972 Practice setting solo, group, medical school, hospital, other	Geographic region (4 regions) Years in ACOG < 6, 6-10, 11-20, >20 Gender
Number of strata	9	30, plus two additional, one for some missing data, the other for all missing data	32
Special exclusions[c]	U S trust territories	None	U S trust territories, military, Public Health Service
First mailing	Feb. 4, 1993	March 4, 1993	May 27,1993
Second mailing	Feb. 23, 1993	None	June 30, 1993

a The ACC survey ıncluded only adult cardiologists
b The ACOG survey excluded gynecological oncologists and reproductive endocrinologists
c For general exclusion criteria see text

SOURCE Office of Technology Assessment 1994

case and control groups. The numbers of case and control respondents therefore differed within each region by as much as 11 percent. Differences in response rates were corrected by reweighting the respondents according to case/control group and sampling stratification factors (e.g., region).

DATA PROCESSING

ACC conducted its own mailouts, data entry, and initial data editing. Individual respondents were tracked, and initial nonrespondents were sent another copy of the questionnaire. In the ACS and A COG surveys, the general procedure was as follows:

- The association providcd OTA with mailing labels for sampled members.
- OTA produced the questionnaires and mailed them with a prepaid return envelope addressed to the association's Washington. DC. office.
- Upon receiving the responses, the association photocopied them and shipped the originals to OTA for processing.

There were several variations on this basic process between the ACS and ACOG surveys. The identity of individual ACOG respondents was tracked by ACOG personnel by means of a relatively unobtrusive identification number printed on the first page of the questionnaire as well as on the mailout label and the postage-paid return envelope. As noted earlier, a second mailing of the ACOG questionnaire was sent to initial nonrespondents. Five such respondents apparently returned both questionnaires, for they had duplicate ID numbers. We allowed one of each pair of data records for these duplicate respondents to be randomly discarded through a computer sorting and matching routine (see the next section).

ACS, on the other hand, preferred not to track individual respondents; thus, no followup mailing of the questionnaire to initial nonrespondents was possible. To track the sampling stratum to which the respondent belonged, OTA devised a method of unobtrusively tracking the respondent's sampling stratum by varying the features of the return mailing label.

Eighty-nine respondents did not use the return envelope provided but instead sent the questionnaire back in an "irregular" envelope (i e., without the tailored mailing label). For 61 of these respondents (68.5 percent), ACS was able to use the return address or postmark on that envelope to identify the sampling stratum to which the respondent belonged. ACS kept the individual identity of these 89 respondents confidential.

OTA made no attempt to identify any individual respondents and analyzed all data separately from any identifying materials.

DATA EDITING AND ENTRY

The major rules used to edit the data in all four surveys are summarized in a technical appendix available from OTA upon request. OTA and the associations made concerted efforts to refine the questionnaire instructions based on responses to the three pretests. Despite these precautions, respondents in all four surveys sometimes provided answers that were inconsistent with the instructions; these responses required editing.

The most frequent ● *error" was failure to circle "no" for unselected clinical options or failure to check the reasons for circling "no" for such options. That is, many respondents circled '*yes" only for selected options and checked reasons for choosing only those options. Fortunately, this kind of "error" did not substantially affect the analysis, which focused on respondents who chose "yes" for a given option (see the next section).

Another very infrequent "error" (on the order of 0.1 to 0.6 percent of all responses) that would affect the analysis was failure to check reasons for c1inical options where "yes" was circled. These respondents (who circled "yes" for an option but failed to check any reasons for doing so) were included in the denominator when the percentage of "choosers" (see below) was calculated—implying that, if the respondent had cited a reason, it would *not* have been "malpractice concerns." The alternative approach—to exclude such respondents from the denominator of that percentage—would have further reduced the size of that denominator, which might have slightly weakened the reliability of the analysis.

All edits of the ACS and ACOG data were performed by OTA. ACC performed similar edits on its own data. After receiving the data from ACC (see below), OTA then made further edits that had not been performed by ACC.

Data for all four surveys were key-entered by the same contractor (Office Remedies, Inc., of Vienna, Virginia) with double-entry verification. Keyed data were returned to OTA in database files on floppy diskettes. (ACC contracted directly with Office Remedies, Inc.) OTA converted these files into SAS (203) format for analysis on a microcomputer using both SAS-PC and SUDAAN (193), a program that computes variance estimates properly weighted for disproportionate stratified sampling and nonresponse. We also used StatXact-Turbo (49) for analyses involving small numbers of respondents, for which large-sample statistical methods might be inappropriate. The use of these programs is discussed in further detail below.

DATA ANALYSIS

■ General Approach

The focus for the analysis of all four surveys was the percentage of respondents who cited "malpractice concerns" as a reason for choosing a diagnostic or therapeutic procedure in a given scenario—i.e., positive defensive medicine (see chapter 2). Analysis of "malpractice concerns" as a reason for choosing *not* to perform a procedure (a form of negative defensive medicine—again see chapter 2) was deemed to be outside the scope of the study.[5] The analysis thus focused on respondents who chose "yes" for one or more procedures (and

[5] A possible exception here is the clinical option of "refer to surgeon," which appeared in the ACOG breast lump scenario. Physicians who chose this option had possibly decided not to intervene themselves (depending on whether they chose to perform other procedures I isted in the scenario), and thus may have been engaging in negative defensive medicine. On the other hand, referral to a surgeon can imply an expectation that relatively aggressive and potentially costly intervention will he undertaken, and may thus reflect positive defensive medicine.

hence chose "no" for the "do nothing"' option). Thus, for each procedure. the denominator was the group of respondents who chose "yes" for that procedure. Excluded from this denominator were not only respondents who explicitly chose "no," but also those who chose neither "yes" nor "no" (i.e., those who had left that entire row of the questionnaire blank). Respondents who did not respond at all to a given scenario, but who responded to other parts of the questionnaire, were excluded only from the analysis of that particular scenario.

Of this denominator (respondents who chose "yes" for a given procedure), the numerator of greatest interest was the group of respondents who checked "malpractice concerns" as a reason for choosing that procedure (with either a single- or double-check). However, the "malpractice" responses could not be analyzed in isolation, because another reason (usually "medical indications") was often cited along with "malpractice concerns" by the same respondents. This meant that these respondents were selecting procedures not only on the basis of malpractice concerns, but also in part because they felt that the procedures were at least somewhat medically indicated. These combinations of responses suggested that differing degrees or levels of defensive motivation were being expressed in these surveys. each of which required a separate measure. Tables showing the distribution of responses by clinical procedure and reason for procedure choice are presented in a technical appendix available from OTA upon request.

Specific Measures of Defensive Medicine

To gauge the extent of "defensive medicine" expressed in these surveys, we constructed six measures of defensive medicine based on specific patterns of reasons given for choosing a given diagnostic or therapeutic procedure. These response patterns involved particular combinations of check marks for "malpractice concern s," "medical indication s," and other reasons. The six measures are 1isted in order below from the most restrictive definition of defensive medicine to the least restrictive definition. The measures are cumulative, i.e., the least restrictive measure (measure 6) includes respondents meeting measures 1 through 5.

Measure 1:
DOUBLE check for "malpractice concerns"
AND
NO check at all for ANY other reason.

Measue 2:
Measure 1 PLUS
a DOUBLE check for "malpractice concerns"
AND
NO check for "medical indications"
(single checks for other reasons are allowed).

Measure 3:
Measure 2 PLUS
a DOUBLE check for "malpractice concerns"
AND
a SINGLE check for "medical indications"
(single checks for other reasons are allowed).

Meusure 4:
Measure 3 PLUS
a SINGLE check for "malpractice concerns"
AND
NO check for "medical indications"
(single or *double* checks for other reasons are allowed).

Measure 5:
Measure 4 PLUS
a SINGLE check for "malpractice concerns"
AND
a SINGLE check for "medical indications"
(single or double checks for other reasons are allowed).

Measure 6:
Measure 5 PLUS
a SINGLE check for "'malpractice concerns"
AND
a DOUBLE check for "medical indications"
(single checks for other reasons are allowed}.

The rationale underlying these measures is as follows. Defensive medicine is most strongly indicated when the respondent cites only "malpractice

concerns" and no other reason (measure 1). Even though there are no medical indications or patient expectations for performing the procedure, the physician would perform it anyway, solely out of fear of malpractice litigation. This response should be infrequent, since it is arguably a violation of medical ethics. Citing other reasons, particularly "medical indications," "dilutes" the degree of defensive medicine indicated. Moreover, a single check for '*malpractice concerns" represents a weaker level of defensive medicine than does a double check.

These six measures of defensive medicine were computed on the basis of two different denominators, thereby creating two separate measures that provide two different interpretations of the results for a given procedure in a given scenario:

Percentage of "choosers": Here the denominator was the number of respondents who would choose the procedure (i.e., circled *'yes"). The measure of defensive medicine was thus the percentage of respondents choosing the procedure who cited "malpractice concerns" as a reason for doing so.

Percentage of scenario respondents: Here the denominator was the total number of respondents to the overall scenario. The measure of defensive medicine was thus the percentage of all respondents who, when presented with the scenario, would choose the procedure for defensive reasons. This percentage was much smaller than the percentage of choosers and represents the frequency with which concerns about malpractice would be expected to enter clinical decisions in situations of this type.

With six separate measures of defensive medicine, the number of comparisons between the percentages for various groups of respondents (case versus control, academic versus nonacademic, etc.) would have been unmanageable. Consequently, for such comparisons we used only measure 3 (double-check for "malpractice concerns," with single checks allowed for any other reasons, including ● 'medical indications"). This measure most closely approximated OTA's working definition of positive defensive medicine: physicians performing procedures *primarily,* but *not necessarily solely,* out of fear of malpractice litigation (see chapter 2). Tables showing the distribution of responses on all six measures of defensive medicine are presented in appendix E.

Statistical Analysis

All data were treated as coming from a sample survey with unequal probability of selection in a stratified (cross-classified) population (114,117, 124). Compared with simple random sampling, the effect of weighting the data to compensate for unequal probability of selection is generally to increase the variance of estimators, while the effect of stratification is generally to reduce that variance. Data from the surveys supported our reliance on this general experience. Test analyses using methods for 1) unweighed simple random samples, 2) weighted simple random samples, 3) unweighed stratified samples, and 4) weighted stratified samples demonstrated that the effects of stratification and weighting in fact did offset each other to a considerable degree. Variances were not increased markedly owing to the use of unequal weights in this sampling design.

Rates (or proportions) of respondents who would choose a clinical procedure, and of those who did so primarily because of malpractice concerns (see above), were calculated using sampling weights that compensated for nonresponse as well as unequal probability of selection across the sampling strata. Wherever possible, variance estimates and confidence intervals for these point estimates used methods that are common in survey analysis and assumed both stratification and sampling without replacement (i.e., use of the finite population correction).

Where possible, comparisons among subclasses of respondents were made by differences in rates (or proportions), and calculations of the variance of those differences took into consideration the sampling design. In several instances we departed from the use of rate differences in

comparing populations. In those cases, we used a sample-weighted logistic regression model (15,16) to compute odds ratios that tested for differences among groups of respondents, while controlling for a third factor.

Assumptions of simple random sampling were used only when data were too sparse to use survey sampling methods, owing to the small numbers of respondents (fewer than 40) who would choose procedures primarily because of malpractice concerns in some of the clinical scenarios. As a fallback method, in these cases we used StatXact-Turbo (49), a software package with advanced numerical algorithms that are especially appropriate for sparse data, i.e., where the numbers of respondents and the rates of citing malpractice concerns are small. The advantage of this additional analysis tool is the ability to produce confidence intervals and p-values that do not overstate the significance of results. The disadvantage is the risk of bias from the use of unweighted data: StatXact-Turbo software (49) assumes simple random sampling (unstratified) and cannot handle weighted data. Use of unweighted data had little effect on the point estimates, however, except when only one or two respondents cited malpractice concerns and their individual sampling weights were large. In those cases both the weighted and unweighted rates were close to zero. For these very small frequencies in this survey, therefore, reliance on StatXact as an alternative tool was acceptable. In addition, we used simple categorical analysis methods to compute chi-square tests for possible differences among groups of respondents.

Sampling Weights: Nonresponse

Prior to analysis, each respondent was assigned a weight that reflected the number of physicians in the population whom he or she represented. First, sampling weights were computed as:

$$swt = 1/p$$

where *swt* is the sampling weight and p is the respondent's probability of selection. Next, the sampling weights were adjusted for nonresponse using the method of sample weight adjustment classes (107,177). In each class of respondents (as determined by the sampling criteria, described earlier), we reweighted each respondent to represent the number of physicians sampled in that class. Thus, the adjusted sampling weight became:

$$adjswt = swt * (1/p_r)$$

where p_r is the probability of response. The weighting classes were created to lump similar groups of physicians together and to ensure that the adjustment factor ($1/p_r$) was not unstable owing to small class size. Finally, we adjusted all weights so that the sum of the weights across respondents exactly equaled the number of physicians in the population. This adjustment represented a change of no more than about 0.5 percent.

Point Estimates and Confidence Intervals

Point estimates and confidence intervals were computed using the PROC DESCRIPT procedure in SUDAAN (193) where, as was commonly the case, the numbers of respondents in most sampling strata were large enough to take advantage of the stratified sampling design. Where the number of respondents in either the numerator or denominator of a rate calculation was small (fewer than 10 in the numerator or fewer than 40 in the denominator), we calculated exact binomial confidence intervals according to the method of Daly (50). This method avoided the well-known problem of having confidence intervals that are both too narrow and too symmetric.

Group Comparisons

For comparisons between groups we used the DIFFVAR option in the PROC DESCRIPT procedure in SUDAAN (193) to compute differences in rates (or proportions) and the variances of those differences. For small-sample comparisons (fewer than 10 respondents in a category), where stratified sampling adjustments were inappropriate, we used exact methods as implemented in StatXact-Turbo (49) and computed odds ratios rather than

rate differences.6 This approach allowed us to take advantage of the stratified sampling design, where the numbers of respondents were sufficient, and alternative methods where the numbers of respondents were too small to justify large-sample techniques. Tests for rate differences and odds ratios are comparable for these data.

Case-Control Comparisons

Comparisons of responses to the case and control scenarios presented special problems. First, the design of the surveys did not permit "within-physician" comparison of case and control responses, because the same respondents could not be given both the case and control scenarios without possibly revealing our purpose. The case and control responses were thus independent, thereby reducing the efficiency of the case-control comparisons (greater variances for the same sample size). Second, although the case and control groups were each stratified random samples, they could differ in systematic ways—most importantly, in their propensity to cite "malpractice concerns. " As a proxy for this control variable, we examined whether or not the respondent double-checked "malpractice concerns" for one or more procedures in the common scenario for each survey (the scenario received by every respondent in a given survey—see table D-l). This adjustment was computed as follows.

Where the numbers of respondents were adequate (again, at least 10 in each category), we used sample-weighted logistic regression, as implemented in the PROC LOGISTIC procedure in SUDAAN (193), to perform the equivalent of stratified 2-by-2 contingency table analysis in which:

- the dependent variable was whether or not the respondent double-checked '*malpractice concerns" in the case-control scenario (labeled *response* in the model shown below);
- the independent variable was the respondent's group (case or control, labeled *group* in the model); and
- the control variable was whether or not the respondent double-checked "malpractice concerns" in the common scenario (labeled *common* in the model).

The saturated model for this analysis then became:

$$\text{response} = \beta_0 + \beta_g * \text{group} + \beta_c * \text{common} + \beta_{int} * (\text{group} * \text{common})$$

where *response* is the log odds of double-checking "malpractice concerns," and the ß's represent regression coefficients.

Using an interaction term representing the joint effects of *group* and *common* permitted us to test whether the impact of the respondent's group (case or control) on his or her defensive-medicine response in the case-control scenario differed according to his or her defensive-medicine response in the common scenario. If the interaction term was not statistically significant, then the model simplified to the two main effects (group and common), and the odds ratio of the case and control responses became $\exp(\beta_g)$.

Where the numbers of respondents were small (again, usually fewer than 10), we used exact analysis of these stratified 2-by-2 contingency tables, as implemented in StatXact-Turbo (49). Here we computed exact common odds ratios (case versus control) and their 95-percent confidence intervals and p values, as well as the exact test for the homogeneity of odds ratios across the categories of the control variable (*common*).

Global Differences

Global tests for the significance of difference across the categories of the demographic variables (e.g., practice setting) in the rate of double-checking of "malpractice concerns" in the common scenario for each survey were initially assessed using

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6 Except where noted, the calculations are evict odds ratios and their accompanying exact 95-percent confidence intervals and p-values, computed according to the methods of Mehta, Gray, and Patel (156).

the PROC FREQ procedure and Cochran-Mantel - Haenszel statistics on the normalized weighted data in SAS (203) (see table D- 1).[7] The DIFFVAR option in PROC DESCRIPT in SUDAAN (193) was used to test the significance of difference in mean attitude scale scores between respondents who double-checked "malpractice concerns" in the common scenario for each survey (see table D-1) and those who did not.

[7] The common scenarios were used for this analysis so that it would be based on all respondents in a given survey.

Appendix E: Detailed Results of the OTA Clinical Scenario Surveys

The main features of the results of the Office of Technology Assessment (OTA) clinical scenario surveys [1] are highlighted in chapter 3. This appendix contains:

- for each clinical option in each "case" scenario, weighted frequencies and percentages of responses using six different definitions of defensive medicine (tables E–1 through E–8); and
- a comparison of attitude scale scores between respondents who cited malpractice concerns as the primary reason for choosing procedures and those who did not (table E-9).

The following additional results are presented in a technical appendix available from OTA upon request:

- unweighed frequencies and percentages of respondents who single-checked or double–checked malpractice concerns for each clinical option;
- detailed comparisons of results for case and control versions of the scenarios, showing unadjusted as well as adjusted odds ratios and confidence intervals;
- weighted crosstabulations between each of the demographic items and our primary measure of defensive medicine (see appendix D);
- descriptive measures of our attitude scales for malpractice concern, cost consciousness, and discomfort with clinical uncertainty (see appendix D); and
- detailed results of comparison of the proportion of respondents who chose clinical actions in the open– and closed–ended versions of the scenario surveys of the American College of Surgeons.

[1] These results were compiled in collaboration with Dr. Russell Localio of Pennsylvania State University.

TABLE E-1: Percentage of Respondents Who Chose a Clinical Action for Malpractice Concerns, Cardiologists[a]

Scenario[b]/ clinical action	% of respondents who chose the clinical action	Percent of respondents who chose the clinical action for malpractice concerns					
		Most restrictive definition					*Least restrictive definition*
		Definition 1	Definition 2	Definition 3	Definition 4	Definition 5	Definition 6
Syncope (N=346)							
Admit	66.3%	0.6%	0.6%	7.2%	8.3%	15.6%	37.9%
Exercise ECG	29.8	0.0	0.3	2.1	2.4	4.8	8.3
Stress thallium	10.7	0.0	0.0	0.3	0.3	1.2	3.3
2 D/M mode	83.0	0.0	0.0	0.9	0.9	5.4	20.6
Doppler	67.0	0.2	0.2	1.4	1.4	3.5	14.5
Color flow doppler	56.2	0.6	0.6	1.8	1.8	3.8	10.8
Transesophageal echo	0.8	0.0	0.0	0.0	0.0	0.0	0.2
Holter monitor	83.5	0.3	0.8	2.8	3.5	9.0	22.7
Tilt table	39.6	0.0	0.0	0.0	0.3	1.7	3.7
Carotid doppler	26.5	0.9	1.9	3.6	4.3	7.0	10.5
EEG	23.1	1.7	2.0	3.4	3.8	6.9	11.3
Brain MRI	7.6	0.7	1.0	1.5	2.2	2.8	4.0
Chest pain (N=162)							
Discharge home w/NSAID	67.8	0.0	0.0	0.0	0.0	2.5	8.8
Admit and observe	8.8	0.0	0.0	0.8	0.8	1.2	4.9
Admit and obtain enzymes	21.5	0.5	1.1	3.0	4.9	6.5	13.4
Admit and obtain ECG	22.4	0.5	1.1	4.4	5.8	8.1	14.0
Exercise ECG	50.2	2.5	2.5	8.6	1.1	14.0	23.9
Stress thallium	8.5	0.0	0.0	0.8	0.8	1.5	2.6
2 D/M mode	18.8	0.0	0.0	1.4	1.4	2.7	7.4
Doppler	7.8	0.7	0.7	1.4	1.4	2.1	2.7
Color flow doppler	8.4	0.0	0.0	0.8	0.8	1.4	2.0
Transesophageal echo	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Angiogram	0.6	0.0	0.0	0.0	0.0	0.0	0.6

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details).

[b] Results shown for "case" versions of scenarios only (see appendix D for explanation)

KEY: 2 D/M = 2 dimensional/time-motion mode; ECG = electrocardiogram; EEG = electroencephalogram; NSAID = nonsteroidal anti-inflammatory drug.

NOTE: Starting with definition 1, the data are cumulative.
- Definition 1: Malpractice Concerns double-checked with no checks for any other reason.
- Definition 2: definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed.
- Definition 3: definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed.
- Definition 4: definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed.
- Definition 5: definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single checked, and single or double checks allowed for other reasons.
- Definition 6: definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double checked, and single checks for other reasons allowed.

SOURCE: Office of Technology Assessment, 1994. Data compiled in collaboration with Dr. Russell Localio of Pennsylvania State University.

TABLE E-2: Percentage of Clinical Actions Chosen for Malpractice Concerns, Cardiologists[a]

Scenario[b]/ clinical action	% of respondents who chose the clinical action	Of clinical actions chosen, percent done for malpractice concerns					
		Most restrictive definition				*Least restrictive definition*	
		Definition 1	Definition 2	Definition 3	Definition 4	Definition 5	Definition 6
Syncope(N=346)							
Admit	66.3%	0.8%	0.8%	10 8%	12 5%	23.5%	57 2%
Exercise ECG	29.8	0.0	1.0	71	80	16.2	278
Stress thallium	10.7	0.0	0.0	23	23	11.4	310
2 D/M mode	83.0	0.0	0.0	11	11	6.5	249
Doppler	67.0	0.3	0.3	22	22	5.2	216
Color flow doppler	56.2	1.0	1.0	32	32	6.8	192
Transesophageal echo	0.8	0.0	0.0	00	00	0.0	299
Hotter monitor	83.5	0.4	1.0	33	42	10.8	272
Tilt table	39.6	0.0	0.0	00	06	4.4	94
Carotid doppler	26.5	3.5	7.1	137	162	26.4	39.8
EEG	23.1	7.2	8.7	14.9	163	29.7	489
Brain MRI	7.6	8.6	12.7	203	289	36.3	53.0
Chest pain (N=162)							
Discharge home w/NSAID	67.8	0.0	0.0	0.0	0.0	3.7	13.0
Admit and observe	8.8	0.0	0.0	8.7	8.7	13.8	556
Admit/obtain enzymes	21.5	2.1	5.1	13.9	23.0	30.2	62.3
Admit and obtain ECG	22.4	2.0	2.0	19.5	25.7	36.1	624
Exercise ECG	50.2	5.0	5.0	17.2	22.1	27.8	477
Stress thallium	8.5	0.0	0.0	9.0	9.0	17.9	307
2 D/M mode	18.8	0.0	0.0	7.6	7.6	14.5	391
Doppler	7.8	8.7	8.7	18.4	18.4	26.6	346
Color flow doppler	8.4	0.0	0.0	9.1	9.1	16.7	24.1
Transesophageal echo	0.6	0.0	0.0	0.0	0.0	0.0	00"
Angioqram	0.6	0.0	0.0	0.0	0.0	0.0	1000

[a]Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details)
[b] Results shown for "case" versions of scenarios only (see appendix D for explanation)

KEY 2 D/M = 2 dimensional/time-motion mode, ECG = electrocardiogram, EEG = electroencephalogram, NSAID = nonsteroidal anti-inflammatory drug

NOTE Starting with definition 1, the data are cumulative.
- Definition 1 Malpractice Concerns double checked with no checks for any other reason
- Definition 2 definition 1 *plus* Malpractice Concerns double-checked no checks for Medical Indications, but single checks for other reasons allowed
- Definition 3 definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed
- Definition 4 definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed
- Definition 5 definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single-checked, and single or double checks allowed for other reasons
- Definition 6 definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double-checked, and single checks for other reasons allowed

SOURCE Office of Technology Assessment, 1994 Data compiled in collaboration with Dr Russell Localio of Pennsylvania State University

TABLE E-3: Percentage of Respondents Who Chose a Clinical Action for Malpractice Concerns, General Surgeons[a]

Scenario[b]/ clinical action	% of respondents who chose the clinical action	Percent of respondents who chose clinical action for malpractice concerns					
		Most restrictive definition				*Least restrictive definition*	
		Definition 1	Definition 2	Definition 3	Definition 4	Definition 5	Definition 6
Breast pain (N=1,412)							
Needle biopsy	13.3%	0.2%	0.3%	2.7%	3.0%	4.6%	9.7%
Open biopsy	8.4	0.2	0.5	2.1	2.1	3.0	6.3
Other	14.5	0.0	0.1	1.0	1.1	1.8	6.2
Rectal bleeding (N=738)							
Air contrast barium enema	19.2	0.0	0.5	2.3	2.4	4.8	11.5
Colonoscopy	26.2	0.6	1.3	5.0	5.0	7.1	16.5
Other	9.7	0.0	0.0	0.3	0.4	1.1	2.0

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details).

[b] Results shown for "case" versions of scenarios only (see appendix D for explanation).

NOTE: Starting with Definition 1, the data are cumulative
- Definition 1: Malpractice Concerns double-checked with no checks for any other reason
- Definition 2: definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed
- Definition 3: definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed
- Definition 4: definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed
- Definition 5: definition 4PM Malpractice Concerns single-checked Medical Indications single-checked and single or double checks allowed for other reasons
- Definition 6: definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double-checked and single checks for other reasons allowed

SOURCE: Office of Technology Assessment, 1994. Data compiled in collaboration with Dr. Russell Localio of Pennsylvania State University.

TABLE E-4: Percentage of Clinical Actions Chosen for Malpractice Concerns, General Surgeons[a]

Scenario[b]/ clinical action	% of respondents who chose the clinical action	Of clinical actions chosen, percent done for malpractice concerns					
		Most restrictive definition					*Least restrictive definition*
		Definition 1	**Definition 2**	**Definition 3**	**Definition 4**	**Definition 5**	**Definition 6**
Breast pain (N=1,412)							
Needle biopsy	13.3%	1.7%	2.1%	20.3%	22.5%	34.7%	73.5%
Open biopsy	8.4	2.4	6.5	24.5	25.5	35.4	75.5
Other	14.5	0.0	0.4	6.6	7.6	12.2	42.6
Rectal bleeding (N=738)							
Air contrast barium enema	19.2	0.0	2.5	11.8	12.4	25.1	60.0
Colonoscopy	26.2	2.4	4.9	19.0	19.0	27.0	63.1
Other	9.7	0.0	0.0	2.8	3.8	11.8	20.7

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details).

[b] Results shown for "case" versions of scenarios only (see appendix D for explanation).

NOTE: Starting with definition 1, the data are cumulative.
- Definition 1: Malpractice Concerns double-checked with no checks for any other reason.
- Definition 2: definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed.
- Definition 3: definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed.
- Definition 4: definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed.
- Definition 5: definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single-checked, and single or double checks allowed for other reasons.
- Definition 6: definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double-checked, and single checks for other reasons allowed.

SOURCE: Office of Technology Assessment, 1994. Data compiled in collaboration with Dr. Russell Localio of Pennsylvania State University.

TABLE E-5: Percentage of Respondents Who Chose a Clinical Action for Malpractice Concerns, Neurosurgeons[a]

Scenario[b]/ clinical action	% of respondents who chose the clinical action	Percent of respondents who chose clinical action for malpractice concerns					
		Most restrictive definition				*Least restrictive definition*	
		Definition 1	Definition 2	Definition 3	Definition 4	Definition 5	Definition 6
Head trauma (N=503)							
Skull x-ray	33.7%	1.4%	3.5%	10.0%	10.3%	12.4%	22.6%
C-spine x-ray	21.2	2.4	3.1	11.2	11.4	13.0	17.5
CT of head	48.8	5.2	7.9	21.8	22.5	27.0	40.0
Other	3.9	0.4	0.4	0.4	0.4	0.4	1.3
Back pain (N=252)							
Lumbosacral x-ray	24.4	0.3	0.6	3.4	4.1	5.0	2.3
CT	3.4	0.0	0.0	1.0	1.2	1.2	1.7
MRI	12.6	0.7	0.7	2.0	2.0	4.3	6.6
Other	9.3	0.0	0.0	0.0	0.0	0.0	0.0

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details).
[b] Results shown for "case" versions of scenarios only (see appendix D for explanation).

KEY: CT = computed tomography, C-spine = cervical spine, MRI = magnetic resonance image.

NOTE: Starting with definition 1, the data are cumulative.
- Definition 1: Malpractice Concerns double-checked with no checks for any other reason.
- Definition 2: definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed.
- Definition 3: definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed.
- Definition 4: definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed.
- Definition 5: definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single-checked, and single or double checks allowed for other reasons.
- Definition 6: definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double-checked, and single checks for other reasons allowed.

SOURCE: Office of Technology Assessment, 1994. Data compiled in collaboration with Dr. Russell Localio of Pennsylvania State University.

TABLE E-6: Percentage of Clinical Actions Chosen for Malpractice Concerns, Neurosurgeons[a]

Scenario[b]/ clinical action	% of respondents who chose the clinical action	Of clinical actions chosen, percent done for malpractice concerns					
		Most restrictive definition					Least restrictive definition
		Definition 1	Definition 2	Definition 3	Definition 4	Definition 5	Definition 6
Head trauma (N=503)							
Skull x-ray	33.7%	4.3%	10.5%	29.6%	30.6%	36.8%	67.0%
C-spine x-ray	21.2	11.3	14.7	52.9	53.9	61.4	82.6
CT of head	48.8	10.7	16.1	44.7	46.0	55.3	81.8
Other	3.9	9.3	9.3	9.3	9.3	9.3	33.3
Back pain (N=252)							
Lumbosacral x-ray	244	1.2	24	139	169	***204***	**503**
CT	3,4	0 0	0 0	298	36.2	36.2	51 1
MRI	12,6	5 7	5 7	16.0	16.0	337	520
Other	9 3	0 0	0.0	0.0	0 0	0 0	0 0

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix **D** for details)
b Results shown for "case" versions of scenarios only (see appendix D for explanation)

KEY CT = computed tomography, MRI = magnetic resonance image

NOTE Starting with Definition 1, the data are cumulative
- Definition 1 Malpractice Concerns double-checked with no checks for any other reason
- Definition 2 definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed
- Definition 3 definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed
- Definition 4 definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed
- Definition 5 definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single-checked, and single or double checks allowed for other reasons
- Definition 6 definition 5p/us Malpractice Concerns single-checked, Medical Indications double-checked, and single checks for other reasons allowed

SOURCE. Off Ice of Technology Assessment, 1994 Data compiled in collaboration with Dr Russell Localio of Pennsylvania State University

TABLE E-7: Percentage of Respondents Who Chose a Clinical Action for Malpractice Concerns, Obstetricians and Gynecologists[a]

Scenario[b]/ clinical action	% of respondents who chose the clinical action	Percent of respondents who chose clinical action for malpractice concerns					
		Most restrictive definition					*Least restrictive definition*
		Definition 1	Definition 2	Definition 3	Definition 4	Definition 5	Definition 6
Breast lump (N=1,230)							
Breast sonography	23.6%	0.2%	0.4%	2.3%	2.5%	6.3%	13.1%
Mammography	45.6	0.2	0.8	5.6	6.3	11.4	28.8
Needle aspiration	24.6	0.2	0.2	1.1	1.2	2.5	9.5
Fine needle biopsy	7.0	0.2	0.2	0.5	0.5	0.6	2.9
Open biopsy	1.0	0.0	0.0	0.0	0.0	0.1	0.6
Refer to surgeon	29.2	1.8	2.4	6.3	6.7	9.5	20.1
Other	2.0	0.0	0.0	0.0	0.0	0.0	0.3
Complicated delivery (N=1,230)							
Continue pushing now	8.8	0.1	0.1	0.2	0.2	0.6	2.2
Rest for 30 minutes	8.1	0.1	0.1	0.2	0.2	0.8	1.4
Operative vaginal delivery	67.7	0.2	0.2	1.4	1.5	5.0	20.4
Caesarean section	23.8	0.4	0.4	6.0	6.0	8.6	18.0
Other	4.8	0.1	0.1	0.2	0.2	0.4	1.0
Perimenopausal bleeding (N=634)							
Hematocrit/hemoglobin	73.4	0.2	0.3	1.3	1.5	6.0	12.2
Pregnancy test	49.5	2.7	2.8	5.5	5.8	10.0	22.5
Endometrial sampling	85.4	0.0	0.1	1.6	2.0	6.4	35.2
Pelvic ultrasound	54.3	1.1	1.3	4.2	4.3	9.5	21.0
Hysteroscopy	14.3	0.1	0.1	0.6	0.6	0.9	4.0
D & C	4.2	0.0	0.0	0.5	0.5	1.0	2.0
Hysterectomy	0.2	0.0	0.0	0.0	0.0	0.2	0.2
Other	4.5	0.0	0.0	0.0	0.0	0.0	0.5

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details).

[b] Results shown for "case" versions of scenarios only (see appendix D for explanation).

KEY: D & C = dilation and curettage

NOTE: Starting with Definition 1, the data are cumulative.
- Definition 1: Malpractice Concerns double-checked with no checks for any other reason.
- Definition 2: definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed.
- Definition 3: definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed.
- Definition 4: definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed.
- Definition 5: definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single-checked, and single or double checks allowed for other reasons.
- Definition 6: definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double-checked, and single checks for other reasons allowed.

SOURCE: Office of Technology Assessment, 1994. Data compiled in collaboration with Dr. Russell Localio of Pennsylvania State University.

TABLE E-8: Percentage of Clinical Actions Chosen for Malpractice Concerns, Obstetricians and Gynecologists[a]

Scenario[b]/ clinical action	% of respondents who chose the clinical action	Of clinical actions chosen, percent done for malpractice concerns					
		Most restrictive definition					*Least restrictive definition*
		Definition 1	Definition 2	Definition 3	Definition 4	Definition 5	Definition 6
Breast lump (N=1,230)							
Breast sonography	23.6%	0.7%	1.8%	9.7%	10.4%	26.9%	55.6%
Mammography	45.6	0.3	1.8	12.3	13.8	24.9	63.2
Needle aspiration	24.6	0.7	0.7	4.5	4.8	10.4	38.8
Fine needle biopsy	7.0	2.5	2.5	6.5	6.5	9.2	41.9
Open biopsy	1.0	0.0	0.0	0.0	0.0	8.1	57.4
Refer to surgeon	29.2	6.3	8.3	21.4	23.1	32.4	68.8
Other	2.0	0.0	0.0	0.0	0.0	0.0	16.7
Complicated delivery (N=1,230)							
Continue pushing now	8.8	0.9	1.9	1.9	1.9	7.1	24.5
Rest for 30 minutes	8.1	0.9	0.9	2.1	3.1	9.4	17.4
Operative vaginal delivery	67.7	0.3	0.4	2.0	2.2	7.5	30.1
Caesarean section	23.8	1.8	6.1	25.0	25.4	35.9	75.5
Other	4.8	2.0	2.0	3.7	3.9	9.0	20.0
Perimenopausal bleeding (N=634)							
Hematocrit/Hemoglobin	73.4	0.2	0.5	1.8	2.0	8.2	16.6
Pregnancy Test	49.5	5.4	5.7	11.1	11.7	20.2	45.4
Endometrial Sampling	85.4	0.0	0.2	1.9	2.3	7.5	41.2
Pelvic Ultrasound	54.3	2.0	2.3	7.6	8.0	17.6	38.7
Hysteroscopy	14.3	1.0	1.0	4.4	4.4	10.5	27.6
D & C	4.2	0.0	0.0	10.9	10.9	23.3	46.3
Hysterectomy	0.2	0.0	0.0	0.0	0.0	100.0	100.0
Other	4.5	0.0	0.0	0.0	0.0	0.0	10.9

[a]Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details)
[b] Results shown for "case" versions of scenarios only (see appendix D for explanation)

KEY D & C = dilation and curettage

NOTE Starting with Definition 1, the data are cumulative
- Definition 1 Malpractice Concerns double-checked with no checks for any other reason
- Definition 2 definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed
- Definition 3 definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed
- Definition 4 definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed
- Definition 5 definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single-checked, and single or double checks allowed for other reasons
- Definition 6 definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double-checked, and single checks for other reasons allowed

SOURCE Office of Technology Assessment, 1994 Data compiled in collaboration with Dr Russell Localio of Pennsylvania State University

TABLE E-9: Differences in Attitude Scale Scores in the OTA Clinical Scenario Surveys

Attitude scale/scenario	Mean attitude scale scores: Respondents citing malpractice concerns as primary reason for choosing "one or-more clinical actions[a]	Mean attitude scale scores: All other respondents	Difference	950/o confidence limits
Malpractice concern (5 items, range 5-25)				
ACC syncope (N-339)	15.55	16 18	-0 63	(-1 39, 0 13))
ACS breast pain (N-1 377)	1442	15.24	-0 82*	(-1 40, -0 24)
ACS head trauma (N-492)	1774	15.61	2 13*	(1 51. 2 75)
ACOG breast lump (N-1 192)	1403	15 17	-1 14*	(-1 62, -0 66)
Cost consciousness (6 items, range 6-30):				
ACC syncope (N-340)	1841	1890	-049	(-1 49, 0 51)
ACS breast pain (N -1 369)	1874	1886	-012	(-0 72. 0 48)
ACS head trauma (N - **488)**	2191	2263	-072	(-1 45 0 03)
ACOG breast lump (N-1 185)	1842	1846	-004	(-0 52. 0 44)
Discomfort with clinical uncertainty (3 items, range 3-15)				
ACC syncope (N-330)	794	9 07	-1 13*	(-1 93, -0 33)
ACS breast pain (N - 1,368)	770	8 39	-0 69	(-1 41. 0 03)
ACS head trauma (N-486)	***955***	9 51	0 04	(-0 56. 0 64)

* Statistically significant at the p < 05 level

[a] Excludes respondents who did not complete the attitude questionnaire

[b] Because the ACOG survey Included only one item on discomfort with clinical uncertainty rather than three (see appendix D), ACOG attitude scale scores for discomfort with clinical uncertainty are not included In the comparison

KEY ACC = American College of Cardiologists ACOG = American College of Obstetricians and Gynecologists ACS American College of Surgeons

SOURCE Off Ice of Technology Assessment 1994 Data analyzed in collaboration with Dr Russell Local io of Pennsylvania State University

Appendix F: Estimates of the Costs of Selected Defensive Medical Procedures

Prejecting the overall cost of defensive medicine based on the Office of Technology Assessment (OTA) clinical scenario survey data is not possible, for two reasons. First, the OTA surveys covered only 13 clinical scenarios, nine of which were deliberate] y designed to increase the likelihood of a defensive response (see chapter 3 and appendix D). (The other four were "control" scenarios, in which concern about liability was expected to be much less important.) Second, reliable incidence and cost data could not be readily obtained for most of the procedures listed in the OTA scenarios.

OTA was able to estimate the annual cost of defensive medicine associated with procedures selected in two scenarios: a complicated obstetrical delivery (American College of Obstetricians and Gynecologists (ACOG) survey) and head injury in a 15-year-old (American College of Surgeons (ACS) neurosurgeons survey). These two scenarios were chosen because they exhibited a high frequency of defensive practice and because national incidence and cost data were available.

APPROACH

OTA's basic approach was. first, to obtain national data on the incidence of the clinical condition described in the chosen scenario. Such data are not available for patients who match each and every demographic and clinical characteristic of the simulated patient. OTA applied the results to patients in a similar age range who fit the broader diagnoses into which the simulated patient might be classified.

Second, the estimated incidence of the clinical case was multiplied by the percentage of OTA survey respondents who chose the selected procedure primarily due to malpractice concerns (see table 3-3 in chapter 3), resulting in a national estimate of the annual frequency with which the procedure was performed primarily because of malpractice concerns in similar situations.

Finally, OTA obtained estimates of the average cost of performing the procedure and multiplied this per-service cost by the estimated number of "defensively'" performed procedures to arrive at an estimated aggregate annual cost of "defensive"

TABLE F-1: Computation of Estimated Annual Cost of Defensive Caesarean Delivery in Cases of Prolonged or Dysfunctional Labor, United States, 1991

Number of live births complicated by prolonged labor or dysfunctional labor among women aged 30 to 39 in 1991 [a]	45,126
Number of live births where the nature of any complications was known among women aged 30 to 39 in 1991[a]	÷ 1,169,963
Proportion of live births complicated by prolonged labor or dysfunctional labor among women aged 30 to 39 in 1991	= 0.0385704
Total number of live births among women aged 30 to 39 in 1991[a]	x 1,215,855
Total number of live births complicated by prolonged labor or dysfunctional labor among women aged 30 to 39 in 1991	= 46,896
Proportion of American College of Obstetricians and Gynecologists (ACOG) respondents who chose Caesarean section primarily because of malpractice concerns in the complicated delivery scenario[b]	x 0.06
Number of live births delivered by Caesarean section primarily because of malpractice concerns among women aged 30 to 39 in 1991	= 2,814
Incremental cost of Caesarean section over and above normal delivery in 1991c	X $3,106
Aggregate cost in 1991 of defensive Caesarean section among women aged 30 to 39 with prolonged or dysfunctional labor	**= $8,740,284**

[a] U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Health Statistics, Division of Vital Statistics, Natality, Marriage and Divorce Statistics Branch, unpublished data on prolonged and dysfunctional labor among women aged 30 to 39 obtained from Selma Taffel, Statistician, Oct. 18, 1993.

[b] See table 3-3 in chapter 3.

[c] Health Insurance Association of America, *Source Book of Health Insurance Data, 1992* (Washington, DC, 1992), table 4.15, p. 73. Separately listed data for hospital and physician costs were summed, and separately listed data for Caesarean section and normal delivery were differenced.

SOURCE: Office of Technology Assessment, 1994.

performance of the procedure. These calculations, discussed in further detail in the following two sections, are displayed in tables F-1 (Caesarean section in a complicated delivery) and F-2 (diagnostic radiology for head injury in young people).

These estimates do not necessarily represent any savings in health care costs that might accrue from elimination of defensive medical practices. Ordering or performing a procedure defensively could save health care costs in the future if poor outcomes are avoided or the patient condition is managed better. OTA assumed that such savings would be negligible in the scenarios used here.

CAESAREAN DELIVERY IN A COMPLICATED LABOR

Scenario

History: *A 36-year-old primigravida presents at 39 weeks gestation after an uncomplicated pregnancy.*

Clinical course: *The patient has had 12 hours of labor, and is now 3 hours into the second stage. She has been receiving oxytocin augmentation for secondary arrest of dilatation since 7 cm. She is completely dilated and effaced at +2 station, ROP. There has been no change in the exam for over an hour. Moderate variable decelerations have been present for the last 30 minutes with*

TABLE F-2: Computation of Estimated Annual Cost of Selected Diagnostic Radiologic Procedures for Head Injury in Young People, United States, 1992

Annual number of head injuries[a]	1,975,000
Proportion of head injuries that are apparently minor[b]	x 070
Annual number of apparently minor head injuries	-1,382,500
Proportionof emergency room visits for head injury in persons aged 5 to 24 in 1992C	X O 3837168
Annual number of apparently minor head injuries in persons aged 5 to 24	-530,488
PROCEDURE-SPECIFIC CALCULATIONS	
Skull x-ray:	
Proportion of American College of Surgeons (ACS) neurosurgeon respondents who chose skull x-ray primarily because of malpractice concerns in the head trauma scenario[d]	x 0.100
Annual number of skull x-rays performed primarily because of malpractice concerns, for apparently minor head injury in persons aged 5 to 24	= 53,049
Estimated private insurance reimbursement[e] for skull x-ray[f] in 1992	x $ 77
1. Aggregate cost of "defensive" skull x-ray for apparently minor head injury in persons aged 5 to 24 in 1992	*= $ 4,084,773*
Cervical ***spine x-ray:***	
Annual number of apparently minor head injuries among persons aged 5 to 24 (see above)	530,488
Proportion of ACS neurosurgeon respondents who chose cervical spine x-ray primarily because of malpractice concerns in the head trauma scenario[d]	x **o 112**
Annual number of cervical spine x-rays performed primarily because of malpractice concerns, for apparently minor head injury in persons aged 5 to 24	59,415
Estimated private Insurance reimbursement[e] for cervical spine x-ray[g] in 1992	x $72
2. *Aggregate cost of "defensive " cervical spree x-ray for apparently minor head injury in persons aged 5 to 24 in* 1992	-$4,277,880
Computed tomography (CT) scan of head:	
Annual number of apparently minor head Injuries among persons aged 5 to 24 (see above)	530488
Proportion of ACS neurosurgeon respondents who chose CT scan of head primarily because of malpractice concerns in the head trauma scenario[d]	x **0218**
Annual number of CT scans of the head performed primarily because of malpractice concerns, for apparently minor head inlury in persons aged 5 to 24	- 115,646
Estimated private Insurance reimbursement[e] for CT scan of the head[h] in 1992	x $315
3 *Aggregate cost of "defensive" CT scan for apparently minor head injury in persons aged 5 to 24 in* **1992**	**-$36,428,490**
Total annual cost of "defensive" radiology for apparently minor head injury in persons aged 5 to 24, 1992 (sum of aggregate costs for: 1) skull x-ray, 2) cervical spine x-ray, and 3) CT scan of head, shown above)	**= s** 44,791,143

[a] J F Kraus, "Epidemiology of Head Injury *Head Injury,* 3rd Ed Cooper, P R (ed) (Baltimore Williams & Wilkins 1993), data from 1985-87 National Health interview Survey

[b] M Eliastam, E Rose, H Jones, et al "Utilization of Diagnostic Radiologic Examinations in the Emergency Department of a Teaching Hospital, " *The Journal of Trauma 2061-66* 1980

[c] Consumer Product Safety Commission, National Electronic Injury Surveillance System, unpu blished data obtained from Kathryn Wallace Congressional Relations Specialist U S Consumer Product Safety Commission, Jan 3, 1994 Data are for all head injuries presenting in an emergency room, for all levels of severity and all causes associated with all consumer products (excluding motor vehicles and public transportation) The proportion was calculated by summing the number of visits for ages 5 to 14 and 15 to 24 and dividing this sum by the total number of visits

[d] See table 3-3 in chapter 3

[e] Private insurance costs were estimated using Medicare data For outpatient hospitals, the average Medicare reimbursement was divided by O 542, obtained by dividing the payment-to-cost ratio computed from Medicare data (O 90) by that from a private multiple-insurer database (MEDSTAT) for 1991 (1 66) (Prospective Payment Assessment Commission unpublished data for 1990 but using 1992 reimbursement rules, supplied by Deborah Williams, Senior Policy Analyst, Jan 21, 1994 and Feb 3, 1994) For physicians' offices (and free-standing Imaging centers), the average Medicare reimbursement (Physician Payment Review Commission, unpublished data for 1992 supplied by Chris Hogan, Principal Policy Analyst, Jan 19, 1994) was divided by 0 70, the ratio of Medicare to private Insurance fees for physician imaging services (M E Miller, S Zuckerman, and M Gates "How Do Medicare Physician Fees Compare with Private Payers?" *Health Care Financing Review* 1425-39 1993) The resulting private Insurance reimbursement estimates for outpatient hospital; and physicians offices were averaged weighted by the proportion of Medicare procedures performed in each setting (private Insurance data on this were not available)

[f] Identified by codes 70250 *and 70260* in American Medical Association Current *Procedural Terminology* 4th Ed (Chicago 1993) The reimbursement figures for these two codes were averaged weighted by the number of procedures performed for each

[g] Identified by codes 72040, 72050, and 72052 in American Medical Association, *Current Procedural Terminology* 4th Ed (Chicago, 1993) The reimbursement figures for these three codes were averaged, weighted by the number of procedures performed for each

[h] Identified by code 70450 in American Medical Association *Current Procedural Terminology,* 4th Ed (Chicago, 1993) This code is for CT scan of head or brain without contrast material which is used to detect tumors rather than blood The reimbursement figures for this code for outpatient hospitals and physicians offices were averaged, weighted by the numbers of procedures performed in each setting

SOURCE Office of Technology Assessment, 1994

good beat-to-beat variability. Estimated fetal weight is 7.5 lbs. and clinical pelvimetry is adequate. The patient is fatigued and can no longer push.

Method

National incidence data for women aged 30 through 39 for calendar year 1991 were obtained from birth certificate data compiled by the National Center for Health Statistics (250). Two kinds of delivery complications that most closely fit the simulated patient were "prolonged labor" and "dysfunctional labor." OTA divided the number of live births in the selected age category (30 to 39) involving these complications by the total number of live births for which the nature of any birth complications was known (250). This gave the rate of each complication in births to women in the selected age range. OTA then multiplied this rate by the total number of live births to women in the selected age range to obtain the total number of live births with the selected complications. This number was then multiplied by the percentage of ACOG survey respondents who chose Caesarean delivery primarily due to malpractice concerns (see table 3-3 in chapter 3), giving a national annual estimate of the number of times that a Caesarean de] i very was performed primarily because of malpractice concerns in situations similar to the ACOG scenario.

National estimates of the incremental cost of Caesarean delivery over and above those of a normal delivery for calendar year 1991 were obtained from the Health Insurance Association of America (89). OTA multiplied this cost estimate by the estimated number of Caesarean deliveries performed primarily due to malpractice concerns in situations similar to the ACOG scenario. This gave the final aggregate estimate of the national annual cost of defensive Caesarean delivery in complicated deliveries involving prolonged or dysfunctional labor.

DIAGNOSTIC RADIOLOGY FOR HEAD INJURY IN YOUNG PEOPLE

Scenario

History of present illness: *A 15-year-old boy fell from his skateboard after riding over a crack in the sidewalk. He hit his head, got up and skated home. Thirty minutes after the fall he told his mother about the incident and she brings him to the ER. In the ER, the patient admits to lightheadedness and some tenderness at the site ofimpact.*

Physical examination: *There is an area of tenderness and swelling at left purietal area. Mental status and neurological exam are normal.*

Method

OTA used an estimate of the annual total number of head injuries per year (11 8), obtained from the National Health Interview Survey for 1985-87. OTA then estimated the proportion of all head injuries that are apparently minor. Discussions with clinicians indicated that the clinical features of a head injury (e.g., loss of consciousness, neurological deficit) are more important than its cause (e.g., fall from a skateboard) in determining severity. OTA therefore broadened the basis for this cost projection beyond the cause-specific ACS c1inical scenario to reflect all minor head injuries in young people.

A conservative estimate of the proportion of all head injuries that appear to be minor upon clinical examination in the emergency room is available from a study by Eliastam and colleagues (63). In that study, the researchers reported the proportion of all head injuries presenting to the emergency room of a suburban teaching hospital for which diagnostic x-rays were ordered. but that were classified immediately prior to the x-ray as not meeting specified criteria for likely skull fracture. This estimate is conservative because it excludes all head injuries for which x-rays were not or-

[1] Although Eliastam and colleagues (63) used [he term *medicolegal* to characterize such injuries, they did not attempt to determine whether the x-rays performed on those patients constituted defensive medicine.

dered. This proportion was applied to the National Health Interview Survey data to generate an annual estimate of the frequency of apparently minor head injuries.

National data on the age distribution of minor head injuries, or even all head injuries, do not exist. However, OTA obtained national data by age group on the number of head injuries (regardless of severity) caused by consumer products (excluding motor vehicles and public transportation) and treated in emergency rooms from the National Electronic Injury Surveillance System (242). The available age categories nearest age 15 (the age of the patient in the ACS head trauma scenario) were 5 to 14 and 15 to 24, which OTA combined into a single category of 5 to 24. Multiplying the estimated number of apparently minor head injuries by the percentage of consumer product-related emergency room visits for head injury among persons aged 5 to 24 gave the estimated number of apparently minor head injuries among persons aged 5 to 24.

This number was then multiplied by the percentage of ACS survey respondents (neurosurgeons) who chose each radiologic procedure (skull x-ray, cervical spine x-ray, or computed tomography (CT) scan) primarily due to malpractice concerns in the ACS head trauma scenario (see table 3-3 in chapter 3). This gave a national annual estimate of the number of times that each procedure was performed primarily due to malpractice concerns in clinical situations similar to the ACS scenario.

National estimates of the cost of performing each radiologic procedure under Medicare (the only readily available and reliable national data) were obtained from the Physician Payment Review Commission (PPRC) and the Prospective Payment Assessment Commission (ProPAC). Data on average per-service Medicare reimbursement rates for each procedure performed in physicians' offices and free-standing imaging centers during calendar year 1992 were obtained from PPRC (187). To estimate the average private insurance reimbursement rate for each procedure, OTA divided these Medicare rates by 0.707, the ratio of Medicare to private insurance fees for physician imaging services found in a recent study by Miller and colleagues (162).

Data on average per-service Medicare reimbursement rates for each procedure performed in hospital outpatient departments during calendar year 1990 (but using 1992 reimbursement rules) were obtained from ProPAC (192). To estimate the average private insurance reimbursement rate for each procedure, OTA divided these Medicare rates by 0.542, the ratio of Medicare to private insurance fees for all nonfee-schedule outpatient hospital services (1 92).[2]

OTA averaged these per-service private insurance cost estimates for radiology services in physicians' offices and outpatient hospitals, weighted by the number of Medicare services performed in each setting (private insurance data by setting were not available). This estimated average private insurance reimbursement rate was then multiplied by the estimated number of times that each procedure was performed primarily due to malpractice concerns in situations similar to the ACS scenario. This gave the final aggregate estimate of the national cost of "defensive" radiologic procedures for apparently minor head injuries among persons aged 5 to 24.

[2] This ratio was obtained by dividing the payment-to-cost ratio computed from Medicare data (0.90) by that from a private multiple-insurer database (MEDSTAT) for 1991 (1.66).

Appendix G: Summary of State Studies on Tort Reforms

Appendix G—Summary of State Studies on Tort Reforms

Study	Data and methodology	Major reported findings	Comments
U.S. General Accounting Office, Medical Malpractice: Six State Case Studies Show Claims and Insurance Costs Still Rise Despite Reforms, HRD-87-21 (Washington, DC U S Government Printing Office, December 1986)	**Data:** Claim frequency, payment per paid claim Insurance premiums, and the cost of resolving claims in Arkansas, California, Florida Indiana New York and North Carolina from 1980 to 1986 **Method:** Comparison of trends among states	▪ Despite the implementation of tort reforms, every state continued to experience increases in claim frequency, payment per paid claim, and insurance premiums. ▪ Indiana, the only state with a cap on both economic and noneconomic damages, experienced smaller insurance premium increases relative to other states.	▪ The study was unable to determine whether tort reforms had slowed the growth in claim frequency, payment per paid claim, or insurance premiums because no data were collected on trends prior to the reforms ▪ The methodology did not control for other factors that might affect malpractice claim activity
W.P. Gronfein, and E. Kinney, Controlling Large Malpractice Claims The Unexpected Impact of Damage Caps, *Journal of Health Politics, Policy and Law* 16(3) 441-483, 1991	**Data:** 1,282 closed claims in Indiana, Michigan and Ohio from the period 1977 through 1988 in which $100,000 or more in total damages were awarded. **Method:** Statistical regression analysis to determine whether Indiana's $500,000 cap on total malpractice damages lowered the average payment per paid claim for large claims The analysis controlled for the effects of plaintiff's age and sex, year of settlement, severity of injury, and allegations of negligence (e g diagnosis, anesthesia surgery medication patient monitoring, etc.)	▪ Mean and median payments per paid claim with damages $100,000 or more were approximately 18 and 42 percent higher in Indiana compared with Michigan and Ohio, respectively. The regression analysis suggested that the higher average award in Indiana is attributable to Indiana's tort reform. ▪ In Michigan and Ohio, payments of $1 million or more were made in 3.1 and 2.6 percent of claims, respectively. Payments for these claims accounted for 21 percent of all payments in Michigan and 14 percent in Ohio. There were no payments above $1 million in Indiana.	▪ There was no pre-reform and post-reform comparison of payment levels for malpractice claims ▪ The higher mean and median payment per claim may be a result of the operation of Indiana's Patient Compensation Fund, which was passed at the same point as the cap on damages and not the result of the cap on damages ▪ Although the average payment per paid claim was higher in Indiana the study could not determine whether Indianas tort reforms resulted in an overall savings in malpractice claims payments
California Medical Association, Actuarial Study of Professional Liability Insurance prepared by Future Cost Analysts Newport Beach CA May 31 1985	**Data:** Malpractice claims costs* from 1966 to 1985 n California. **Method:** Actuarial methods used to assess the impact of California's 1975 package of tort reforms. Medical Insurance Compensation Reform Act (MICRA) on malpractice claims costs (see chapter 4 for a description of these reforms). *Claims costs include payments made to plaintiffs (including the payments by plaintiffs to their attorneys) and the malpractice insurers' direct costs attributable to the claim (fees for investigative work, expert witnesses, and legal defense work).	▪ Prior to MICRA (1966-75), claims costs were increased at an annual rate of 15 percent in California. After MICRA (1976-85), claims costs increased 7 percent annually.	▪ According to data gathered by the U S Health Care Financing Administration national average premiums increased at a compound annual rate of approximately 12 percent between 1976 and 1985 (51 F R 28772, 28774 57 F R 5903) Therefore California claims costs (a proxy for premiums) Increased at a slower rate after MICRA than national malpractice insurance premiums ▪ The reductions in claim costs may be unrelated to MICRA especially since MICRA was not upheld by the courts until 1985, which may have limited its impact There may be alternative explanations for the findings for exam,ple after 1975 most commercial Insurers were replaced by physlclan-owned companies

Study	Data and methodology	Major reported findings	Comments
Californians Allied for Patient Protection, The Coalition to Preserve MICRA, MICRA Information, January 1 1993	**Data for various years between 1976 and 1991:** ▪ Physician fees—American Medical Association survey ▪ Malpractice premiums in California—Physlclan Insurance Association of America ▪ Malpractice premiums in New York Florida Michigan—Medical Liability Monitor ▪ National Malpractice Premiums—Tlllinghast **Method:** Comparison of trends in California with those in other states and the nation to assess the impact of MICRA reforms	▪ No pre-reform, post-reform comparisons between states. ▪ Physician fees declined physician fees in California increased by 9 2% compared with 13.1% nationally. ▪ Average California malpractice insurance premiums, after adjusting for inflation, declined from $18,000 in 1976 to $7,000 in 1991. ▪ 1992 average malpractice Insurance premiums were lower in California than in New York, Florida, or Michigan	▪ The magnitude of the decline may have been overstated by comparing a peak in premium levels (1 976) to a relative trough in premiums (1991) [a] In addition comparisons of single-year premiums can be misleading because premiums are based on expected revenue needs and are often adjusted upward or downward when better Information is available ▪ The study did not control for any other factors in California that may have led to lower insurance premiums or physician fees e g changes in the malpractice insurance market or health care delivery market
Harvey **Rosenfeld,** California MICRA Profile of a Failed Experiment in Tort Law Restrictions , Voter Revolt, Los Angeles CA (no date)	**Data:** ▪ National per capita health care spending data—U S Health Care Financing Administration and the Center for National Health Statistics U S Public Health Service ▪ Estimate of California's personal health care expenditures—California Almanac (5th Ed 1991) ▪ Average medical consumer price index from Los Angeles, San Francisco, and San Diego ▪ Malpractice Insurance premiums, profits, and losses—National Association of Insurance Commissioners **Methods:** Comparison of trends in the measures listed above from 1975 to 1991, and comparison of these measures among states in various years	▪ In 1990 the average California malpractice insurance premium was $7,741 as compared with a national average premium cost of $8,327 ▪ Incurred malpractice Insurance losses as a percent of health care costs declined in California between 1987 and 1990 at a greater rate than in the nation	▪ In 1985 California's average premium was 65 percent above the national average, therefore, the decline to less than the national average is noteworthy [b] ▪ The study did not control for other factors that contribute to changes in malpractice and health costs therefore, one cannot conclude that MICRA was solely responsible for lower premiums or moderate growth in health care costs

Study	Data and methodology	Major reported findings	Comments
Academic Task Force for Review of the insurance and Tort Systems, Preliminary Fact-Finding Report on Medical Malpractice, Gainesville, FL, August 14, 1987. #	**Data:** Florida insurance company data on claims closed between 1975 to 1986. **Method:** Analysis of trends in malpractice cost indicators. **Tort reforms:** Florida passed three malpractice reform acts: The 1976 act implemented:* ▪ limitation on *res ipsa loquitur* doctrine, ▪ abolishment of collateral source rule, ▪ periodic payment of future damages, and ▪ standard of care determined by reference to same or similar locality. 1985 and 1986 acts included: ▪ pretrial screening, ▪ patient compensation fund, ▪ cap on noneconomic damages, ▪ attorney fee limits, and ▪ certificate of merit. * For a definition of these reforms, see chapter 4, box 4-2 or appendix K.	▪ The rate of closed claims per 100 physicians remained stable from 1975 to 1986 ▪ The average payment per paid claim increased 14.8% per year from 1975 to 1986 ▪ Claims with million dollar plus awards accounted for **4.9%** of total paid claims in 1981 but 29 1% in 1986 ▪ The average cost of defending a claim increased at an annual rate of 17% from 1975 to 1986, ▪ Increases in payment per paid claim were the primary factor driving Increases in premiums in Florida	▪ The study did not do a pre-post reform comparison of trends The 1985-86 reforms were unlikely to have had an effect on the data analyzed because most claims were closed prior to implementation of reforms. ▪ The study looked at gross trends in malpractice cost indicators, but made no attempt to assess the individual impact of particular reforms on those Indicators
Pretrial screening studies			
P.E., Carlin, Medical Malpractice Pre-trial Screening Panels: A Review of the Evidence, Intergovernmental Health Policy Project, The George Washington University, Washington, DC, October 30, 1980.	**Data:** Various statistics on the operations of 15 pretrial screening panels in Arizona (Maricopa County), Delaware, Hawaii. Indiana Louisiana, Massachusetts, Montana, Nevada, New Jersey, New Mexico, New York, Pennsylvania, Tennessee, Virginia, and Wisconsin **Method:** ▪ Analysis of data ▪ Review of the empirical literature ▪ Interviews with pretrial panel administrators and members of state medical societies and state bar associations	▪ Majority of panel decisions found no liability; physicians won an average of 73% of panel decisions. ▪ Plaintiffs only appealed approximately 5% to 22% of adverse decisions in Delaware, Hawaii, Massachusetts, Arizona (Maricopa County), and Wisconsin, indicating that pretrial screening panels may lead some claims to be settled earlier. ▪ Nearly every state had failed to convene a panel within the statutory time limit and there were long delays and backlogs of cases.	▪ There were no comparisons of claim disposition prior to the implementation of the panel ▪ Because pretrial panels offer plaintiffs a relatively inexpensive mechanism for screening the merits of a case, their existence may have encouraged plaintiffs with nonmeritorious suits to file This could explain the high rate of decisions for defendants and the low rate of plaintiff appeals ▪ The long delays in panel hearings may lead some plaintiffs to drop claims or settle after proceeding through the pretrial screening process

Study	Data and methodology	Major reported findings	Comments
J.K. Mardfin, Medical Malpractice in the State of Hawaii, Department of Commerce and Consumer Affairs, Honolulu Hl, January 1986	**Data:** 453 pretrial screening panel decisions between 1979 and 1984 in Hawaii Method: Comparison of disposition of pretrial screening panel decision and subsequent disposition of claim	• The majority of claims were settled or dropped after a panel hearing ▪ Of the 109 cases in which the panel found the physician liable, 18 claims (16%) were subsequently settled, and 53 claims (49%) were apparently dropped. ▪ In the **328** cases in which no liability was found, 3% settled without filing suit and 221 claimants (67%) apparently took no further action ▪ A majority of plaintiffs who filed suit after a panel decision of no-liability received a payment ▪ Data was available on 71 suits filed following a panel finding of no-liability Only 51 were closed by the time the study was completed In 28 cases (55%), plaintiffs received a payment In 10 of these cases, the amount paid to the plaintiff exceeded $100,000 ▪ The average time from filing a claim to the panel's decision was 7'/$_2$ months, with 55% Of claims beinq settled within 1 month	The majority of claimants took no further action following the pretrial screening panel hearing This indicates that the panel promoted early settlement However, the researchers were not completely confident about the status of the cases they reported as taking no further action They did not know whether plaintiffs were still considering a suit or engaged in settlement negotiations The relatively large number of no-liability panel decisions that resulted in payment to the plaintiff raises a question about the accuracy of the panels' decisions
Howard, D.A An Evaluation of Medical Liability Review Panels in Arizona *State Courts Journal* 519-25, 1981	**Data:** ▪ Aggregate data for malpractice claims filed in Maricopa County (Phoenix), Arizona, 1975 to 1979 ▪ Individual case data for cases in Maricopa County from primary malpractice Insurers in Arizona, 1975 to 1979 ▪ Insurance claim data for Arizona, 1975 to 1979 • Interviews with judges and attorneys in Arizona (circa 1980) **Method:** Analysis of trends before and after implemnentation of pretrial screening panels in 1976	**Court data:** • The percentage of malpractice cases that went to trial dropped from 15°/0 in 1975 to 6°A in 1978 ▪ The percentage of stipulated dismissals (indicating settlement prior to trial) Increased after 1975 ▪ Median time for resolution of claims Increased after panels were Instituted Cases that went through the panel process were slowest • There were significant delays in convening panels and scheduling hearings. **Insurance claims data:** • Probability of payment remained stable • Average payment per paid claim similar for screened and nonscreened claims • Average cost to the insurer to defend a claim increas°d • Average time to resolve a claim Increased • Claim frequency increased after the implementation of the panel (1 978 1979)	▪ The data set only Included 1 year of data for claims filed prior to the enactment of pretrial screening, and 3 years of claims data postpanel The use of only a slngle year of prepanel data is inadequate for comparison of trends The decline in the number of trials may result from delay in claim resolution, 27% of claims filed in 1977 and 56% of those filed in 1978 had not been closed by the time the study was completed in May 1980 Changes in patterns of disposition of claims may be a result of changes in the malpractice Insurance market A major shift from commercial to physician-owned Insurance companies occurred at the same time panels were implemented

Study	Data and methodology	Major reported findings	Comments
S. Shmanske, and T. Stevens, The Performance of Medical Malpractice Review Panels, *Journal of Health Politics, Policy and Law* 11 (3) 525-535, 1986	**Data:** Claims data from two Insurance companies in Arizona prior to (1 972-75) and after (1 976-79) pretrial screening panels were implemented The data set Included only claims that closed within 2 years of filing and claims that were filed within 1 year of the incident **Method:** Pre-post comparison of differences in claims disposition before and after 1976.	▪ Claim frequency Increased ▪ Claims took longer to resolve ▪ Probability of payment remained the same ▪ There was no overall Increase in average indemnity payment, but claims that closed quickly had higher average payment	• There were no controls for other factors that may have led to changes in malpractice claim activity for example, the change from commercial insurer to a physician-owned mutual company, changes in demographics, and national trends in malpractice claims activity
J. Goldschmidt, Where have All the Panels Gone? A History of the Arizona Medical Liability Review Panel, *Arizona State Law Journal* 23:1013-1109, 1991.	**Data:** Interviews with 69 Superior Court judges, 47 defense attorneys, 41 plaintiff attorneys, 250 physicians, and 73 malpractice plaintiffs.	▪ Participants tended to believe that pretrial screening panels did not promote settlement ▪ Pretrial screening Increased the cost of litigation ▪ General dissatisfaction with the operation of the pretrial screening panel system ▪ About one-third of plaintiff attorneys said there was no reason to enter settlement negotiations prior to the panel decision	▪ No empirical data ▪ Response rates to surveys were as follows Defense attorneys—60% Plaintiff attorneys—42% Physicians—50% Plaintiffs—24% Superior court judges—68% Thus, there was potential for response bias in results
arbitration studies			
U.S. Department of Health, Education and Welfare, Public Health Service, Health Resources Administration, National Center for Health Services Research, An Analysis of the Southern California Arbitration Project, January 1966 Through June 1975, prepared by D H Heintz, HHEW Pub 77-3159 (Washington DC: U.S. Government Printing Office, 1975)	**Data:** 1,353 malpractice claims brought between 1966 and 1975 against Southern California hospitals One group of 8 hospitals had Implemented an arbitration project in which patients were presented with an arbitration agreement upon entering the hospital (the 'arbitration hospitals") The other group of 8 hospitals did not promote arbitration (the "nonarbitration hospitals") **Method:** Comparison of claims experience in arbitration and nonarbitration hospitals before and after implementation of the arbitration program in 1970	▪ Fewer claims were filed in arbitration hospitals as compared with nonarbitration hospitals ▪ The amount paid per closed claim was lower in arbitration hospitals ▪ There was a statistically significant decline in the defense cost per claim in the arbitration hospitals over the period of the study ▪ The average length of time to resolve a claim was shorter For arbitration hospitals the time period was measured from the filing of the claim Prior to the initiation of the arbitration project the arbitration hospitals had taken longer to resolve a claim than the nonarbitration hospitals	• Hypotheses were stated in terms of differences between arbitration hospitals and nonarbitration hospitals in the levels of certain variables (e. g. , the number of malpractice claims) but the test statilstic measures the difference between the two groups of hospitals in the rates of change in those variables A number of hypotheses were tested using a test statistic that appears to be Incorrectly specified. Consequently, the statistical significance-though not necessarily the direction-of the findings must be questioned ▪ There was evidence that arbitration hospitals were using "more intensive efforts to resolve claims earner in the process "

Study	Data and methodology	Major reported findings	Comments
Ladimer, I., Solomon, J.C., Mulvihill, M., Experience in Medical Malpractice Arbitration. *The Journal of Legal Medicine*, 2(4) 433-469. 1981	**Data:** ▪ 130 California medical malpractice arbitration cases filed between 1971 and 1980. These cases arose in hospitals from the Southern California Arbitration Project (see previous study reviewed in this table). ▪ 500 to 3,200 California malpractice claims that were filed in a court between 1975 and 1978. (The number of litigated cases used for comparison varied depending on the data available.) **Method:** Comparison of trends in arbitration cases and litigated malpractice cases.	▪ Fewer defendants per arbitration claim. The percent of claims involving a single defendant were as follows: arbitration—62% litigation—23% ▪ Plaintiffs' injuries were less serious in arbitrated cases: arbitrated cases less frequently involved death and more frequently involved temporary injuries. ▪ There were no statistically significant differences in the probability of payment between arbitration and litigation cases. ▪ Arbitration claims were filed more quickly following the incident than were claims filed for litigation. ▪ The average time to resolve an arbitrated claim was 28 weeks less than for a litigated claim.	▪ Exact methods used to control for confounding factors were not clearly specified. ▪ Arbitration claims may be filed more quickly because claimants with temporary injuries may be able to file their claims sooner. ▪ The quicker settlement time for arbitration claims may be a result of fewer defendants in arbitration claims or the plaintiffs with less serious injuries choosing arbitration. ▪ Since arbitration is voluntary, the patients who select arbitration may differ from the patients that chose litigation. Moreover, patients were permitted to revoke the arbitration agreement within 30 days after being discharged. Therefore, plaintiffs with obvious, serious injuries upon discharge may have decided to proceed to trial.

[a] U.S. Congress, Office of Technology Assessment, *Impact of Legal Reforms on Medical Malpractice Costs*, OTA-BP-H-119 (Washington, DC: U.S. Government Printing Office, 1993).
[b] S. Zuckerman, S. Norton, and B. Wadler, *A State-Based Survey of Malpractice Premiums: Implications for Medicare Physicians Payment Policy*, Report 6090-02 (Washington, DC: The Urban Institute, March 1993).

SOURCE: Office of Technology Assessment, 1994.

Appendix H: Clinical Practice Guidelines and Malpractice Liability

Clinical practice guidelines have been hailed as tools that can help reduce defensive medicine, improve the quality of care, and protect health care providers from unpredictable liability by clarifying the legal standard of care (59,101 ,188). Medical professional societies have been developing clinical practice guidelines for some years now. In 1989, Congress established the federal Agency for Health Care Policy and Research (AHCPR), which is charged with conducting medical effectiveness research and developing and disseminating national clinical practice guidelines (249).

Despite high hopes in Congress and the Administration and continuing enthusiasm among academics for the clinical practice guidelines movement (30,59), a number of factors are likely to limit the impact of guidelines on medical liability and physician behavior. This appendix examines the potential impact of clinical practice guidelines on medical liability. First, it describes the existing legal standard of care and the current role of clinical practice guidelines in helping to determine it. Second, it discusses limitations of guidelines as legal standards of care. Third, it describes some state initiatives to promote the use of guidelines in litigation. Finally, it comments on the potential role of guidelines in bringing about more cost-effective medical care as our health care system struggles to contain costs.

CURRENT USE OF GUIDELINES AS LEGAL STANDARDS

Because they are more or less concise statements of what the profession deems to be appropriate care, clinical practice guidelines developed by groups of physicians are clearly relevant evidence of the legal standard of care, which is based on customary practice. In fact, the development and acceptance of national guidelines for hospital care provided impetus for abandoning the strictly local standard of care for hospitals in some jurisdictions.[2] However, factors inherent in both the legal

[1] In this appendix, *guideline* refers to a clinical practice guideline itself, and *standard* refers to the legal standard of care. In general practice, as well as in certain places in this appendix, these terms as well as others (e. g., *parameter* and *protocol*) are used interchangeably.

[2] In *Cornfeldt v. Tongen*, 262 N.W. 2d 684 (Minn.1977), the appeals court determined that [he trial court had erred in not admitting Joint Commission on the Accreditation of Hospitals as evidence of the legal standard of care. See also *Darling v. Charleston Community Hospital*, 33Ill. 2d *326,2* 11 N.E. 2d *253 (Ill. 1965) (55).*

system and in guidelines themselves limit the role guidelines currently play in the litigation process.

The Legal Standard of Care

To prove that a medical practitioner committed medical malpractice, a plaintiff must establish:

1) that the provider owed a duty *of care* to the patient,
2) that the provider breached this duty by failing to provide care that met the applicable *standard of care* for that practitioner under the specific circumstances,
3) that the patient sustained *compensable damages,* and
4) that the physician's breach of duty was the *proximal cause* of those damages.

It is in establishing the second element, negligent conduct, that clinical practice guidelines have a potential role.

The applicable standard of care in a given case is established through expert testimony. Both the plaintiff and defense counsel call to the stand expert witnesses who testify as to what constituted an appropriate level of care in the patient's case and whether or not the defendant physician breached this standard. Expert testimony is based on the experience of the witnesses themselves as well as their knowledge of the literature (which may include textbooks, journal articles, or clinical practice guidelines); hence, the courts defer to the medical profession rather than to some objective or lay standard in determining the scope of a physician's duty to a patient.[3] After testimony has been delivered, it is up to the jury to decide whether or not the physician has breached the standard of care, although in extreme cases the court may take this decision away from the jury by directing a verdict.

Until relatively recently, the legal standard of care was articulated as a strictly local standard:

> A physician is bound to bestow such reasonable and ordinary care, skill, and diligence as physicians and surgeons in good standing in the same neighborhood, in the same general line of practice, ordinarily have and exercise in like cases (1 90).

Today, most jurisdictions apply a national standard for medical specialists that allows plaintiffs and defendants access to expert witnesses from outside their locality.[4] The specific standard varies from state to state. In some jurisdictions, the standard recognizes situational resource constraints--e.g., a practitioner would not be held liable for failing to perform a magnetic resonance imaging study if no facilities were available (86).

Additional safe harbors under the customary standard are the "respectable minority" rule, which allows practices that deviate from the professional norm as long as they are followed by a respected minority of practitioners;5 and the "error in judgment" rule, which protects a physician who chooses between two or more legitimate courses of treatment (109).

How Guidelines Are Admitted as Evidence

Courts generally bar written guidelines from being admitted as evidence under the hearsay rule, which prohibits the introduction of out-of-court statements as evidence (150). In these cases, guidelines can only color the evidence to the extent that expert witness testimony reflects their contents. Certain guidelines, however, may be ad-

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[3] The professionally determined standard was challenged successfully in *Helling v. Carey*, 83 Wash. 2d 514, 519 P. 2d 98 I (Wash. 1974). in which the court rejected the professional standard for glaucoma screening in favor of its own higher standard. The precedent set by this case, which sparked considerable concern in the provider community, has since been restricted to apply (rely to situations of obvious negligence (83).

[4] Most jurisdictions apply a national standard of care for board-certified specialists, but a significant number still apply a local standard for general practitioners. The most common formulation of the standard currently is a modified locality rule, which requires physicians to meet the standard of physicians practicing in "the same or similar" localities (9).

[5] *See, e.g., Chumbler v. McClure*, 505 F. 2d 489 (6th Cir. 1974).

mitted into evidence as "learned treatises," a class of statements that are granted exception from the hearsay rule in many jurisdictions (1 13). Federal Rules of Evidence, which have been adopted in a similar form by most states, define the "learned treatise" exception as follows:

> . . . statements contained in published treatises, periodicals, or pamphlets on a subject of history, medicine, or other science or art, established as a reliable authority by the testimony or admission of the witness or by other expert testimony or by judicial notice (150).

There is no hard and fast rule as to which guidelines have "reliable authority." Guidelines reflecting comprehensive analysis of scientific evidence and broad consensus among members of the profession are likely candidates, but courts themselves are likely to defer to expert opinion regarding the scientific validity of a guideline rather than make such judgments themselves (113).6

Use of Guidelines in Establishing the Legal Standard of Care

Once admitted as evidence of the legal standard of care, guidelines do not carry greater legal weight than any other expert testimony—i.e., they are not regarded as definitive statements of the standard of care. Once all testimony has been heard, it is left to the jury to decide the applicable legal standard of care. Even when a guideline is quite explicit and straightforward, it is not clear how much weight it will be accorded by the jury. OTA knows of no studies that have examined the reactions of juries to the use of guidelines as evidence.

Under the current customary standard of care, clinical practice guidelines can only influence the standard to the extent that they are adopted into common medical practice. The existence of a guideline might not be persuasive if expert witnesses testify that most physicians do not follow it. In spite of extensive and focused guidelines development in some areas of practice, physicians are sometimes slow to incorporate them (1 32). Additional incentives and dissemination tactics may. be needed to change physician behavior m accordance with guidelines.

A recent study suggests that guidelines currently play only a small role in litigation but that this role may be increasing (100). The authors studied guideline use from the three different perspectives in order to assess their use in the various phases of medical malpractice litigation.

- A national review of all published court opinions between 1980 and 1993 found only 32 cases in which the opinion indicated that guidelines had been used as evidence of the standard of care.
- A review of a sample of 259 claims—both open and closed—from two malpractice insurance companies found that only 17 involved the use of guidelines.
- In a random sample survey of medical malpractice plaintiff and defense attorneys, 36 percent of attorneys reported that they had at least one case per year where guidelines played an important role. Moreover. 30 percent of attorneys reported they felt the use of guidelines in litigation was increasing (1 00).

The study identified more claims involving the use of guidelines by plaintiffs than claims involving the use of guidelines by defendants. In many cases, attempts to use guidelines as proof or rebuttal of negligence or nonnegligence were unsuccessful. The most frequently cited guidelines were those published by the American College of Obstetricians and Gynecologists (100).

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6 A recent U.S. *supreme* Court decision, *Daubert v. Merrell Dow Pharmaceuticals,* 113 S. Ct. 2786, 125 L. Ed.2d 469 (1993), gives judges greater responsibility for making independent judgments of the scientific validity of evidence before it is admitted m court. It is unclear how this decision wilt affect [he admissibility of cl inical practice guidelines as evidence of the professional standard of care, but it does herald a shift away from relying solely on expert opinion to make such judgments.

BARRIERS TO THE USE OF GUIDELINES AS LEGAL STANDARDS

One factor limiting the impact of guidelines in litigation is that their language and form are often not amenable to use as legal standards. Some guidelines offer several treatment options, while others offer a single option but do not hold it forward as the only acceptable one. A typical guideline frequently includes allowances for deviation based on professional judgment.

Many medical societies consciously avoid the use of words such as always and *never* when drafting guidelines and avoid referring to their guidelines as standards for fear of potential adverse legal consequences (232). AHCPR has also been concerned with potential legal consequences of guidelines development and has sought immunity from civil liability for the members of its guidelines panels (2.54).

The American Medical Association (AMA) shares these concerns about the legal implications of guidelines. Although it encourages the devel - opment and dissemination of practice guidelines as a means of improving and further standardizing the practice of medicine, the AMA resists the use of guidelines as an absolute legal standard of care:

> . . . the evidentiary value of practice parameters will vary depending upon the origins and content of the parameter and the circumstances of the case. As a policy matter, this result seems entirely appropriate. Rules of law, *like parameters, must maintain sufficient flexibility to adjust to the needs of the particular case.* (emphasis added) (6)

The AMA endorses and encourages building flexibility into guidelines in order to avoid "'cookbook medicine" (6). Such flexibility may be warranted: however, it may limit the usefulness of guidelines in a legal context.

The vastness and complexity of medical knowledge pose additional barriers to the courts' ability to depend on practice guidelines. While it may be possible to develop explicit criteria for diagnosis and treatment of certain pathologies, the current state of medical knowledge is insufficient to support the development of explicit criteria for the majority ofclinicalsituations(101). One study estimated that there could be over 10 billion possible pathways for diagnosing common medical problems (56). Adding treatment algorithms would increase the number even further.

Even if good evidence were available on which to base guidelines for a subset of medical conditions. its complexity could be daunting in a court of law. Court decisions could be complicated further in cases where conflicting guidelines were introduced into evidence. In a 1992 survey, a random sample of state trial and appellate judges ranked clinical practice guidelines third among 30 scientific topics on which they felt a need for greater information (262). To satisfy this need, a major project is currently under way to publish "desk books" that will give judges guidance on the evaluation of scientific evidence. However, because the medical community is still debating the relative merits of different types of evidence on the effectiveness of medical treatments,[7] it maybe some time before judges have the tools necessary to evaluate clinical practice guidelines from an evidentiary standpoint.

Finally, the continuing evolution of medical practice presents a challenge for efforts to keep guidelines current. Some critics argue that the adoption of rigid guidelines as legal standards of care could hinder the development and adoption of new medical technologies in the future.

INITIATIVES TO PROMOTE LEGAL USE OF GUIDELINES

Today, clinical practice guidelines carry limited evidentiary weight in medical malpractice litigation. To enhance the role of guidelines in the

[7] A concurrent OTA study is reviewing and critiquing medical effectiveness research methodologies and the development and dissemination of those research results to practitioners. The study includes a review of the activities of the federal Agency for Health Care Policy and Research.

courts, two different approaches could be taken. One approach would be to give greater evidentiary weight to certain guidelines in the litigation process (e.g., by authorizing judges to exercise more discretion with respect to admissibility of guidelines or by adopting certain guidelines under administrative law). A mere passive approach would be to continue current efforts in guidelines development at the national level in the expectation that, over time, guidelines would figure increasingly in medical malpractice litigation.

The first approach requires legislative action. In fact, such action was taken in the early 1970s as a part of the Medicare Program. A provision of the Medicare Act[8] grants immunity from civil liability to practitioners who exercise "due care" in complying with treatment criteria developed by Medicare peer review organizations (PROS). Although this provision has been on the books for over two decades, it has never been invoked, probably because the criteria developed are not explicit enough to be of much use in a legal context (85, 116). Even if sufficiently explicit criteria were available, legal scholars dispute how much additional protection the provision would confer because of a lack of clarity in the legislative language (17, 116, 169). Another likely explanation for the disuse of the Medicare provision is its link to the PRO program, which has itself been the subject of considerable controversy and change since the adoption of the immunity provision (85).

In recent years, however, several states have passed legislation that may allow for greater use of guidelines in determining the legal standard of care. Four states—Maine, Florida, Minnesota, and Vermont—recently passed legislation that accords greater weight to certain guidelines in medical malpractice litigation.

Maine's 5-year Medical Liability Demonstration Project, begun in 1991, makes state-developed guidelines admissible as a defense in medical malpractice proceedings (24 M.R.S. Sees. 2971 *et. seq.* (1993)). The project's goals include reducing malpractice suit rates and insurance premiums; reducing defensive medicine; reducing variation in practice patterns; and containing overall health care costs. Guidelines for selected areas of practice in obstetrics/gynecology, emergency medicine, radiology, and anesthesia were developed by four medical specialty advisory committees appointed by the Maine Board of Registration in Medicine (see box H-l). Guidelines were developed in areas of practice where defensive medicine was believed to be extensive.

The statute permits physicians electing to participate in the demonstration to use these guidelines as an *affirmative defense* in medical malpractice proceedings. Under the affirmative defense provision, use of guidelines as evidence is no longer a matter of the judge's discretion. If a physician introduces the guideline as a defense, he or she must prove only that the guideline was followed. In order to deny a physician this affirmative defense, the plaintiff must either: 1) prove that the physician did not follow the guideline, or 2) prove, through expert testimony, that the guideline is not applicable to the given case. If the plaintiff is unable to do this and the physician proves that he or she complied, the physician is cleared of liability.

Another provision of the Maine Statute prohibits plaintiffs from introducing a state guideline into evidence in an effort to prove that the physician's performance was substandard (24 M. R. IS. Sec. 2975 (1993)). This provision was included to allay fears on the part of physicians that the guidelines, instead of protecting them from liability, would be used against them (212). Some critics, however, claim that this provision may be subject to challenge on state or federal constitutional grounds because it selectively denies plaintiffs the use of evidence that may be critical to proving malpractice (215). A hearing on such a constitutional challenge would probably not occur for sev -

[8] 42 U.S.C. Sec. 1 32&'-6(c)

BOX H-1: Guidelines Adopted for Use in the Maine Medical Liability Demonstration Project

Emergency Medicine

- Criteria for performing cervical spine x-rays on asymptomatic trauma patients in the emergency room
- Checklist for criteria to be met in accordance with federal statute before affecting a patient transfer

Obstetrics and Gynecology

- Caesarean delivery for failure to progress
- Assessment of fetal maturity prior to repeat cesarean or elective induction of labor
- Management of singleton breech presentation
- Management of Intrapartum fetal distress
- Antepartum management of prolonged pregnancy
- Hysterectomy for diagnosis of abnormal uterine bleeding in women of reproductive age or diagnosis of leiomyomata
- Tocolysis
- Diagnosis and management of ectopic pregnancy
- Management of perinatal herpes simplex virus infection

Anesthesiology

- Preoperative testing
- Preoperative, interoperative, and postoperative monitoring

Radiology

- Screening mammography
- Antepartum ultrasound
- Outpatient angiography
- Adult barium enema examination

SOURCE State of Maine Board of Registration in Medicine Department of Professional and Financial Regulation, Rule 02-373 chs 20 22 24 26 Medical Liability Demonstration Project—Specialty Practice Parameters and Risk Management Protocols

eral years. As of May 1994, the state's largest medical malpractice insurance carrier had only received one claim for which the adopted guidelines were potentially relevant (29).

Florida legislation in 1993 authorized a 4-year demonstration project similar to that in Maine. Outcomes data on hospital patients collected through a statewide mandatory reporting system will be used to help develop "practice parameters" for inpatient care. These parameters, as well as parameters for selected outpatient services, will be developed by the Florida Agency for Health Care Administration in conjunction with relevant state health professional associations and boards. Once adopted under state rulemaking procedures. these parameters will be admissible as an affirmative defense in medical malpractice proceedings (Fla. Stat. Sec. 408.02 (1993)). Unlike Maine, however, the Florida legislation does not bar plaintiffs from trying to use the parameters to prove that a physician's care was substandard. A plaintiff might be able to introduce the parameter as evidence, but the parameter would not be accorded greater weight than any other expert testimony.

Minnesota recently passed legislation that allows guidelines developed or adopted by a special

state commission to be used as an *absolute defense* in malpractice litigation (164).[9] Like the Maine statute, Minnesota's law also bars the plaintiff from introducing the guideline as evidence that the physician *failed* to meet the standard of care. As of May 1994, the first round of guidelines had yet to be developed (72).

Vermont's approach is more moderate, amounting to a change in the rules of evidence that would allow a wider variety of guidelines--e. g., guidelines developed by health care professional groups, the federal government, or health care institutions—to be directly admitted as evidence of the standard of care by either the plaintiff or the defendant in future mandatory medical malpractice arbitration proceedings (18 V. S. A., part 9, chapter 21, Sec. 1 (1992)). This provision would make it easier to introduce guidelines as evidence but would not give them legal weight any greater than other expert testimony.

Maryland, in a departure from the strategies adopted by other states, recently adopted legislation that mandates the development of state guidelines but explicitly *prohibits* them from being introduced as evidence by any party in a malpractice suit (Maryland, State House of Representatives, House Bill 1359, enacted Apr. 13, 1993.) A few other states have passed legislation authorizing the development of guidelines and encouraging consideration of their use in the future as legal standards of care.

Some patient rights advocates may oppose the approach taken by Maine and Minnesota because it offers no safeguard against "bad" guidelines—i.e., the plaintiff cannot contest the reasonableness of the guidelines themselves (179). Some critics contend that the use of guidelines as rigid legal standards may be problematic due to the continual evolution of medical practice and the inability of written guidelines to reflect changes in a timely manner (94).

State guidelines initiatives raise the potential for conflict between national, state, and even institutional guidelines. For example, most of Maine's guidelines were based on nationally recognized guidelines, but others were developed de novo by Maine physicians (53) and could be construed as setting a precedent for reconversion to a more local standard of care. Guidelines developers in Minnesota anticipate using national guidelines as models and amending them if necessary to conform to the realities of health care delivery in the state (72). In Vermont, the statutory description of guidelines could be interpreted as including even written hospital protocols.

It will be some time before evidence of the effects of these state efforts is available. Some early reports suggest that the Maine initiative has reduced defensive practices in selected areas (e.g., the use of cervical spine x-rays in the emergency room) (115). Given the modest nature of the changes and the limited number of guidelines adopted, however, it is unlikely that these programs will have much of an impact overall on the practice of medicine. The extent to which Maine and Minnesota's programs will streamline the litigation process is also questionable. In both states, expert testimony will still be required to establish whether the guidelines are relevant to the case and, because of the complicated nature of medical practice, whether they were in fact followed. In cases where several different guidelines can be introduced as evidence, expert testimony may also be necessary to determine which, if any, represents the legal standard of care.

PRACTICE GUIDELINES IN AN ERA OF COST CONTAINMENT

Increasing concern over the costs of medical care has sparked the introduction of cost as a factor in medical decisionmaking (204). Costs as well as

[9] It is unclear exactly how Minnesota's *absolute defense* provision differs from Maine's *affirmative defense*. The legal meaning may he essentially the same+. c., the plaintiff must prove that the physician didn 't follow the guideline or that the guideline is not applicable to the specific case in order to deny the physician this avenue of defense. However, until there have been test cases involving the guidelines, it remains unclear how exactly how judges will interpret the statutes (83).

effectiveness have been used as criteria by payers and institutions to help decide which of two or more diagnostic or treatment alternatives to reimburse or use for a given condition—for example, low versus high osmolar contrast media for radiologic diagnosis (103). AHCPR is now required to consider cost implications when developing guidelines (42 U.S.C. Sec. 299b-1 (1994)).

Judges have traditionally been averse to accepting the high cost (to the provider) of performing a procedure as a defense against medical malpractice (168). A physician may refuse to accept a patient on the basis of that patient's ability to pay (48,98,143). However, once a physician has established a relationship with a patient, the law generally holds that he or she is responsible for ensuring that the care that patient receives measures up to the "customary practice" standard,[10] although in some cases courts have allowed departures from customary practice due to cost constraints. For example, in *Youngberg v. Romeo*,[11] the court found that a physician in a state-operated facility could not be held liable for failing to meet normal professional standards due to institutional budget constraints.

A more recent case, *Wickline v. State of California*,[12] illustrates the legal system's increasing consciousness of the tension between cost constraints and appropriate care. The case involved a claim of negligence against the state Medicaid program for not approving a medically necessary extension of an inpatient stay for complications following coronary artery bypass surgery. The patient's primary physician had requested an 8-day extension, but the Medicaid program authorized only 4 days. The patient was discharged after a 4-day extension and suffered post-discharge complications that ultimately resulted in a leg amputation. The court concluded that the state Medicaid program was not liable for Wickline's injury because the decision of when to discharge was the responsibility of the treating physician. The primary physician testified that "he felt that Medi-Cal had the power to tell him, as a treating doctor, when a patient must be discharged from the hospital."13 However, all three physicians involved in the patient's care testified that the decision to discharge after the 4-day extension was consistent with customary practice. 14 The court stated that, although:

> . . . *cost* consciousness has become a permanent feature of the health care system, it is essential that cost limitation programs not be permitted to corrupt medical judgment. We have concluded, from the facts in issue here, that in this case it did n{~[.I5.16

Some legal scholars have argued that, as cost concerns enter increasingly into physicians treatment decisions, the customary standard will come to reflect these concerns either implicitly or explicitly (85,1 99), as suggested in *Wickline.* Practice guidelines, to the extent that they reflect cost considerations and are given evidentiary weight in court, are clearly one of the more systematic ve-

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[10] See, e.g., *Smith v. Yohe*, 194 A.2d 167 (Pa. 1963), *Clark v. United states*. 402 F. 2d 950 (Cir. D.C. 1968), *Wilkinson v. Vesey*, 295 A. 2d 676 (R.I. 1972); *Ricks v. Budge*, 64 P.2d 208 (1937); *Rise v. United States*, 630 F. 2d 1068 (5th Cir. 1980); *Wickline v. State of California*, 183 Cal. App. 3d 1064, 228 Cal. Rptr. 661 (Cl. Ct. App. 1986); see also (47,88,111,251).

[11] *Youngberg v. Romeo*, 457 U.S. 308 (1982).

[12] *Wickline v. State of Caltfornia*, 288 Cal. Rptr. 661 (Cal. Ct. App. 1986).

[13] *Wickline v. State of California*, 288 Cal. Rptr. 661 (Cal. Ct. App. 1986).

[14] *Wickline v. State of California*, 288 Cal. Rptr. 661 (Cal. Ct. App. 1986).

[15] *Wickline v. State of Caltfornia*, 288 Cal. Rptr. 661 (Cal. Ct. App. 1986).

[16] The differing court opinions in *Wickline* and *Youngberg* regarding physicians' duties under cost constraints may have turned on the difference in employment status between the physicians. In *Youngberg*, the physician was an employee of a state institution; in *Wickline*, the physicians were private practitioners. Physician employment status is yet another factor that may influence decisions as to the applicable standard of care or, alternatively, the locus of responsibility for treatment decisions.

hicles that might be used to bring about such a change. There is still considerable argument regarding the incorporation of cost concerns into practice guidelines (33,1 88). The AMA does not include cost as one of its criteria for guidelines development (8) and maintains that practice guidelines should be developed independent of considerations of cost (227). An entire area of law is under development that may expose payers to liability for negligent utilization review and payment decisions that result in harm to patients (84).

It remains to be seen whether courts will come to accept economic factors as determinants of the legal standard of care for physicians. Resolution of these difficult questions maybe central to effective health care reform. If they can be used to protect physicians from liability, clinical practice guidelines may be a potential means for reconciling broader social goals (e.g., health care cost containment) with a more individual-oriented legal standard of medical care.

Appendix I: Description of 32 Direct Physician Surveys of Defensive Medicine Reviewed by OTA

Appendix I—Description of 31 Direct Physician Surveys of Defensive Medicine Reviewed by OTA

Author, year of release	Survey year	Sample population location	Specialty	Survey characteristics	Response rate (percent)
Porter, Novelli & Associates, 1983a	1983	National	Obstetrician/ Gynecologists (Ob\Gyn)	Survey of random sample of American College of Obstetricians and Gynecologists (ACOG) members regarding medical liability Insurance premiums, claims experience, and practice changes in response to malpractice risks	**50.1%.**
Reynolds et al 1987[b]	1983/1 984	National	All	Data from the 3rd quarter 1983 and 4th quarter 1984 American Medical Association (AMA) Socioeconomic Monitoring Surveys on practice changes made in response to liability risk	6 3 0
Bligh, American College of Surgeons, 1984C	1984	National	Surgeons	Survey of members regarding medical liability Insurance premiums, claims experience, and practice changes in response to medical liability	36
Kansas Medical Society, 1985[d]	1984	Kansas	All	Survey of all members for data and opinions on the medical professional liability environment	**50**
Needham, Porter, Novelli, 1985[e]	1985	National	Ob\Gyn	Survey of random sample of ACOG members regarding medical liability Insurance premiums, malpractice claims experience, and practice changes in response to malpractice risks	**3 9 7**
Texas Medical Association, 1985f	1985	Texas	All	Survey regarding professional liability and defensive medicine	2 3 2
Charles, Wilbert, & Frankel 1985g	1985	Chicago	All	Survey of physicians to assess the personal and professional impact of malpractice litigation	3 6 6
Alabama Academy of Family Physicians 1986[h]	1985	Alabama	Family and General Practitioners (F\GP)	Survey of all members regarding obstetric practice	84
Iowa Family Physician Survey 1985	1985	Iowa	F\GP	Survey on medical liability	47
Michigan State Medical Society, 19851	1985	Michigan	Ob\Gyn	Survey to measure the potential impact of the professional liability Insurance problem	56
University of Nevada, School of Medicine, 1985[K]	1985	Nevada	Ob\Gyn and F\GP	Phone survey of rural doctors regarding obstetrical care and malpractice concerns	62

(continued)

Appendix I—Description of 31 Direct Physician Surveys of Defensive Medicine Reviewed by OTA (cont'd).

Author, year of release	Survey year	Sample population location	Specialty	Survey characteristics	Response rate (percent)
The Oregon Medical Association 1986[l]	1985	Oregon	Ob\Gyn and F\GP	Survey to assess the impact of professional liability issues on access to obstetrical care	81 1
Rosenblatt and Wright, 1987[m]	1985	Washington	F\GP	Survey to assess the impact of rising malpractice Insurance premiums on the practice of obstetrics	803
Rosenbach and Stone, 1990[n]	1986	National	All	Interview survey regarding costs and availability of malpractice Insurance and their impact on physician practice	742
American Academy of Family Physicians, 1987[o]	1986	National	F\GP	Survey to assess impact of cost and availability of liability insurance on the practice of obstetrics	337
Opinion Analysts, Inc., 1986[p]	1986	Texas	All	Survey to measure the impact of professional liability Insurance rates on the medical profession	355
Georgia Obstetrical and Gynecological Society, 1987[q]	1986	Georgia	Ob\Gyn	Survey of how malpractice liability affects obstetric care	61
Kentucky Medical Association, 1987[r]	1986	Kentucky	Ob\Gyn and F\GP	Survey regarding professional liability	42
Michigan Academy of Family Physicians, 1989 (Smith et al., 1989)[s]	1986	Michigan	F\GP	Survey to describe the characteristics of family physicians who practice obstetrics and identify factors prompting them to discontinue practice	815
Rosenblatt and Detering, 1988[t]	1986	Washington	Ob\Gyn, F\GP, and midwives	Survey to describe the impact of rapidly rising malpractice premiums on obstetric practice and to assess the impact of tort reform on professional liability costs	635
Opinion Research Corp., 1988[u]	1987	National	Ob\Gyn	Survey of random sample of ACOG members regarding medical liability Insurance premiums, claims experience and practice changes in response to malpractice risks	484
Shapiro et al., 1989[v]	1987	Wisconsin	All	Survey to assess the impact of malpractice litigation on the doctor-patient relationship and to collect data that might suggest effective tort reform	427
Illinois Department of Public Health, 1987 (Ring, 1987)[w]	1987	Illinois	Ob\Gyn and F\GP	Survey on changes in availability of obstetrical services	256
Weisman et al., 1989[x]	1987	Maryland	Ob\Gyn F\GP and Internal Medicine	Telephone survey regarding practice changes as a result of the current malpractice liability cilmate	65

(continued)

Appendix I—Description of 31 Direct Physician Surveys of Defensive Medicine Reviewed by OTA (cont'd).

Author, year of release	Survey year	Sample population location	Specialty	Survey characteristics	Response rate (percent)
Texas Medical Association, 1988Y	1988	Texas	All	Survey to assess impact of malpractice Insurance premiums cost and liability risk on physician practice	41
Louisiana Section of ACOG, 1988Z	1988	Louisiana	Ob\Gyn	Survey on professional liability	384
Lawthers et al , 1992aa	1989	New York	All	Survey of physicians' perceptions of the risk of being sued and their impact on physician practice	405
Opinion Research Corp 1990[bb]	1990	National	Ob\Gyn	Survey of random sample of ACOG members regarding medical liability Insurance premiums, claims experience, and practice changes in response to malpractice risks	540
Opinion Research Corp ,1992[cc]	1992	National	Ob\Gyn	Survey of random sample of ACOG members regarding medical liability insurance premiums, claims experience, and practice changes in response to malpractice risks	51
Minnesota Ob\Gyn Survey (Meader, no date)dd	no date	Minnesota	Ob\Gyn	General survey regarding income and malpractice Insurance cost concerns	Not provided
West Virglnia State Medical Association, no date[ee]	no date	West Virginia	All	Survey regarding professional liability Insurance problems facing physicians	50

[a]Porter, Novelli &Associates, "Professional Liability Insurance and Its Effects Report of a Survey of ACOG's Membership, " prepared for the American College of Obstetricians and Gynecologists, Washington, DC, August 31, 1983

[b]R A Reynolds, J A Rizzo, and M L Gonzalez, "The Cost of Medical Professional Liability," *Journal of the American Medical Association 257(20)* 2776-2781, May 22/29, 1987

[c]T J Bligh, "American College of Surgeons Professional Liability Survey Report, 1984 ," Executive Services Department for the Regents' Ad Hoc Committee on Professional Liability, American College of Surgeons, Washington, DC, 1984

[d]Kansas Medical Society, "Professional Liability Survey, " *Kansas Medicine* P 43, February 1985

[e]Needham, Porter, Novelli, "Professional Liability Insurance and Its Effect Report of a Survey of ACOG's Membership, " prepared for the American College of Obstetricians and Gynecologists, Washington, DC, November 1985

[f]Texas Medical Association, "Texas Medical Association's 1985 Professional Liability Survey" (unpublished), Austin, TX September 1985

[g]S C Charles, J R Wilbert and K J Franke, "Sued and Nonsued Physicians' Self- Reported Reactlons to Malpractice Litigation, " *American Journal of Psychiatry* 142(2) 437-440, April 1985

[h]Alabama Academy of Family Physicians, "A Survey of Family Physicians Providing Obstetrical Care A Preliminary Report, " Alabama Academy of Family Physicians, Montgomery, AL, February, 1986

[i]Iowa Medical Society, "Iowa Family Physician Survey Findings" (unpublished),1 987

[j]M Block, "Professional Liability Insurance and Obstetrical Practice, " commissioned by Michigan State Medical Society, July 1985

[k]H E Crow University of Nevada School of Medicine, Off Ice of Rural Health, Survey of Rural Doctors Regarding Their Participation (Or not) in Obstetrics, " Off Ice of Rural Health, University of Nevada School of Medicine, Mar 11, 1985

[l]The Oregon Medical Association, Ad Hoc 06 Task Force on Professional Liability, "The Impact of Professional Liability Issues on Access to Obstetrical Care in Oregon, " Oregon Medical Association, March 1986

[m]R A Rosen blatt and C L Wright, "Rising Malpractice Premiums and Obstetric Practice Patterns The Impact on Family Physicians in Washington State, " *The Western Journal of Medicine* 146(2) 246-248, February 1987

[n]M L Rosenbach and A G Stone "Malpractice Insurance Costs and Physician Practice, 1983 -1986," *Health Affairs 9(4)* 176-185, 1990

(continued)

Appendix I—Description of 47 Direct Physician Surveys of Defensive Medicine Reviewed by OTA (cont'd).

o) Amerlcan Academy of Family Physicians Commitee on Professional Liablility and Division of Research and Information Services Family Physicians and Obstetrics A Professional Liability Study 1987

p Opinion Analysts Inc The Texas Medical Association Professional Liability Insurance Survey prepared for the Texas Medical Association September 1986

q Georgia Obstetrical and Gynecological Society GOGS 1987 Survey Results Atlanta GA 1987

r G S Bonham Survey of Kentucky Obstetric Practice *Jolurnal of fhe Kentucky Medical Assocliation 349 353,* June 1987

s M A Smith L A Green and T L Schwenk "Family Practice Obstetrics in Michigan Factors Affecting Physician Participation on *The Journal of Family Practice 28(4) 433 437* 1989

t R A Rosenblatt and B Deterlng "Changing Patterns of Obstetric Practice in Washington State The Impact of Tort Reform *Famlily Medicine 20(2)* 101 107, March/April 1988

u Opinion Research Corp , "Professional Liability and Its Effects Report of a 1987 Survey of ACOG's Membership prepared for the American College of Obstetricians and Gynecologists Washington, DC March 1988

v R S Shapiro, D E Simpson, S L Lawrence et al "A Survey of Sued and Nonsued Physicians and Suing Patients " Archives *of Internal Medicine* 1492190 2196 October 1989

w M C Ring, ' Draft Report Changes in Availability of Obstetrical Services in in Illinois" Division of Local Health Administration, Illinois Department of Public Health 1987

x C S Weisman, L L Morlock, M A Teitelbaum et al , Practice Changes in Response to the Malpractice Litigation Climate *Medical Care* 27(1) 16 24 January 1989

Y Texas Medical Association, ' Texas Medical Assocition 1988 Professional Liability Survey" summer 1988

z W P Begneaud, "Obstetric and Gynecologic Malpractice in Louisiana Incidence and Impact " prepared for the Louisiana Section of the American College of Obstetrics and Gynecology, Lafayette, IA 1988

aaA.G. Lawthers, A R Localio and N M Laird, Physicians Perceptions of the Risk of Being Sued " *Journal of Health Politics, Policy and Law* 17(3) 463-482, 1992

bbOpinion Research Corporation, "professional Liability and Its Effecfs: Report of a 1990I *Survey* **Of *ACOG's*** Membership, " prepared for the American College of Obstetricians and Gynecologists, Washington, DC, September 1990

ccOpinion Research Corporation, "Professional Liability and Its Effects Report of a 1992 Survey of ACOG's Membership, " prepared for the American College of Obstetricians and Gynecologists, Washington DC, October 1992

ddE.C. Meader, Jr., , Minnesota Obstetrics and *Gynecology Practice Survey Summary,* prepared for the Minnesota Section of the American College Of Obstetrics and Gynecology, no date

eeWest Virglnia State Medical Association, "West Virglnia State Medical Association's Physician Survey" (unpublished), undated

SOURCE Off Ice of Technology Assessment, 1994

Appendix J: Detailed Critique of Reynolds et al. and Lewin-VHI Estimates

In chapter 3 of this report, the Office of Technology Assessment (OTA) reviewed two wide] y publicized estimates of the costs of defensive medicine and the medical malpractice system-one published in 1987 by Reynolds and colleagues at the American Medical Association (194) and the other published in 1993 by Lewin-VHI, Inc. (1 25). This appendix provides a detailed critique of the data, methods, and assumptions that underlie those estimates.

THE REYNOLDS ESTIMATES

Method 1: Survey of Physicians

Reynolds and colleagues tried to estimate the full impact of the malpractice system on physician costs, including:

- malpractice insurance premiums;
- the time lost in defending against malpractice claims and lawyers' fees not covered by malpractice insurance; and
- practice changes, including
  - —increased recordkeeping,
  - —use of more tests or treatment procedures,
  - —increased time spent with patients. and
  - —increased followup visits.

Of all the practice changes, only two-increases in tests or treatment procedures and followup vis--its—fall within OTA's definition of defensive medicine. Though some observers would claim that more time spent with patients or in documenting medical records is defensive medicine, OTA excluded these practices because it is extremely difficult to measure their frequency and magnitude and because the positive impact of these practices on the
quality of care is less equivocal. In contrast, procedures and followup visits are documented in utilization data, offering an empirical check.

Estimation of malpractice insurance premiums was based on the American Medical Association (AMA) Socioeconomic Monitoring System (SMS) survey, which asks physicians to report their malpractice insurance premiums and other practice costs. The SMS also gives information on days lost from work to defend against malpractice claims and the amount paid for outside attorneys. These data items, though subject to the usual problems of recall bias, are sufficiently accurate for the purposes at hand. (They are also subject to verification with objective premium data and other survey data.) The main problem comes in esti-

mating the net costs of practice changes resulting from malpractice liability.

In its fourth quarter 1984 survey, the AMA asked a series of questions about whether physicians were maintaining mm-e detailed records, prescribing more diagnostic tests and treatment procedures, spending more time with patients. and having more followup visits with patients in the last 12 months in response to their malpractice risks (194). If physicians answered in the affirmative to any of these items, they were asked to quantify the change over the past 12 months in percentage terms.

Table J-1 summarizes the results of the survey. The physicians reported that in 1984 they increased tests and procedures by 3.2 percent and followup visits by 2.6 percent in response to changes in the frequency of malpractice claims. These two practice changes fall within OTA's definition of defensive medicine. The other practice changes, such as increasing recordkeeping and time spent with the patient, may result from the same desire to avoid a malpractice suit, but these practice changes lead to increases in the cost per visit or procedure. Such cost increases would be passed on to consumers in the form of higher fees rather than additional procedures or visits.

Reynolds estimated the cost of all of the 1984 practice changes *except* the cost of extra tests and procedures, which was excluded because the researchers could not find a good way to estimate the average cost of such a diverse array of services. The average cost per physician of the remaining practice changes was $4.600. of which $1,900 was the cost of reported changes in followup visits.

The authors computed the ratio of the 1984cost of practice changes ($4,600) to the 1984 increase in malpractice insurance premiums ($ 1,300), and applied this ratio (3.53) to the average 1984 malpractice premium ($8,400) to arrive at a per-physician cost of practices done in response to the malpractice system: $29,700. or 14percent of average physician revenues. In the aggregate, this cost corresponds to $10.6 billion in 1984.

To summarize, under method 1. Reynolds' total estimate of the cost of the malpractice system for physicians—$ 13.7 billion in 1984---comprises the following elements:

- premiums-$3.O billion.
- other costs of incurring malpractice claims-$0.1 billion, and
- practice changes-$ 10.6 billion.

Of the $13.7 billion in total cost, about $4.3 billion, or 30 percent, represents defensive medicine under OTA's definition.

The estimate of the cost of practice changes has several potential sources of bias. On the one hand, there is reason to believe that Reynolds' estimate of the malpractice system's impact on health care costs is too low because Reynolds and colleagues excluded the reported 1984 cost impact of increased tests and treatment procedures. The importance of this exclusion is unknown. but it rep-

TABLE J-1: Reported Practice Changes in Response to Increasing Liability Risk, 1984

Activity	Percent of physicians making change in 1984	Average percent change in 1984[a]
Increased recordkeeping	31.0%	**2 9%**
Prescription of more test or treatment procedures	**200**	**3 2**
Increased time spent with patients	170	2 4
Increased followup visits	170	2 6
Percent of physicians with at least 1 listed practice charge	41 8	

[a] Calculations include zeros for physicians who did not make practice change

SOURCE American Medical Association Socioeconomic Mon toring System survey as reported in R A Reynolds J A Rizzo and M L Gonzalez "The Cost of Medical Professional Liability *Journal o/ American Medical Association* 257(20) 2776-2781 May 2229 1987

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resents the essence of OTA's definition of defensive medicine and means that the Reynolds estimate probably does not capture the greatest part of defensive medicine.

On the other hand, there is reason to believe that Reynolds' estimate is too high, because the survey may have prompted physicians, who regularly articulate negative feelings about malpractice liability, to overestimate the impact of rising malpractice claims on their practices. Data from the National Ambulatory Medical Care Survey (NAMCS) show no change between 1981 and 1985 in the per-capita number of followup visits; they also show an annualized rate of increase of less than 1 percent in total per-capita physician office visits over the period (70). Barring some dramatic factor at work between 1983 and 1984 to otherwise reduce the frequency of followup visits by as much as 2.3 percent, physicians' responses to the AMA survey appear to exaggerate their actual change in behavior. 1 If physicians overestimated the malpractice system's impact on follow up visits, they may also have done so with the other practice changes.

Finally, Reynolds' approach involved an arbitrary assumption with unknown effects on the validity of the estimate. Reynolds assumed that the ratio of the *change* in practices (in response to malpractice risk) to the *change* in premiums can predict the ratio of the level of such activities to the *level* of premiums in 1984. The authors had no empirical evidence for this assumption, and there is reason to believe that it may be inaccurate.[2] As a consequence of these issues, OTA concluded that Reynolds' first method does not offer a sufficiently reliable estimate of the full cost impacts of malpractice liability and does not offer a basis for estimating the costs of defensive medicine.

Method 2: Relationship Between Reported Malpractice Risk and Physician Fees and Utilization

The researchers examined the relationship between the level of malpractice liability risk, as measured by the 1984 malpractice premium reported by each physician responding to the AMA survey, and the physician's fees and volume of' selected services reported in the same survey. Regression of utilization and fees on premiums[3] and other demographic variables (e.g., physicians per 1,000 population, years in practice, board certification, etc.) gave estimates of the impact of each $1 of premium on the utilization or fee for a given procedure. Doctors with higher premiums were found to have higher fees, but they had lower lev-

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1 It is theoretically feasible that physicians responding to the AMA survey were able to differentiate between extra followup visits they would like to have provided and extra visits that they actually realized, after other independent impacts on visits were taken into account. If, for example, the demand for visits declined over the period, physicians might have ordered more follow up visits for defensive reasons but nevertheless actually provided fewer net visits overall. To accept this possibility y, one would have to believe that physicians responding to surveys could accurately estimate the partial impact of their defensive behavior on the volume of visits.

2 The assumption implies a linear relationship between the frequency of the cited practices and the level of malpractice insurance Premiums, with the graph of the line intersecting the y-axis at the origin. Because ordering extra tests, procedures, and visits does not cost physicians money and is often financially remunerative, there is no reason to believe that as malpractice premiums decline, the motive to practice defensively declines in a linear fashion to the origin. Indeed, one would expect that physicians in 1984 were practicing on the "flat of the curve" where they were already as defensive as they knew how to be. Thus, to the extent that their reported 1984 behavior changes reflect reality, the linearity assumption would understate the amount of defensive medicine. On the other hand, practice changes that take up more time (such as increased time with the patient) would increase the physician's costs and presumably be more directly responsive to increases in premiums. Whether the relationship is linear or not is unknown.

3 The malpractice premium used in the regression analysis was an estimated value based on a first-stage regression of premiums on demographic characteristics, the status of various malpractice reforms in the physician state, and the malpractice claim frequency in the state. This two-stage method of estimation is referred to as the *instrumental variable* technique. The rationale for such an approach is to make the instrumental variable (premiums m this case) a better measure of the actual variable (malpractice risk in this case) than it would be were the actual value used in the regression.

els of use of the most important services studied. Table J-2 summarizes the results for each service.

Reynolds took the findings presented in table J-2 as the basis for estimating what utilization and fees would have been if malpractice insurance premiums (and, presumably, malpractice liability risk) had been zero in 1984. These rates were compared with actual reported utilization and fees to obtain an estimate of the impact of premiums on physician revenues.

The eight services chosen for the analysis represented about 70 percent of the average revenues of self-employed physicians in 1984. Without any malpractice insurance premiums, these revenues would have been reduced (according to the regression estimates) by 11.2 percent of average revenues. In the aggregate, a reduction of 11.2 percent in average physician revenues represents an $8.4 billion saving in expenditures if there were no malpractice insurance premiums (and presumably no malpractice liability system). If the services constituting the 30 percent of average revenues not studied by Reynolds were influenced by premiums to the same extent as the eight studied, the physician revenues saved by no malpractice liability would amount to $12.1 billion in 1984.

The most striking feature of this analysis is that virtually all of the impact on cost comes through increased fees, *not* through increases in utilization of procedures. In fact, utilization of most of the procedures studied appeared to be reduced by higher malpractice insurance premiums. Any pos-

TABLE J-2: Effects of Professional Liability Premiums on Physician Fee and Utilization Levels, 1984

Procedure	Coefficient	Standard Error	% change in fee or utilization per % change in premiums[a]
Fees			
Established patient office visit	O 85	0 17b	O 272
New patient office visit	1 16	0 .37b	0212
Followup hospital visit	1 18	0 .22b	0340
Electrocardiogram	148	0 .46[b]	O 205
Obstetric care, normal delivery	2224	4 .53b	O 427
Hysterectomy	2538	5 .74b	0349
Hernia repair	311	566	0069
Cholecystectomy	-238	860	-0033
Monthly utilization			
Established patient office visit	-6641	28 .97[b]	-0171
New patient office visit	-1381	7 .33c	-0209
Followup hospital visit	-4515	20 .84[b]	-0297
Electrocardiogram	606	3499	0073
Obstetric care, normal delivery	146	1 31	0168
Hysterectomy	-049	063	-0276
Hernia repair	-051	1 12	-0224
Cholecystectomy	070	095	0217

[a] The premium levels used in the computation are the averages for the specialties used in estimating the premium effect for each procedure For patient visits, these include all specialties except radiology, psychiatry, pathology and anesthesiology for electrocardiograms general family practice and internal medicine for obstetric care and hysterectomies, obstetrics-gynecology, and for hernia repairs and cholecystectomies, general surgery

b Indicates regression coefficient is different from O at the 01 significance level

[c] Indicates regression coeff icient is different from O al the 10 sign ificance level

SOURCE R A Reynolds J A Rizzo and M L Gonzalez 'The Cost of Medical Professional Liability, *The Journal of American Medical Association 257(20) 2776-2781,* May *22/29 1987* table 2

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itive effects of malpractice risk on defensive medicine are apparently overshadowed by the negative effect of malpractice risk on demand that results from the higher fees that physicians with higher malpractice risk charge their patients. Thus, if the statistical analysis is correct, high malpractice risk depresses the demand for services as much as or more than it increases defensive medicine.

The method underlying the estimates is based on a standard econometric technique, but as with all econometric analyses, the results might be sensitive to the specification of the statistical model and the ability to measure the relevant variables.[4] Just how sensitive they might be is impossible to tell without more analysis of the quality of the premium measure of malpractice risk or corroborating evidence from other analyses.

To turn the results of the statistical analysis into an estimate of the net costs of the malpractice system, the authors assumed that the relationship between malpractice insurance premiums and practice fees and volumes is linear throughout the range of potential premiums. The assumption that defensive medicine or other practice changes decline in lock-step linear fashion with declines in premiums all the way to the point of zero premiums is unlikely to be accurate, for reasons discussed above. Thus, OTA is unable to verify the accuracy of the estimates derived from the second method.

Even if the total cost estimates are accurate, they do not allow any inferences about the extent or cost of defensive medicine, whose practice is embedded in a larger set of utilization changes resulting from the malpractice system. High or low rates of defensive medicine are equally consistent with the results of the statistical model.

LEWIN-VHI ESTIMATES

Lewin-VHI began with the Reynolds" estimates of the cost of the malpractice system (an average $18.8 million in 1991 constant dollars) and added another $6.1 billion for extra costs incurred in hospitals. Lewin-VHI obtained this hospital cost estimate by assuming that the cost of hospital professional liability in excess of hospital malpractice insurance premiums ($2.7 per dollar of premium) was the same as the ratio of physicians costs to physicians' premiums estimated in the Reynolds study.[5] The preliminary total cost of malpractice—$24.9 billion in 199l—was then reduced by three percentages (80, 60, and 40). This produced "low,''($5 billion) "medium" ($10 billion) and '*high" ($1 4.9 billion) final estimates of the net costs of defensive medicine to the health care system in 1991. The adjustments were made because Lewin-VHI researchers wanted to exclude that portion of defensive medicine not caused solely by liability concerns.

To help justify their estimates, Lewin-VHI researchers described three technologies whose utilization may be influenced by malpractice risk: electronic fetal monitoring in labor and delivery, skull x-rays in emergency rooms, and preoperative laboratory testing.[6] Lewin-VHI researchers concluded that the low estimate of defensive medicine costs ($5 billion) represents a reasonable lower bound on defensive medicine costs based on a brief review of the literature on "unneces-

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[4] For example, the assertion that individual physicians premiums are a good measure of liability risk using the instrumental variables technique cannot be assessed with the information presented in the paper or its unpublished technical appendix Recent research suggests that if an instrumental variable is not a good one, it can lead to misleading and biased results (173,213). The authors had a measure of claim frequency available to them, which they might also have used as a direct measure of malpractice risk. Whether these factors would change the results is impassible to know without carrying out such analyses.

[5] Lewin-VHI obtained this ratio (2.7) from AMA researchers; it is lower than the ratio published in the Reynolds study (3,2).

[6] For example, the authors cited one study of preoperative tests that claimed about $2.7 billion extra is spent each year for unnecessary preoperative testing (138). Because doctors typically do not gain financially from ordering such tests, the Lewin-VHI authors concluded that an appreciable portion of these costs results from fear of malpractice liability (125).

sary" use of these three procedures. Lewin-VHI offered no justification for the upper bound of the range.

Although the Lewin-VHI researchers acknowledged the great uncertainty surrounding any estimate of defensive medicine, the objective basis for their specific adjustments from the Reynolds estimate is weak. The evidence presented in the three clinical examples used for the lower bound estimate does not necessarily reflect the percentage of unnecessary procedures motivated solely (or even primarily) by fear of malpractice liability. Also, the estimates of the number of unnecessary procedures in the studies cited by Lewin-VHI were based on small and sometimes subjective assessments. Finally, they represent only three relatively narrow areas of medicine.

To summarize, Lewin-VHI began with the estimates by Reynolds and colleagues, whose accuracy is unknown and unverifiable, and then made downward adjustments using a fragile base of evidence. Consequently, the Lewin-VHI estimate is not a reliable gauge of the possible range of defensive medicine costs.

Appendix K: Glossary

Accelerated compensation events (ACE)
A set of medical injuries deemed to be statistically "avoidable" with good medical care which would be compensated under a limited no-fault claims resolution system.

Affirmative defense
A response by the defendant in a legal suit that, if true, constitutes a complete defense to the plaintiff's complaint.

Alternative dispute resolution (ADR)
A process outside the judicial system for resolving legal claims. Decisions are made by dispute resolution professionals. ADR can be binding or nonbinding (see *arbitration).*

American Medical Association/Specialty Society Malpractice Liability Project (AMA/SSMLP) Administrative System
A proposed alternative to the malpractice system in which the medical licensing boards in each state would decide medical malpractice cases based on fault (negligence), using an administrative process designed to be more abbreviated and less costly than the current malpractice system.

Arbitration
A form of ADR in which the parties agree to have one or more trained arbitrators hear the evidence of the case and make a determination on liability or damages. The rules of evidence and other procedural matters may often be specified by the parties. There are two types of arbitration: binding and nonbinding. In binding arbitration the arbitration decision is subject to very limited judicial review. If arbitration is nonbinding, the parties may proceed to trial if they are not satisfied with the outcome of the arbitration. Some states require parties to submit a claim to nonbinding arbitration before trial (see also *pretrial screening).*

Attorney fee limits
Legislation that either limits a plaintiff attorney fees to a set percentage of the award or allows for court review of the proposed fee and approval of what it considers to be a "reasonable fee."

Awarding costs, expenses, and fees
Statutes that provide that the losing party in a friv--o1ous suit may be required to pay the other party's reasonable attorney and expert witness fees and court costs. These provisions are designed to deter the pursuit of frivolous medical injury claims.

Caps on damages
Legislative limits on the amount of money that can be awarded to the plaintiff for economic or noneconomic damages in a personal injury claim. such as medical malpractice. The limit is imposed regardless of the actual amount of economic and noneconomic damages.

Certificate of merit
As a prerequisite to filing suit, some states require that a plaintiff obtain a written affidavit from an independent physic i an attesting that the plaintiff suit has merit. This provision is designed to limit nonmeritorious suits.

Claim frequency
A rate expressing the frequency with which physicians are named in malpractice claims. It is usually expressed as the number of malpractice claims per 100 physicians per year.

Collateral source rule
A rule of evidence that prohibits the introduction at trial of an y evidence that a patient has been compensated or reimbursed for the injury from any source (e.g., health or disability insurer). Legislation modifying the collateral source rule has taken two basic approaches: 1) permitting the jury to consider the compensation or payments received from some or all collateral sources and decide whether to reduce the award by the amount of collateral sources; or **2)** requiring a mandatory offset against any award in the amount of some or all collateral source payments received by the plaintiff.

Confidence interval
An interval that contains, with certain probability, the true value of a statistic. The mean is a typical statistic. The true mean lies within the bounds of the 95-percent confidence interval in 95-percent of all samples.

Correlation
A statistic that gauges the strength of association between two variables. The value of a correlation coefficient usually ranges from a minimum of zero (no association at all between the two variables) to a maximum of one (perfect association between the two variables). Some correlation coefficients also have a sign indicating the direction of association between the two variables: a positive sign indicates direct association (as one variable increases in value. the other also increases); and a negative sign indicates inverse association (as one variable increases in value, the other decreases).

Damages
See *economic damages* and *noneconomic damages.*

Defensive medicine
The ordering of extra tests, procedures, and visits or the avoidance of high-risk patients or procedures primarily (but not necessarily solely) to reduce their risk of malpractice 1iability. The performance of extra procedures for defensive purposes is positive defensive medicine. Avoidance of high-risk patients or procedures is negative defensive medicine.

Difference-of-means test
A test of the statistical significance of the difference between two groups in their mean scores on a single variable.

Direct malpractice costs
The net costs of compensating injuries through the medical malpractice system, including costs borne by malpractice insurers, defendants, and plaintiffs.

Discovery
Pretrial tools for obtaining information in preparation for trial. The tools include written and oral questioning of relevant parties, requests for documents, and physical examination of evidence and physical premises. The process of discovery is governed by federal and state rules of civil procedure.

Economic damages
Monetary damages that compensate the plaintiff for his or her actual economic losses—i.e., past and future medical expenses, lost wages, rehabilitation expenses, and other tangible losses,

Enterprise liability
A system under which a health care institution or health insurance plan assumes full legal liability for the actions of physicians acting as their agents, and individual physicians cannot be named as defendants.

Error in judgment rule
An exception to the general requirement that the physician must meet the prevailing standard of care provided by his or her profession. A physi-

cian's conduct will not be judged to fall below the standard of care if the physician chooses between two or more legitimate choices of treatment, even though a better result might have been obtained with a different treatment.

Guidelines
Generally referring to clinical practice guidelines, which are defined by the Institute of Medicine as "systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances. " However, ● 'guidelines" in some cases refers to clinical practice guidelines developed with additional goals explicitly in mind, such as cost containment or reduction of defensive medicine.

Health maintenance organization (HMO)
A health care organization that, in return for prospective per capita payments (cavitation), acts as both insurer and provider of comprehensive but specific health care services. A defined set of physicians (and often other health care providers such as physician assistants and nurse midwives) provide services to a voluntarily enrolled population. Prepaid group practices and individual practice associations, as well as ● 'staff models," are types of HMOs.

Iatrogenic injury
Unintended, detrimental effects on a patient's health as a result of medical care. The term is commonly applied to secondary infections, adverse drug reactions, injuries, or other complications that may follow treatment.

Indirect malpractice costs
A cost of the malpractice system that is not directly associated with the compensation of persons injured by medical malpractice. Defensive medicine is an example of an indirect cost of the malpractice system (see *defensive medicine,* compare *direct malpractice costs).*

Informed consent
As applied to clinical care, a patient's agreement to allow a medical procedure based on full disclosure of the material facts needed to make an informed decision. The required elements of disclosure differ from state to state.

Joint and several liability
A rule under which each of the defendants in a tort suit can be held liable for the total amount of damages, regardless of his or her individual responsibility. In other words, even if a defendant was only 20 percent responsible, he or she could be held liable for 100 percent of the damages if other defendants are unable to pay. Several states have eliminated joint and several liability for medical malpractice so that physicians are liable only in proportion to their responsibility.

Low osmolality contrast agent (LOCA)
A contrast agent is a substance that is used to improve the visibility of structures during radiologic imaging-e. g., angiography, intravenous urography, or computerized tomography (CT) scans. A low osmolality contrast agent has an osmolality (i.e., concentration of dissolved particles in solution) that is closer to the osmolality of body fluids than the osmolality of traditional contrast agents.

Malpractice cost indicators
Factors that reflect direct costs of the medical malpractice system, such as claim frequency, payment per paid claim, and malpractice insurance premiums (see *direct malpractice costs).*

Multivariate analysis
Statistical analysis of three or more variables simultaneously. The most widely used form of multivariate analysis is multiple regression analysis, in which a single dependent variable (the presumed effect) is analyzed as a function of two or more independent variables (presumed causes).

Negligence
In medical malpractice, conduct that falls below the prevailing standard of care in the medical profession (see *standard of care).*

No-fault compensation program
A malpractice reform under which certain medical injuries would be compensated regardless of whether they are caused by negligence. This reform

would be administered in a manner analogous to worker's compensation programs in the states.

Noneconomic damages
Monetary damages that compensate the plaintiff for "pain and suffering," which includes:

- tangible physiologic] pain suffered by a victim at the time of injury and during recuperation,
- the anguish and terror felt in the face of impending death or injury,
- emotional distress and long-term loss of love and companionship resulting from injury or death of a close family member, and
- loss of enjoyment of life by the plaintiff who is denied pleasures of a normal person because of physical impairment.

Normal distribution
A bell-shaped frequency distribution of the values of a variable, so that most of the values fall in the middle of the distribution and few of them fall at the extremes.

Odds ratio
The ratio of the odds of an event occurring under one set of circumstances to the odds of the event occurring under mother set of circumstances.

Patient compensation fund (PCF)
A go~'ernment-operated" mechanism that pays the portion of any judgment or settlement against a health care providcr in excess of a statutorily designated amount. A PCF may pay the remainder of the award or it may have a statutory maximum (e.g.. $1 million).

Payment per paid claim
The average dollar amount awarded to plaintiffs for claims that result in payment.

Periodic payments
Payments to the plaintiff for future damages made over the actual lifetime of the plaintiff or for the actual period of disabi1ity rather than in a prospective lump sum.

Point estimate
A sample-based estimate of the true population value of a statistic-e. g., the mean of a variable (see also *confidence interval).*

Pretrial screening
An alternative dispute resolution procedure that parties use prior to filing a legal suit. The pretrial screening panel usually comprises health care professionals, legal experts, and sometimes, consumers. The panel hears the evidence, including expert testimony, and makes a finding on liability and, in certain cases. on damages. Pretrial screening may be voluntary or mandatory, as specified by legislation. The panel decision is not binding on the parties, so parties may continue to pursue claims through the legal system.

Punitive damages
Monetary damages awarded when the defendant conduct is found to be intentional, malicious, or outrageous, with a disregard for the plaintiffs well-being. (Punitive damages are rarely awarded in malpractice suits.)

Reliability
The reproducibility of a measure. A measure is reliable if it yields similar results each time it is used on similar samples, or if its components yield similar results for the same or similar samples (compare *validity).*

Res ipsa loquitur
A legal doctrine that allows plaintiffs with certain types of injuries to prevail without having to introduce expert testimony of negligence. (Literall y, '*the thing speaks for itself.") A plaintiff must establish that the procedure or incident causing the injury was under the exclusive control of the physician and that such injuries do not occur in the absence of negligence.

Respectable minority rule
An exception to the general rule that a physician must meet the prevailing standard of care provided in his or her profession. A physician is shielded from liability when his or her clinical decision is consistent with the practices of a minority of physicians in good standing.

Right of subrogation
A provision typically found in health and disability insurance contracts that requires a plaintiff to reimburse the insurance company for any pay-

ments received from the tort system that were for services reimbursed by the insurer.

Scale
A composite statistical measure comprising several variables.

Schedule of damages
A set of guidelines for juries to use in deciding appropriate awards for noneconomic damages in malpractice cases.

Standard of care
A legal standard defined as the level of care provided by the majority of physicians in a particular clinical situation. In a malpractice action, a physician's actions are judged against the prevailing standard of care. Negligence is defined as failure to meet the standard of care.

Statistical significance
A statistically significant finding is one that is unlikely to have occurred solely as a result of chance. Throughout this report, a finding is considered to be statistically significant if the probability that it occurred by chance alone is no greater than five out of 100—i.e., a "p value" of 0.05 or less.

Statute of limitations
A legal rule that determines how long after an injury one can bring a lawsuit-e. g., t wo years after the injury. In many states, the "clock" does not start until discovery of the injury. The *discovery rule* states that the date of injury, from which the statutory time period is measured, is the date that it was reasonable for the plaintiff to have discovered the injury rather than the actual date of injury. Injuries may be discovered years after the treatment was provided, so the time period for filing action may be uncertain.

Stratified random sampling
A method of drawing a random sample from a population that has been grouped by population characteristics.

Tort law
A body of law that provides citizens a private, judicially enforced, remedy for injuries caused by another person. Legal actions based in tort have three elements: existence of a legal duty from defendant to plaintiff, breach of that duty, and injury to the plaintiff as a result of that breach.

Tort reform
A legal reform that changes the way tort claims are handled in the legal system or removes claims from the civil judicial system.

Tort signal
Direct or indirect signals from the malpractice system that apprise physicians of their liability risk (e.g., litigation exposure of self or peers, malpractice insurance rates, professional literature and popular media).

Unweighed results
Statistical results based on a disproportionate stratified sample (see *stratified random sampling)* without applying sampling weights (see *weight).*

Validity
Broadly, the extent to which an observed situation reflects the true situation. *Internal* validity is a measure of the extent to which study results reflect the true relationship of an intervention to the outcome of interest in the study subjects. *External* validity is the extent to which the results of a study may be generalized beyond the subjects of the study to other settings, providers, procedures, diagnostics, etc. (compare *reliability).*

Weight
A multiplier applied to each element of a given stratum of a sample (see *stratified random sampling) so* that the sample accurately represents the population from which the sample was drawn. A weight can be thought of as the number of members of the population represented by each respondent.

Weighted results
Results to which sampling weights have been applied (see *weight).*

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