Summary of the Evidence on Defensive Medicine

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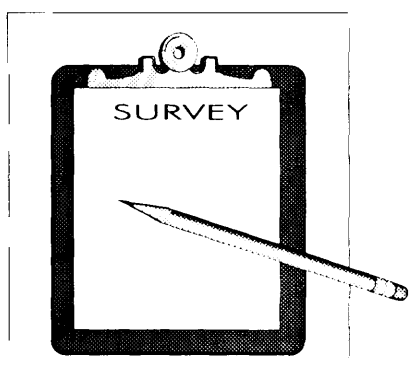
For more than two decades, news stories, interest groups, and witnesses at congressional hearings have quoted estimates of the extent of defensive medicine and its impact on health care costs. Often these statements have been based on anecdotes, which mayor may not represent the general experience of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

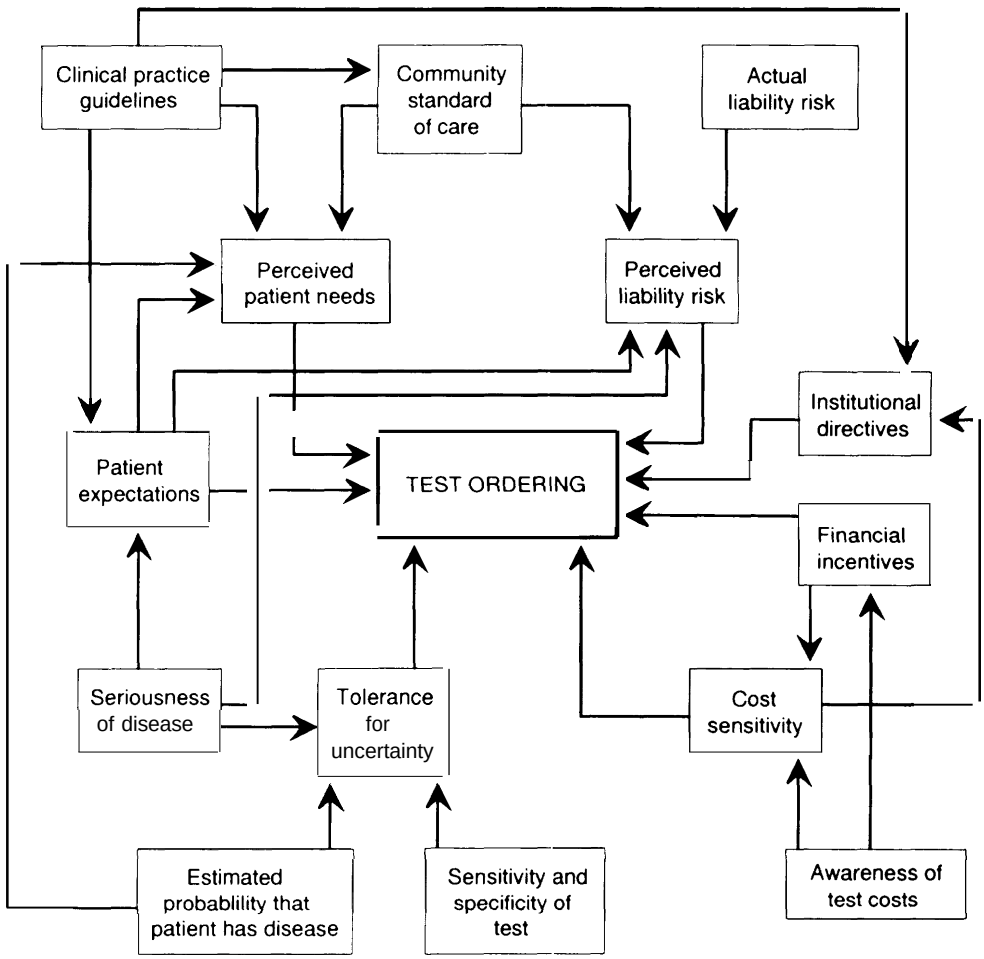
Some studies surveyed physicians directly about the extent of their defensive behavior; others used objective data and more sophisticated statistical analyses. To expand the base of knowledge in this area, OTA undertook four physician surveys and commissioned three additional empirical studies.



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SOURCE Off Ice of Technology Assessment, 1994 Adapted from unpublished work of RichardKravitz, MD, Assistant Professor of Medicine, University of California, Davis, School of Medicine, Sacramento, CA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

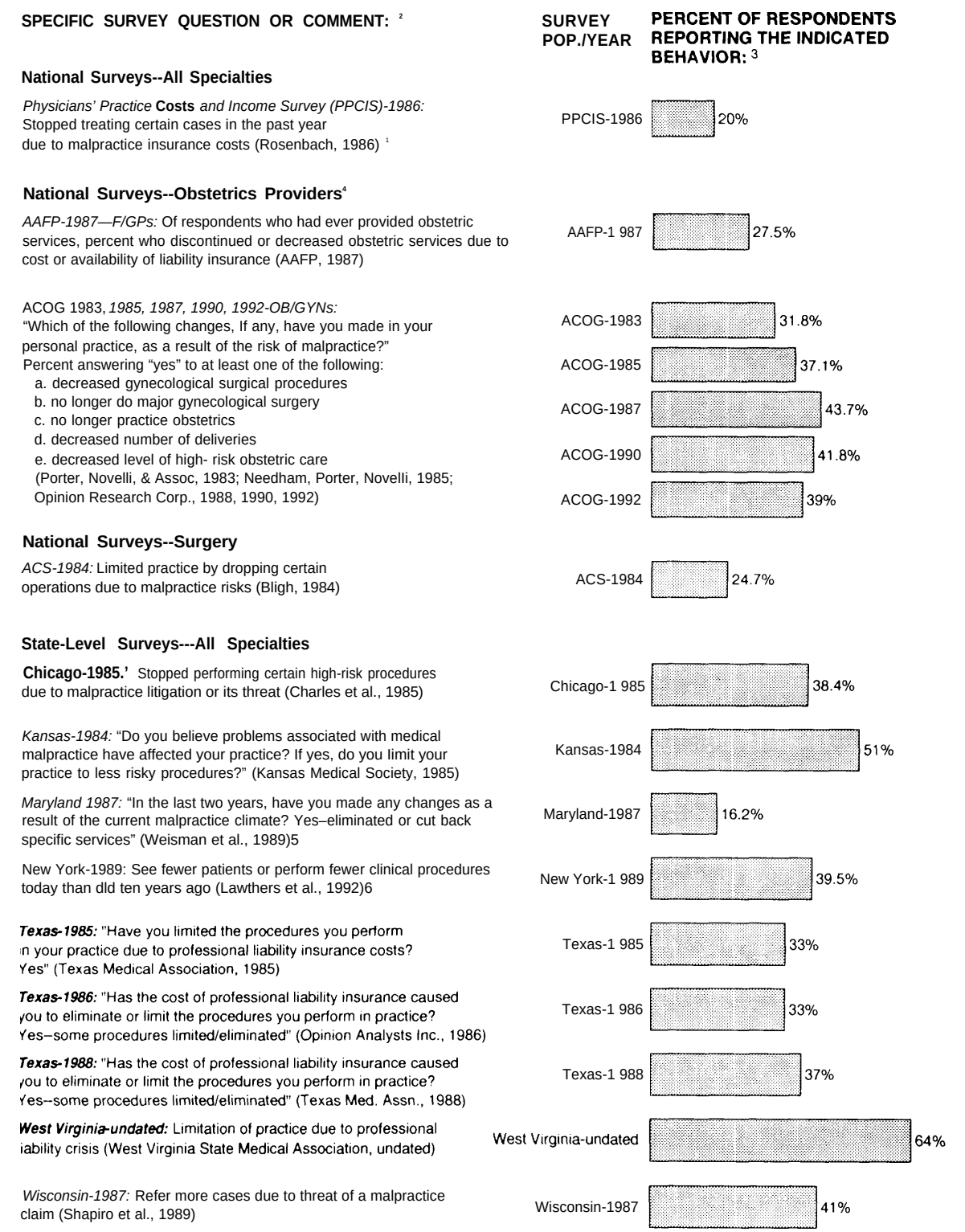

FIGURE 3-2: Selected Results of Direct Physician Surveys of Negative Defensive Medicine[1] (Cont'd.)

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-I 986	9.6%

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

2 If the actual quest on was available it is giver in quotation marks Otherwse a brief descr ption of reported behavior is prov ded

[3] Unless otherw se spec fied 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 [] uestior was asked in the context of numerous questions regarding malpractice

[7] In the 1985 Georgia survey respondents were g ven a choice between *age health malpractice* and *other* p *ac* 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 factor Where two factors bave the same mean rank they are given the same value
b Includes 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 Medicine contract report prepared for the Office 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.