WISCONSIN STATE LEGISLATURE
COMMITTEE HEARING RECORDS

# 2005-06
(session year)

# Assembly
(Assembly, Senate or Joint)

# Task Force on Medical Malpractice (ATF-MM)

Sample:

Record of Comm. Proceedings ... RCP
- 05hr_AC-Ed_RCP_pt01a
- 05hr_AC-Ed_RCP_pt01b
- 05hr_AC-Ed_RCP_pt02

- *Appointments* ... *Appt*
- **

- *Clearinghouse Rules* ... *CRule*
- **

- *Committee Hearings* ... *CH*
- **

- *Committee Reports* ... *CR*
- **

- *Executive Sessions* ... *ES*
- **

- *Hearing Records* ... *HR*
- **

- *Miscellaneous* ... *Misc*
- **05hr_ATF-MM_Misc_pt16c**

- *Record of Comm. Proceedings* ... *RCP*
- **

# Appendix A: Method of Study

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

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

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

The project had four components:

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

## PLANNING WORKSHOP

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

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

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

## ADVISORY PANEL

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

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

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

## CLINICAL SCENARIO SURVEYS

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

In total, OTA surveyed 5,865 physicians; the average response rate was 60 percent. For the analysis of the data, OTA worked closely with Russell Localio of the Center for Biostatistics and Epidemiology, School of Medicine, Pennsylvania State University. An analysis plan for the surveys was discussed at the advisory panel meeting in September 1993.

## ADDITIONAL EMPIRICAL RESEARCH

In addition to its clinical scenario studies, OTA commissioned several other empirical studies of defensive medicine.

Initially, OTA had hoped to do a large-scale statistical analysis of the relationship between malpractice risk and use of health care services. However, after concerted efforts to identify good sources of data on malpractice claims and health care utilization, it became clear that adequate data were not avail able to conduct such analysis on a national level.

OTA then considered doing a smaller analysis of this type using comprehensive hospital discharge and malpractice claims data from Florida—the only state for which such data were readily available. On June 2, 1993, OTA convened a special workshop to identify indicators of defensive medicine in a hospital setting that could be measured using discharge data abstracts. Workshop participants included seven practicing physicians with expertise in analysis of utilization data, an economist from the Center for Health Policy

Studies at Georgetown University, and an individual familiar with the two Florida databases. (Participants are listed at the end of this appendix.) Although the workshop produced a short list of potentially useful indicators, OTA ultimately decided not to proceed with the analysis because the data available were not adequate to control for a variety of other factors known to affect utilization of the procedures. Without those controls, the results of the analysis would have been highly equivocal.

OTA was able to find several researchers with data that could be used to measure defensive medicine. OTA funded Dr. Laura-Mae Baldwin and other faculty from the Department of Family Medicine, University of Washington, to examine the impact of medical malpractice liability experience on the treatment of low-risk obstetric patients by a sample of obstetricians and family practitioners in Washington State. OTA also funded Drs. Kevin Grumbach and Harold Luft of the University of California at San Francisco to examine whether increases in malpractice premiums in New York State led obstetricians and family practitioners to drop their obstetric practice.

Finally, OTA commissioned several papers on medical malpractice and defensive medicine. The major contract papers prepared under this assessment are listed at the end of this appendix. Almost all of these contract papers were sent out for external review.

## BACKGROUND PAPERS

As OTA began its research on defensive medicine and medical malpractice, it became apparent that there were many important issues relating to medical malpractice reform that might be of interest to Congress during the health care reform debate. OTA decided to issue a separate background paper on medical malpractice reform. The background paper, *Impact of Legal Reforms on Medical Malpractice Costs,* was published in September 1993. OTA reviewed statutes and surveyed state attorneys general to document the current status of malpractice reform in the states. The paper also examined the best evidence regarding the impact of malpractice reforms on the indicators of the direct costs of the medical malpractice system—malpractice insurance premiums, payments per paid claim, and frequency of claims.

In addition, in response to the request from the Sunbelt caucus, OTA issued a background paper in August 1992, titled *Do Medicaid and Medicare Patients Sue Physicians More Often Than Other Patients ?* This paper was a review of the available literature on whether Medicaid and Medicare patients were more likely to sue their physicians than patients with private health insurance or patients without insurance.

## REPORT REVIEW PROCESS

Prior to completing the draft, the main contract papers were sent out for review. The 10 contract papers were reviewed by a total of 58 outside reviewers. After completing the reviews of the contract papers, a preliminary draft of OTA's report was prepared and submitted for review and critique to the advisory panel in January 1994. The advisory panel was given 10 days to review the draft for problems that were important enough to warrant attention before an outside review draft was prepared. Several panel members sent comments, but very few substantive changes were necessary before the final review draft.

In February 1994, a formal draft for outside review was prepared and sent to both advisory panelists and a selected group of 80 outside reviewers. The reviewers (including the panelists) represented a wide range of expertise and interests. In all, OTA received a total of 47 sets of reviews, including those from advisory panel members. OTA reviewed and revised the draft as appropriate in response to these comments.

## Participants in the OTA Workshop on Defensive Medicine and Medical Malpractice, Washington DC, November 26, 1991

**Laura -Mae Baldwin, M. D., MPH**
Assistant Professor
Department of Family Medicine
Seattle, WA

**Randall R. Bovbjerg, J.D.**
Senior Research Associate
The Urban Institute
Washington, DC

**Laura Morlock, Ph.D.**
Professor and Division Head
Health Finance and Management
Johns Hopkins University
School of Public Health and Hygiene
Baltimore, MD

**Lawrence R. Tancredi, M. D., J.D.**
Director
Health Law Program
University of Texas Health Science Center
Houston, TX

**Richard Kravitz, M.D.**
Consultant
The Rand Corporation
Santa Monica, CA

**Russell Localio, J. D., M.P.H.**
Research Associate
Center for Biostatistics and Epidemiology
School of Medicine
Pennsylvania State University
Hershey, PA

**Brad Cohn, M.D.**
President
Physician Insurers Association of America
San Francisco, CA

**David Sundwall, M.D.**
American Healthcare Systems Institute
Washington, DC

## Participants in the OTA Workshop on Developing Indicators of Defensive Medicine Using Hospital Discharge Data Abstracts, Washington, DC, June 2, 1993

**Jack Hadley, Ph.D.**
Center for Health Policy Studies and Department of Family and Community Medicine
Georgetown University
Washington, DC

**Richard L. Kravitz, M. D., M.S.P.H.**
Department of Medicine
UCLA School of Medicine
Los Angeles, CA

**Jeremy Sugarman, M. D., M.P.H.**
Division of Internal Medicine
The Johns Hopkins University School of Medicine

**Arthur Garson Jr., M. D., M.P.H.**
Duke University Medical Center
Durham, NC

**John Ayanian, M.D.**
Department of Health Care Policy
Harvard Medical School
Boston, MA

**Jeffrey Whittle, M.D.**
Division of General Internal Medicine
University of Pittsburgh
Pittsburgh, PA

**James R. Ligas, M. D., Ph.D.**
Department of Surgery
University of Connecticut School of Medicine
Farmington, CT

**Mark I. Taragin, M. D., M.P.H.**
Division of General Internal Medicine
Robert Wood Johnson Medical School
University of Medicine and Dentistry of New Jersey
New Brunswick, NJ

**James Phillips, R.R.A.**
Center for Health Statistics
Department of Health Care Administration
State of Florida
Tallahassee, FL

## Major Contract Papers Prepared for the Defensive Medicine and Medical Malpractice Project

**L. M. Baldwin, M.D., M. P. H., L.G. Hart, M. D., M. Lloyd, A. R.M., M. Fordyce, M. A., and R.A. Rosenblatt, M. D., M. P.H.,** Department of Family Medicine, University of Washington, Seattle WA, "Malpractice Claims Exposure and Resource Use in Low Risk Obstetrics," Nov. 21, 1993.

**P. Ehrenhaft, M. P. H.,** Lake Oswego, OR, "Do Medicaid and Medicare Patients Sue Physicians More Often Than Other Patients?" August 1992.

**K. Grumbach, M. D., D. Peltzman-Rennie, B. A., and H.S. Luft, Ph. D.,** Institute for Health Policy Studies and the Department of Family and Community Medicine, University of California, San Francisco, CA, "Charges for Obstetric Liability Insurance and Discontinuation of Obstetric Practice in New York," Dec. 7, 1993.

**P.A. Glassman, M. D., M.Sc., L.P. Petersen, M.S., Bradley, M. A., B.A., J.E. Rolph, Ph. D.,** RAND, Santa Monica, CA, "The Effect of Malpractice Experience on Physicians' Clinical Decision -Making," Dec. 1993.

**M. Hall, J. D.,** Wake Forest University School of Law and Bowman Gray School of Medicine, "The Effect of Insurance Coverage Law on Defensive Medicine," Aug. 25, 1993.

**P. Jacobson, J. D., M. P. H., and C.J. Rosenquist, M. D.,** RAND, Santa Monica, CA, 'The Diffusion of Low Osmolality Contrast Agents: Technological Change and Defensive Medicine," March 1993.

**E. Kinney, J. D., M. P. H.,** The Center for Law and Health, Indiana University School of Law, Indianapolis, IN, "The Impact of Proposed Tort Reform on the Medical Malpractice System and Physician Behavior," June 1993.

**T.B. Metzloff, J. D.,** Duke University School of Law, "Defensive Medicine and the Use of Medical Technology: Physician Involvement in Medical Malpractice Litigation," Jan. 1994.

**L. Modock, Ph. D., and F.E. Malitz, MA.S.,** School of Hygiene and Public Health, The Johns Hopkins University, Baltimore MD, "Short-Term Effects of Tort and Administrative Reforms on the Claiming Behavior of Privately Insured, Medicare, Medicaid and Uninsured Patients," Sept. 30, 1993.

**G. Ruby,** Consultant, Garret Park, MD, "The Role of Medical Education in Promoting the Practice of Defensive Medicine," Apr. 28, 1993.

# Appendix B: Acknowledgments

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Maine Bureau of Insurance
Augusta, ME

**John Ayanian**
Harvard Medical School
Boston, MA

**Pamela P. Bensen**
Oxford, ME

Elizabeth **Brandt**
**California** Department of Health Services
Sacramento, CA

**Theodore Briggs**
Medical Mutual Insurance Co.
Portland, ME

**Kathy Bryant**
American College of Obstetricians and Gynecologists
Washington, DC

**Joel Cantor**
Robert Wood Johnson Foundation
Princeton, NJ

**Rebecca Chagrasulis**
Casco, ME

**David Chinoy**
Jacksonville. FL

**Mark Cohen**
University of California, Davis Medical Center
Sacramento, CA

**Mark M. Connolly**
Chicago, IL

**Milton 1. Cooper**
Kaiser Permanente Medical Care Program
Oakland, CA

**Philip H. Corboy**
ABA Special Committee on Professional Liability
Chicago, IL

**Joan Corder-Mabe**
Department of Health
Richmond. VA

Susan Cox
University of Texas
Dallas, TX

**Daniel Creasey**
Risk Management Foundation of the Harvard Medical Institutions
Cambridge, MA

**Myles P, Cunningham**
Evanston, 11,

**Robert diBenedetto**
Baton Rouge, LA

**Leonard S. Dreifus**
Philadelphia, PA

**James Fabian**
**The** New York Hospital
New York, NY

**Don Fadjo**
Gold River, CA

**Richard M. Flowerdew**
Portland, ME

**Thomas F. Floyd**
Bangor. ME

**Larry Ganslaw**
American College of Cardiology
Bethesda, MD

**Arthur Garson, Jr.**
Duke University Medical Center
Durham, NC

**Lillian Gaskin**
American Bar Association
Washington, DC

**Paul Geauvreau**
Geauvreau & Blackburn
Lewis ton, ME

**Edward Goldman**
University of Michigan
Ann Arbor, ME

**Paul Gluck**
Miami, FL

**Susan Goold**
University of Michigan Medical Center
Ann Arbor, MI

**Margaret 6. Griffin**
Waterville, ME

**Jim Gross**
University of California, Davis Medical Center
Sacramento, CA

**Jack Hadley**
Georgetown University
Washington, DC

**Martin Hatlie**
American Medical Association
Chicago, IL

**Kenneth Heland**
American College of Obstetricians and Gynecologists
Washington, DC

**Alnoor Hemani**
The Johns Hopkins University
Baltimore, MD

**James R. Hines**
Chicago, IL

**Robert E. Hirshon**
Dummond, Woodsum, Plimpton & MacMahon
Portland, ME

**Chris Hogan**
Physician Payment Review Commission
Washington, DC

**E. Kirk Huang**
Potomac, MD

**Tricia Hunter**
Sacramento, CA

**Richard D. Judge**
Ann Arbor, MI

**Graham Kalton**
Westat, Inc
Rockvillc, MD

**Mary Kaynor**
Risk Management Foundation of the Harvard Medical institutions

**Raynard Kington**
RAND
Santa Monica, CA

**Leonard 1. Kranzler**
Chicago, IL

**John A. LaCasse**
Medical Care Development
Augusta, ME

**Ann Lawthers**
**Harvard School of Public Health**
Boston, MA

**James R. Ligas**
University of Connecticut School of Medicine
Farmington, CT

**Barbara A. Luke**
Portland, ME

**John Lundberg**
Regents of the University of California
Oakland, CA

**Robert Markowitz**
Federation of Jewish Philanthropies Service Corp.
New York. NY

**William C. McPeck**
Augusta, ME

**Irving Meeker**
Portland, ME

**Daniel Mendelson**
Lewin–VHI, Inc.
Fairfax, VA

**Daniel L, Meyer**
Augusta, ME

**Fabrizio Michelassi**
Chicago, IL

**Jean M. Milligan**
Augusta, ME

**Don Harper Mills**
Professional Risk Management Corp.
Long Beach, CA

**Penny S, Mills**
American College of Cardiology
Bethesda, MD

**David Nagey**
Baltimore, MD

**Joseph P. Newhouse**
Harvard University
Boston, MA

Neil **Newton**
Augusta, ME

**Michael A. Nocero, Jr.**
Orlando, FL

**Paul Nora**
**American College of Surgeons**
Chicago, IL

**Jeffrey O'Connell**
University of Virginia Law School
Charlottesville, VA

**Donald C. Overy**
Bloomfield, MI

**James Phillips**
State of Florida
Department of Health Care Administration
Tallahassee, FL

**Stuart M. Poticha**
Chicago. IL

**O. Howard Reichman**
**Maywood, IL**

**John Rizzo**
**Yale** University School of Medicine
New Havce, CT

**David L. Roseman**
Chicago, IL

**Robert Rubin**
Lewin-VHI, Inc.
Fairfax, VA

**Kevin A. Schulman**
GeorgetownUniversityMedical Center
Washington, DC

**Ruth Schwartz**
Rochester, NY

**David Shapiro**
**Physician** Payment Review Commission
Washington, DC

**Tonya Sharp**
Chapel Hill, NC

**Rebecca Shaw**
**Des** Moines, IA

**Frank Sloan**
Duke University
Durham, NC

**Robert Smith**
San Francisco, CA

**Robert Stolt**
Lipman & Katz
Augusta, ME

**Robin Stombler**
American College of Surgeons
Washington. DC

**James L. Stone**
Cook County Hospital
Chicago, IL

**Selma Taffel**
National Center for Health Statistics
Washington. DC

**Mark 1. Taragin**
Robert Wood Johnson Medical School
New Brunswick, NJ

**George O. Thomasson**
COPIC Insurance Company
Englewood, CO

**Ronald J. Trahan**
Augusta, ME

**Sandy Ulsaker**
**St. Paul** Companies, Inc.
St. Paul, MN

**Harvey F. Wachsman**
**Pegalis and** Wachsman
Great Neck, NY

**Walter Wadlington**
University of Virginia
Charlottesville, VA

**Kate Wallace**
**Consumer** Product Safety Commission
Washington, DC

**Sylvan L. Weinberg**
Dayton. OH

**Jeffrey Whittle**
University of Pittsburgh
Pittsburgh, PA

**Debra Williams**
Prospective Payment Assessment Commmission
Washington, DC

**Sidney Wolfe**
Public Citizen Health Research Group
Washington, DC

**Stephen Zuckerman**
The Urban Institute
Washington. DC

# Appendix C: The Impact of Nonclinical Factors on Physicians' Use of Resources

Although clinical factors are still the most important determinants of physicians' clinical decisions (61 ), research suggests that a number of nonclinical factors also influence physicians' diagnosis and treatment choices, among them malpractice liability concerns.

The influence of malpractice risk on physician behavior is discussed at length in chapters 2 and 3 of this report. This appendix briefly reviews some evidence on the influence of other nonclinical factors in physicians' decisions about resource use.

## AWARENESS OF AND SENSITIVITY TO TEST COSTS

A number of studies have suggested that physic c ians are sensitive to costs when ordering tests and prescribing treatments (1 1,65,97,1 33,225). For example, one study found that physicians who were given information on test costs ordered 14 percent fewer tests per patient than physicians who are not given cost information (225).

In a study of test use for hypertensive patients, cost to patient was cited as an important reason for not ordering electrocardiograms (65). An OTA-sponsored clinical scenario study found that physicians with greater levels of cost-consciousness (measured by using attitude scales) reported they would use fewer resources than physicians with lower levels of cost-consciousness (73).

## FINANCIAL INCENTIVES

Several studies have found that diagnostic testing and other service use is lower in prepaid and salaried practice settings than in fee-for-service systems (64,92, 136, 140,208). Other types of financial incentives have also been shown to have an effect on use.

For example, a study of physicians in a for-profit chain of ambulatory care centers found that use of laboratory tests and x-rays increased substantially (23 and 16 percent, respectively) after physicians were offered bonuses for increasing patient care revenues (91 ).

Other studies have shown that physicians respond to reduced fees by increasing the volume of services they perform ( 189,195,205). Finally, physician ownership of testing and treatment facilities has been associated with increased resource use (93,2 14,245).

## INSURANCE COVERAGE

Insurance status of patients has also been associated with willingness to use resources. This may reflect physicians' sensitivity to both their own and patients' financial concerns. Research has consistently shown that hospitalized patients with private insurance coverage stay in the hospital longer and receive more procedures (especially more discretionary and high-cost procedures)

than patients with Medicaid coverage or patients who lack health insurance (238).

For example, a recent study of low-income pregnant women in Massachusetts (82) found that public health insurance coverage increased their likelihood of undergoing a Caesarean section. Service-specific financial incentives did not play a role, as the public insurance program paid a global fee regardless of type of delivery. Another study of patients with ischemic heart disease in California hospitals found that, after controlling for demographic, clinical, and hospital characteristics, the frequency of coronary revascularization procedures (coronary artery bypass surgery and coronary angioplasty) was almost two times higher in fee-for-serv ice patients than in health maintenance organization (HMO) and Medicaid patients (121). The same study also found that the rate of coronary revascularization increased more quickly in fee-for-service and HMO patients than in Medicaid patients between 1983 and 1985 (121 ).

## PROXIMITY OF TECHNOLOGY

Some studies have shown that the availability of technologies influences their use. For example, a recent study of acute myocardial infarction (AMI) patients in Seattle found that patients admitted to hospitals with onsite cardiac catheterization facilities were three times as likely as patients in hospitals without those facilities to undergo coronary angiography. After adjusting for clinical factors, the existence of onsite catheterization facilities was the strongest predictor of use of coronary angiography (66). A similar study in New York corroborated these results, finding that AMI patients admitted to facilities offering cardiac catheterization, bypass surgery, and angioplasty services were two to six times as likely as patients in facilities not offering them to receive these services (18).

Another study of physician practice patterns suggested that some of the otherwise unexplained variation may be influenced by differences in physicians ' "enthusiasm" for using certain interventions (39). This enthusiasm may be a byproduct of other related issues, such as greater familiarity with the technique, a role in its pioneering, or availability of technology.

## OTHER FACTORS

Other factors associated with physicians' use of tests and procedures include physician specialty and training (62, 123,126, 175,257,259), practice setting (e.g., managed care versus unrestricted private practice) (135, 136) and patient expectations (144).

[1]For example, one study found that internists and family practitioners ordered more diagnostic tests than general practitioners (62).

# Appendix D: Methods Used in the OTA Clinical Scenario Surveys

This appendix summarizes the methods used to develop and analyze surveys of three physician professional societies. The Office of Technology Assessment (OTA) cooperated with three physician associations to conduct clinical scenario surveys of association members by mail from February through August of 1993.[1] The three physician associations, listed in the order in which they were surveyed, were:

- the American College of Cardiology (ACC),
- the American College of Surgeons (ACS), and
- the American College of Obstetricians and Gynecologists (ACOG).

The ACS component actually involved two separate surveys: one for general surgeons and the other for neurosurgeons. Thus, four distinct surveys were actually conducted.

The questionnaire for each survey was developed jointly between OTA and the respective association. ACC maintains an ongoing "practice panel" sample of its practicing members and conducted its own mailout, data entry, and initial data editing. For the other two surveys, these tasks were shared between OTA and the respective association. OTA performed all final data editing, processing, and analysis. Strict rules protecting respondent confidentiality were observed by all participating organizations.

## SURVEY INSTRUMENT CONTENT AND FORMAT

The main goal of each survey was to ascertain, as unobtrusively as possible, the extent to which physicians would choose "malpractice concerns" from among several reasons for selecting or rejecting specific diagnostic or therapeutic procedures in treating specific hypothetical cases. Respondents were presented two or three specific clinical scenarios appropriate to their respective specialties. Introductory letters from both the physician association and OTA described the purpose of the survey in general terms, without mentioning malpractice or defensive medicine. Two separate instruction pages, including an example scenario, explained how the questionnaire should be

[1] Dr. Russell Localio of Pennsylvania State University and Dr. Jeremy Sugarman of Duke University were consultants to OTA on the design of the survey instruments and statistical analysis. Dr. Localio designed the sampling plan and data analysis components of the surveys and participated extensively in the analysis and interpretation of the survey results. Dr. Sugarman consulted on the development of the format and content of the clinical scenarios used in the surveys.

completed. Copies of a all survey instruments are presented in a technical appendix available from OTA upon request.

## Clinical Scenarios

### Scenario Format and Content

The clinical scenarios in each of the four surveys were developed by an expert panel containing from seven to 10 members of the relevant physician association (selected by association leadership in cooperation with OTA project staff and consultants). During a one-day meeting at the association headquarters, the panel members were asked to "brainstorm" at least 20 clinical scenarios in which concerns about liability would be expected to strongly influence clinical actions. Then the panel was asked to select from these candidates three or four scenarios that would be expected to elicit the strongest defensive medicine responses for inclusion in the survey.

Panel members were also asked to create a "control" version of each selected case by adding or deleting one or more key clinical indicators (e.g., a result from a laboratory or radiologic test) that would, in the opinion of the panelists, greatly reduce the likelihood that malpractice concerns would be cited as the primary reason for choosing any action. OTA staff and consultants then selected and refined the final scenarios, with input from association leaders and panel members. Each questionnaire was pretested on a small sample of association members who were excluded from the final survey.

Each clinical scenario:

- described the patient's demographic characteristics, symptoms, vital signs, and initial diagnostic test results;
- presented between 3 and 13 diagnostic or therapeutic procedures, including the option of essentially doing nothing; and
- presented four reasons for choosing or rejecting each procedure:
  - —medical indications,
  - —concerns about costs versus benefits,
  - —malpractice concerns, and
  - —patient expectations.

"Other (specify)" was also a choice under both the procedures and the reasons for choosing them.[2]

The respondent was asked to:

- choose "yes" or "no" for each procedure,
- check one or more reasons for that choice, and
- double-check the most important reason for the choice.

Only one double-check was allowed for each procedure. These choices were presented in a grid format, with the procedures as rows and the reasons as columns. The first "procedure" listed was typically "do nothing," and the rest were diagnostic and therapeutic interventions with varying degrees of "invasiveness" or technological sophistication.

### Case and Control Scenarios

ACC and ACS respondents each received two scenarios, while ACOG respondents received three (see below). In each survey, the "case" version of one scenario was given to a randomly chosen subgroup of respondents, and the "control" version of that same scenario was given to the remaining respondents. One or two additional scenarios in each survey, referred to here as "common" scenarios, were sent to all respondents. Thus, the first randomly selected subgroup of surveyed physicians received one or two scenarios (all of which were selected because concern about liability was

[2] In place of "other," the ACC survey used "institutional protocols/professional guidelines" as the fifth reason. Although "other" was listed as a procedure on the ACC questionnaire, the association did not code the presence or absence of a written response in that box. Consequently, OTA was unable to include "other procedure" in its analysis of the ACC data.

expected to be frequent); the other received the control scenario and one or two common scenarios, The specific combination of scenarios presented to each group of respondents is summarized in table D- 1. Special analytical problems posed by this case-control design are discussed later in this appendix.

### *Open-Ended Version of the ACS General Surgeon Survey*

A supplemental sample of general surgeons was sent an "open-ended" version of each ACS clinical scenario used in the main survey of general surgeons (case versions only—see previous section). The open-ended questionnaire offered no specific "reasons" for choosing procedures. Instead, a blank space was provided beside each procedure, in which respondents could fill in their own reasons, in their own words, for choosing the procedure. A senior OTA staff member coded the responses on these open-ended questionnaires into the categories of "reasons" given in the main questionnaire. Responses were coded as citing "malpractice concerns" if they contained any suggestion at all of defensive practice (e.g., ". . . to cover myself").

## Attitudinal and Demographic Items

Each survey instrument contained items on two or three professional or demographic characteristics (e.g., practice setting) that were particularly relevant to malpractice issues within that specialty.[3] The instrument also contained a set of attitudinal items provided to OTA by Dr. Susan Goold of the University of Michigan, who had developed and tested three composite scales based on those items (77). For this report those attitude scales were labeled as follows:

TABLE D-1: Combinations of Clinical Scenarios in OTA Surveys of Defensive Medicine

| Association | Group | Scenario 1 (case/control) | Scenario 2 (common) |
|---|---|---|---|
| American College of Cardiology | Group 1 (case) | Chest pain case | Syncope |
| | Group 2 (control) | Chest pain control | Syncope |
| American College of Surgeons | | | |
| General surgeons | Group 1 (case) | Rectal bleeding case | Breast pain |
| | Group 2 (control) | Rectal bleeding control | Breast pain |
| Neurosurgeons | Group 1 (case) | Back pain case | Head injury |
| | Group 2 (control) | Back pain control | Head injury |
| American College of Obstetricians and Gynecologists | Group 1 (case) | Perimenopausal bleeding case | Breast lump<br>Complicated delivery |
| | Group 2 (control) | Perimenopausal bleeding control | Breast lump<br>Complicated delivery |

SOURCE Off ice of Technology Assessment, 1994

[3]These characteristics were jointly selected by staff members of OTA and the relevant physician association, considering not only differences among the specialties, but also the unavailability of some characteristics in each association's membership database (also see the section on sampling, below). Most importantly, the following measures were not available: in the ACC survey, the number of years in practice; in the ACS survey, geographic region; and in the ACOG survey, whether the respondent held an academic appointment. Also, the categories of the respondent's usual practice setting differed slightly from survey to survey, reflecting the different categories used by the associations themselves. Finally, as measures of the number of years in practice, ACS used years since board certification, whereas A COG used years of membership m the association. These unavoidable variations in measurement reduced the comparability of results from the four surveys.

- Malpractice Concern,
- Cost Consciousness, and
- Discomfort with Clinical Uncertainty.

Additional items regarding satisfaction with medical practice were developed by OTA and Dr. Goold to serve as decoy items in the surveys.

Each attitude item offered five response categories, scored as 1 through 5 (respectively): strongly agree, agree, unsure, disagree, and strongly disagree. The Malpractice Concern scale contained five items, the Cost Consciousness scale contained six items, and the Discomfort with Clinical Uncertainty scale originally contained three items. However, OTA did not use the entire Uncertainty scale for the ACOG survey (only one Uncertainty item was included in that survey), after receiving written comments from ACS respondents regarding how similarly worded the items were.

Each respondent's scores (1 through 5) on all the items in a given scale were summed to obtain a total scale score.[4] To make a "5" represent agreement rather than disagreement (so that the summed scores would measure agreement), the item scores were reversed by subtracting them from 6, except where an item was worded negatively (e.g., where agreement represented low malpractice concern). The scores for the five-item Malpractice Concern scale thus ranged from 5 (minimal malpractice concern) to 25 (maximal malpractice concern), whereas the six-item Cost Consciousness scale ranged from 6 (minimal cost consciousness) to 30 (maximal cost consciousness). The three-item Uncertainty scale, which ranged from 3 (minimal discomfort with clinical uncertainty) to 15 (maximal discomfort with clinical uncertain y), was computed on] y for ACC and ACS respondents because the ACOG survey contained only one Uncertainty item (see above).

## SAMPLING

OTA and its consultant, Russell Localio, developed a sampling plan for each survey, with input from association staff. Sampling fractions were based on statistical power calculations for two-sample comparisons, with rough assumptions about the survey response rate and the number of respondents who would choose clinical procedures primarily because of malpractice concerns. Sampling fractions varied across sampling strata to ensure adequate numbers of respondents in each subclass of physicians. Each physician association then drew a sample from its membership database according to detailed instructions provided by OTA. Population sizes, sample sizes, numbers of respondents, and response rates for each survey are displayed in table D-2. All four surveys targeted only association members who, according to the membership database:

- had earned the degree of either Medical Doctor (MD) or Doctor of Osteopathy (DO).
- were not in residency training,
- were not retired,
- were board certified in the relevant specialty, and
- were currently practicing in the United States.

All four samples were drawn from the association's membership database through systematic stratified random sampling. However, due to limitations of the membership databases and special association concerns, the stratification factors differed somewhat from survey to survey. These and other features of the four samples are summarized in table D-3. Other differences also existed among the four samples:

- ACC used its existing "Professional Practice Panel," a standing sample of about 1,500 practicing members who are occasional] y surveyed

[4] Dr. Goold reported that this simple additive approach was most appropriate, given that factor analysis had failed to create satisfactory composite scales with weighted individual items (76)

**TABLE D-2: Samples for OTA Clinical Scenario Surveys of Defensive Medicine**

| Survey | Group | Population | Sample | Respondents[a] | Response rate |
|---|---|---|---|---|---|
| American College of Cardiology[b] | Total | 11,541 | 622 | 352 | 566 |
| | Case | | 311 | 184 | 591 |
| | Control | | 311 | 168 | 540 |
| American College of Surgeons General surgeons | Total | 12,972 | 3,004 | 1,793 | 597 |
| | Closed-ended | | 2,401 | 1,412 | 588 |
| | Case | | 1,196 | 739 | 618 |
| | Control | | 1,205 | 673 | 559 |
| | Open-ended | | 603 | 381 | 63.2 |
| Neurosurgeons | Total | 1,384 | 859 | 503 | 586 |
| | Case | | 427 | 252 | 59.0 |
| | Control | | 432 | 251 | 581 |
| American College of Obstetricians and Gynecologists[c] | Total | 20,832 | 1,983 | 1,230 | 623 |
| | Case | | 1,002 | 634 | 633 |
| | Control | | 981 | 596 | 608 |

a The numbers of respondents shown in this table may differ slightly from the scenario-specific numbers of respondents shown in text tables 3-2 through 3-5 in chapter 3 because a few respondents completed one scenario but not the other
b The American College of Cardiology sample included only adult cardiologists
c The American College of Obstetricians and Gynecologists sample excluded gynecological oncologists and reproductive endocrinologists

SOURCE Office of Technology Assessment, 1994

on various issues regarding the practice of cardiology. This sample is drawn using similar methods to those used in the ACS and ACOG surveys (see table D-3). For this survey, only adult cardiologists on the panel as of February 1993 were included. As with the ACS and ACOG samples, questionnaires were sent to all 622 adult cardiologists on the ACC panel. Their overall response rate was slightly lower than the response rates in the ACS and ACOG surveys (see table D-2). ACC panel members may have been more sensitized to practice issues raised by previous surveys.

- The ACOG survey excluded gynecological oncologists and reproductive endocrinologists. The sample size was limited to 2,000 to meet administrative and budgetary constraints at both OTA and the association.
- In both the ACC and ACOG surveys, a second mailing of the questionnaire was sent to members who had not responded to the first mailing. In the ACS survey, one mailout was used because the association preferred not to track individual respondents. The method of identifying each respondent's sampling stratum is described in the next section.
- The ACS survey included physicians practicing in U.S. territories (Puerto Rico, Guam, etc.), whereas the ACC and ACOG surveys did not.
- The ACC and ACS surveys contained government-employed physicians, including military doctors (except those practicing overseas,), whereas the ACOG sample excluded military physicians.

In the ACS and ACOG surveys, the numbers of case and control respondents were not equal, for two reasons. First, for ease of data processing, random assignment of respondents to the case or control group (every other respondent) was performed within each sampling stratum rather than throughout the entire sample. In the ACC survey, the overall numbers of case and control respondents were equal; however, the case respondents were selected by taking a simple random subsample of the overall sample, without regard to the stratification variable of geographic region. Second, response rates differed slightly between the

**TABLE D-3: Features of Sampling Plan for OTA Clinical Scenario Surveys of Defensive Medicine**

| Feature | American College of Cardiology[a] | American College of Surgeons | American College of Obstetricians and Gynecologists[b] |
|---|---|---|---|
| Stratification factors | Census region | Academic appointment yes, no<br>Year of first board certification post-1981, 1972-81, pre-1972<br>Practice setting solo, group, medical school, hospital, other | Geographic region (4 regions)<br>Years in ACOG < 6, 6-10, 11-20, >20<br>Gender |
| Number of strata | 9 | 30, plus two additional, one for some missing data, the other for all missing data | 32 |
| Special exclusions[c] | U S trust territories | None | U S trust territories, military, Public Health Service |
| First mailing | Feb. 4, 1993 | March 4, 1993 | May 27,1993 |
| Second mailing | Feb. 23, 1993 | None | June 30, 1993 |

a The ACC survey included only adult cardiologists
b The ACOG survey excluded gynecological oncologists and reproductive endocrinologists
c For general exclusion criteria see text

SOURCE Office of Technology Assessment 1994

case and control groups. The numbers of case and control respondents therefore differed within each region by as much as 11 percent. Differences in response rates were corrected by reweighting the respondents according to case/control group and sampling stratification factors (e.g., region ).

## DATA PROCESSING

ACC conducted its own mailouts, data entry, and initial data editing. Individual respondents were tracked, and initial nonrespondents were sent another copy of the questionnaire. In the ACS and A COG surveys, the general procedure was as follows:

- The association provided OTA with mailing labels for sampled members.
- OTA produced the questionnaires and mailed them with a prepaid return envelope addressed to the association's Washington. DC. office.
- Upon receiving the responses, the association photocopied them and shipped the originals to OTA for processing.

There were several variations on this basic process between the ACS and ACOG surveys. The identity of individual ACOG respondents was tracked by ACOG personnel by means of a relatively unobtrusive identification number printed on the first page of the questionnaire as well as on the mailout label and the postage-paid return envelope. As noted earlier, a second mailing of the ACOG questionnaire was sent to initial nonrespondents. Five such respondents apparently returned both questionnaires, for they had duplicate ID numbers. We allowed one of each pair of data records for these duplicate respondents to be randomly discarded through a computer sorting and matching routine (see the next section).

ACS, on the other hand, preferred not to track individual respondents; thus, no followup mailing of the questionnaire to initial nonrespondents was possible. To track the sampling stratum to which the respondent belonged, OTA devised a method of unobtrusively tracking the respondent's sampling stratum by varying the features of the return mailing label.

Eighty-nine respondents did not use the return envelope provided but instead sent the questionnaire back in an "irregular" envelope (i.e., without the tailored mailing label). For 61 of these respondents (68.5 percent), ACS was able to use the return address or postmark on that envelope to identify the sampling stratum to which the respondent belonged. ACS kept the individual identity of these 89 respondents confidential.

OTA made no attempt to identify any individual respondents and analyzed all data separately from any identifying materials.

## DATA EDITING AND ENTRY

The major rules used to edit the data in all four surveys are summarized in a technical appendix available from OTA upon request. OTA and the associations made concerted efforts to refine the questionnaire instructions based on responses to the three pretests. Despite these precautions, respondents in all four surveys sometimes provided answers that were inconsistent with the instructions; these responses required editing.

The most frequent ● *error" was failure to circle "no" for unselected clinical options or failure to check the reasons for circling "no" for such options. That is, many respondents circled '*yes" only for selected options and checked reasons for choosing only those options. Fortunately, this kind of "error" did not substantially affect the analysis, which focused on respondents who chose "yes" for a given option (see the next section).

Another very infrequent "error" (on the order of 0.1 to 0.6 percent of all responses) that would affect the analysis was failure to check reasons for clinical options where "yes" was circled. These respondents (who circled "yes" for an option but failed to check any reasons for doing so) were included in the denominator when the percentage of "choosers" (see below) was calculated—implying that, if the respondent had cited a reason, it would *not* have been "malpractice concerns." The alternative approach—to exclude such respondents from the denominator of that percentage—would have further reduced the size of that denominator, which might have slightly weakened the reliability of the analysis.

All edits of the ACS and ACOG data were performed by OTA. ACC performed similar edits on its own data. After receiving the data from ACC (see below), OTA then made further edits that had not been performed by ACC.

Data for all four surveys were key-entered by the same contractor (Office Remedies, Inc., of Vienna, Virginia) with double-entry verification. Keyed data were returned to OTA in database files on floppy diskettes. (ACC contracted directly with Office Remedies, Inc.) OTA converted these files into SAS (203) format for analysis on a microcomputer using both SAS-PC and SUDAAN (193), a program that computes variance estimates properly weighted for disproportionate stratified sampling and nonresponse. We also used StatXact-Turbo (49) for analyses involving small numbers of respondents, for which large-sample statistical methods might be inappropriate. The use of these programs is discussed in further detail below.

## DATA ANALYSIS

### General Approach

The focus for the analysis of all four surveys was the percentage of respondents who cited "malpractice concerns" as a reason for choosing a diagnostic or therapeutic procedure in a given scenario—i.e., positive defensive medicine (see chapter 2). Analysis of "malpractice concerns" as a reason for choosing *not* to perform a procedure (a form of negative defensive medicine—again see chapter 2) was deemed to be outside the scope of the study.[5] The analysis thus focused on respondents who chose "yes" for one or more procedures (and

[5] A possible exception here is the clinical option of "refer to surgeon," which appeared in the ACOG breast lump scenario. Physicians who chose this option had possibly decided not to intervene themselves (depending on whether they chose to perform other procedures listed in the scenario), and thus may have been engaging in negative defensive medicine. On the other hand, referral to a surgeon can imply an expectation that relatively aggressive and potentially costly intervention will be undertaken, and may thus reflect positive defensive medicine.

hence chose "no" for the "do nothing"' option). Thus, for each procedure. the denominator was the group of respondents who chose "yes" for that procedure. Excluded from this denominator were not only respondents who explicitly chose "no," but also those who chose neither "yes" nor "no" (i.e., those who had left that entire row of the questionnaire blank). Respondents who did not respond at all to a given scenario, but who responded to other parts of the questionnaire, were excluded only from the analysis of that particular scenario.

Of this denominator (respondents who chose "yes" for a given procedure), the numerator of greatest interest was the group of respondents who checked "malpractice concerns" as a reason for choosing that procedure (with either a single- or double-check). However, the "malpractice" responses could not be analyzed in isolation, because another reason (usually "medical indications") was often cited along with "malpractice concerns" by the same respondents. This meant that these respondents were selecting procedures not only on the basis of malpractice concerns, but also in part because they felt that the procedures were at least somewhat medically indicated. These combinations of responses suggested that differing degrees or levels of defensive motivation were being expressed in these surveys. each of which required a separate measure. Tables showing the distribution of responses by clinical procedure and reason for procedure choice are presented in a technical appendix available from OTA upon request.

## Specific Measures of Defensive Medicine

To gauge the extent of "defensive medicine" expressed in these surveys, we constructed six measures of defensive medicine based on specific patterns of reasons given for choosing a given diagnostic or therapeutic procedure. These response patterns involved particular combinations of check marks for "malpractice concern s," "medical indication s," and other reasons. The six measures are listed in order below from the most restrictive definition of defensive medicine to the least restrictive definition. The measures are cumulative, i.e., the least restrictive measure (measure 6) includes respondents meeting measures 1 through 5.

*Measure 1:*
DOUBLE check for "malpractice concerns"
AND
NO check at all for ANY other reason.

*Measue* 2:
*Measure 1* PLUS
a DOUBLE check for "malpractice concerns"
AND
NO check for "medical indications"
(single checks for other reasons are allowed).

*Measure 3:*
*Measure 2* PLUS
a DOUBLE check for "malpractice concerns"
AND
a SINGLE check for "medical indications"
(single checks for other reasons are allowed).

*Meusure* 4:
*Measure* 3 PLUS
a SINGLE check for "malpractice concerns"
AND
NO check for "medical indications"
(single or *double* checks for other reasons are allowed).

*Measure 5:*
*Measure 4* PLUS
a SINGLE check for "malpractice concerns"
AND
a SINGLE check for "medical indications"
*(single* or double checks for other reasons are allowed).

*Measure 6:*
*Measure 5 PLUS*
a SINGLE check for "'malpractice concerns"
AND
a DOUBLE check for "medical indications"
(single checks for other reasons are allowed}.

*The rationale* underlying these measures is as follows. Defensive medicine is most strongly indicated when the respondent cites only "malpractice

concerns" and no other reason (measure 1). Even though there are no medical indications or patient expectations for performing the procedure, the physician would perform it anyway, solely out of fear of malpractice litigation. This response should be infrequent, since it is arguably a violation of medical ethics. Citing other reasons, particularly "medical indications," "dilutes" the degree of defensive medicine indicated. Moreover, a single check for '*malpractice concerns" represents a weaker level of defensive medicine than does a double check.

These six measures of defensive medicine were computed on the basis of two different denominators, thereby creating two separate measures that provide two different interpretations of the results for a given procedure in a given scenario:

*Percentage of "choosers":* Here the denominator was the number of respondents who would choose the procedure (i.e., circled *'yes"). The measure of defensive medicine was thus the percentage of respondents choosing the procedure who cited "malpractice concerns" as a reason for doing so.

*Percentage of scenario respondents:* Here the denominator was the total number of respondents to the overall scenario. The measure of defensive medicine was thus the percentage of all respondents who, when presented with the scenario, would choose the procedure for defensive reasons. This percentage was much smaller than the percentage of choosers and represents the frequency with which concerns about malpractice would be expected to enter clinical decisions in situations of this type.

With six separate measures of defensive medicine, the number of comparisons between the percentages for various groups of respondents (case versus control, academic versus nonacademic, etc.) would have been unmanageable. Consequently, for such comparisons we used only measure 3 (double-check for "malpractice concerns," with single checks allowed for any other reasons, including ● 'medical indications"). This measure most closely approximated OTA's working definition of positive defensive medicine: physicians performing procedures *primarily,* but *not necessarily solely,* out of fear of malpractice litigation (see chapter 2). Tables showing the distribution of responses on all six measures of defensive medicine are presented in appendix E.

## Statistical Analysis

All data were treated as coming from a sample survey with unequal probability of selection in a stratified (cross-classified) population (114,117, 124). Compared with simple random sampling, the effect of weighting the data to compensate for unequal probability of selection is generally to increase the variance of estimators, while the effect of stratification is generally to reduce that variance. Data from the surveys supported our reliance on this general experience. Test analyses using methods for 1 ) unweighed simple random samples, 2) weighted simple random samples, 3) unweighed stratified samples, and 4) weighted stratified samples demonstrated that the effects of stratification and weighting in fact did offset each other to a considerable degree. Variances were not increased markedly owing to the use of unequal weights in this sampling design.

Rates (or proportions) of respondents who would choose a clinical procedure, and of those who did so primarily because of malpractice concerns (see above), were calculated using sampling weights that compensated for nonresponse as well as unequal probability of selection across the sampling strata. Wherever possible, variance estimates and confidence intervals for these point estimates used methods that are common in survey analysis and assumed both stratification and sampling without replacement (i.e., use of the finite population correction).

Where possible, comparisons among subclasses of respondents were made by differences in rates (or proportions), and calculations of the variance of those differences took into consideration the sampling design. In several instances we departed from the use of rate differences in

comparing populations. In those cases, we used a sample-weighted logistic regression model (15,16) to compute odds ratios that tested for differences among groups of respondents, while controlling for a third factor.

Assumptions of simple random sampling were used only when data were too sparse to use survey sampling methods, owing to the small numbers of respondents (fewer than 40) who would choose procedures primarily because of malpractice concerns in some of the clinical scenarios. As a fallback method, in these cases we used StatXact-Turbo (49), a software package with advanced numerical algorithms that are especially appropriate for sparse data, i.e., where the numbers of respondents and the rates of citing malpractice concerns are small. The advantage of this additional analysis tool is the ability to produce confidence intervals and p-values that do not overstate the significance of results. The disadvantage is the risk of bias from the use of unweighted data: StatXact-Turbo software (49) assumes simple random sampling (unstratified) and cannot handle weighted data. Use of unweighted data had little effect on the point estimates, however, except when only one or two respondents cited malpractice concerns and their individual sampling weights were large. In those cases both the weighted and unweighted rates were close to zero. For these very small frequencies in this survey, therefore, reliance on StatXact as an alternative tool was acceptable. In addition, we used simple categorical analysis methods to compute chi-square tests for possible differences among groups of respondents.

*Sampling Weights: Nonresponse*

Prior to analysis, each respondent was assigned a weight that reflected the number of physicians in the population whom he or she represented. First, sampling weights were computed as:

$$swt = 1/p$$

where *swt* is the sampling weight and $p$ is the respondent's probability of selection. Next, the sampling weights were adjusted for nonresponse using the method of sample weight adjustment classes (107,177). In each class of respondents (as determined by the sampling criteria, described earlier), we reweighted each respondent to represent the number of physicians sampled in that class. Thus, the adjusted sampling weight became:

$$adjswt = swt * (1/p_r)$$

where $p_r$ is the probability of response. The weighting classes were created to lump similar groups of physicians together and to ensure that the adjustment factor $(1/p_r)$ was not unstable owing to small class size. Finally, we adjusted all weights so that the sum of the weights across respondents exactly equaled the number of physicians in the population. This adjustment represented a change of no more than about 0.5 percent.

### Point Estimates and Confidence Intervals

Point estimates and confidence intervals were computed using the PROC DESCRIPT procedure in SUDAAN (193) where, as was commonly the case, the numbers of respondents in most sampling strata were large enough to take advantage of the stratified sampling design. Where the number of respondents in either the numerator or denominator of a rate calculation was small (fewer than 10 in the numerator or fewer than 40 in the denominator), we calculated exact binomial confidence intervals according to the method of Daly (50). This method avoided the well-known problem of having confidence intervals that are both too narrow and too symmetric.

### Group Comparisons

For comparisons between groups we used the DIFFVAR option in the PROC DESCRIPT procedure in SUDAAN (193) to compute differences in rates (or proportions) and the variances of those differences. For small-sample comparisons (fewer than 10 respondents in a category), where stratified sampling adjustments were inappropriate, we used exact methods as implemented in StatXact-Turbo (49) and computed odds ratios rather than

rate differences.6 This approach allowed us to take advantage of the stratified sampling design, where the numbers of respondents were sufficient, and alternative methods where the numbers of respondents were too small to justify large-sample techniques. Tests for rate differences and odds ratios are comparable for these data.

### Case-Control Comparisons

Comparisons of responses to the case and control scenarios presented special problems. First, the design of the surveys did not permit "within-physician" comparison of case and control responses, because the same respondents could not be given both the case and control scenarios without possibly revealing our purpose. The case and control responses were thus independent, thereby reducing the efficiency of the case-control comparisons (greater variances for the same sample size). Second, although the case and control groups were each stratified random samples, they could differ in systematic ways—most importantly, in their propensity to cite "malpractice concerns." As a proxy for this control variable, we examined whether or not the respondent double-checked "malpractice concerns" for one or more procedures in the common scenario for each survey (the scenario received by every respondent in a given survey—see table D-l). This adjustment was computed as follows.

Where the numbers of respondents were adequate (again, at least 10 in each category), we used sample-weighted logistic regression, as implemented in the PROC LOGISTIC procedure in SUDAAN ( 193), to perform the equivalent of stratified 2-by-2 contingency table analysis in which:

- the dependent variable was whether or not the respondent double-checked "*malpractice concerns" in the case-control scenario (labeled *response* in the model shown below);
- the independent variable was the respondent's group (case or control, labeled *group* in the model); and
- the control variable was whether or not the respondent double-checked "malpractice concerns" in the common scenario (labeled *common* in the model).

The saturated model for this analysis then became:

$$\text{response} = \beta_0 + \beta_g * \text{group} + \beta_c * \text{common} + \beta_{int} * (\text{group} * \text{common})$$

where *response* is the log odds of double-checking "malpractice concerns," and the ß's represent regression coefficients.

Using an interaction term representing the joint effects of *group* and *common* permitted us to test whether the impact of the respondent's group (case or control) on his or her defensive-medicine response in the case-control scenario differed according to his or her defensive-medicine response in the common scenario. If the interaction term was not statistically significant, then the model simplified to the two main effects (group and common), and the odds ratio of the case and control responses became $\exp(\beta_g)$.

Where the numbers of respondents were small (again, usually fewer than 10), we used exact analysis of these stratified 2-by-2 contingency tables, as implemented in StatXact-Turbo (49). Here we computed exact common odds ratios (case versus control) and their 95-percent confidence intervals and p values, as well as the exact test for the homogeneity of odds ratios across the categories of the control variable (*common*).

### Global Differences

Global tests for the significance of difference across the categories of the demographic variables (e.g., practice setting) in the rate of double-checking of "malpractice concerns" in the common scenario for each survey were initially assessed using

[6] Except where noted, the calculations are exact odds ratios and their accompanying exact 95-percent confidence intervals and p-values, computed according to the methods of Mehta, Gray, and Patel ( 156).

the PROC FREQ procedure and Cochran-Mantel-Haenszel statistics on the normalized weighted data in SAS (203) (see table D-1).[a] The DIFFVAR option in PROC DESCRIPT in SUDAAN (193) was used to test the significance of difference in mean attitude scale scores between respondents who double-checked "malpractice concerns" in the common scenario for each survey (see table D-1) and those who did not.

[a]The common scenarios were used for this analysis so that it would be based on all respondents in a given survey.

# Appendix E: Detailed Results of the OTA Clinical Scenario Surveys

The main features of the results of the Office of Technology Assessment (OTA) clinical scenario surveys [1] are highlighted in chapter 3. This appendix contains:

- for each clinical option in each "case" scenario, weighted frequencies and percentages of responses using six different definitions of defensive medicine (tables E–1 through E–8); and
- a comparison of attitude scale scores between respondents who cited malpractice concerns as the primary reason for choosing procedures and those who did not (table E-9).

The following additional results are presented in a technical appendix available from OTA upon request:

- unweighed frequencies and percentages of respondents who single-checked or double–checked malpractice concerns for each clinical option;
- detailed comparisons of results for case and control versions of the scenarios, showing unadjusted as well as adjusted odds ratios and confidence intervals;
- weighted crosstabulations between each of the demographic items and our primary measure of defensive medicine (see appendix D);
- descriptive measures of our attitude scales for malpractice concern, cost consciousness, and discomfort with clinical uncertainty (see appendix D); and
- detailed results of comparison of the proportion of respondents who chose clinical actions in the open– and closed–ended versions of the scenario surveys of the American College of Surgeons.

[1] These results were compiled in collaboration with Dr. Russell Localio of Pennsylvania State University.

## TABLE E-1: Percentage of Respondents Who Chose a Clinical Action for Malpractice Concerns, Cardiologists[a]

| Scenario[b]/ clinical action | % of respondents who chose the clinical action | Percent of respondents who chose the clinical action for malpractice concerns — Most restrictive definition: Definition 1 | Definition 2 | Definition 3 | Definition 4 | Least restrictive definition: Definition 5 | Definition 6 |
|---|---|---|---|---|---|---|---|
| **Syncope (N=346)** | | | | | | | |
| Admit | 66.3% | 0.6% | 0.6% | 7.2% | 8.3% | 15.6% | 37.9% |
| Exercise ECG | 29.8 | 0.0 | 0.3 | 2.1 | 2.4 | 4.8 | 8.3 |
| Stress thallium | 10.7 | 0.0 | 0.0 | 0.3 | 0.3 | 1.2 | 3.3 |
| 2 D/M mode | 83.0 | 0.0 | 0.0 | 0.9 | 0.9 | 5.4 | 20.6 |
| Doppler | 67.0 | 0.2 | 0.2 | 1.4 | 1.4 | 3.5 | 14.5 |
| Color flow doppler | 56.2 | 0.6 | 0.6 | 1.8 | 1.8 | 3.8 | 10.8 |
| Transesophageal echo | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Holter monitor | 83.5 | 0.3 | 0.8 | 2.8 | 3.5 | 9.0 | 22.7 |
| Tilt table | 39.6 | 0.0 | 0.0 | 0.0 | 0.3 | 1.7 | 3.7 |
| Carotid doppler | 26.5 | 0.9 | 1.9 | 3.6 | 4.3 | 7.0 | 10.5 |
| EEG | 23.1 | 1.7 | 2.0 | 3.4 | 3.8 | 6.9 | 11.3 |
| Brain MRI | 7.6 | 0.7 | 1.0 | 1.5 | 2.2 | 2.8 | 4.0 |
| **Chest pain (N=162)** | | | | | | | |
| Discharge home w/NSAID | 67.8 | 0.0 | 0.0 | 0.0 | 0.0 | 2.5 | 8.8 |
| Admit and observe | 8.8 | 0.0 | 0.0 | 0.8 | 0.8 | 1.2 | 4.9 |
| Admit and obtain enzymes | 21.5 | 0.5 | 1.1 | 3.0 | 4.9 | 6.5 | 13.4 |
| Admit and obtain ECG | 22.4 | 0.5 | 1.1 | 4.4 | 5.8 | 8.1 | 14.0 |
| Exercise ECG | 50.2 | 2.5 | 2.5 | 8.6 | 1.1 | 14.0 | 23.9 |
| Stress thallium | 8.5 | 0.0 | 0.0 | 0.8 | 0.8 | 1.5 | 2.6 |
| 2 D/M mode | 18.8 | 0.0 | 0.0 | 1.4 | 1.4 | 2.7 | 7.4 |
| Doppler | 7.8 | 0.7 | 0.7 | 1.4 | 1.4 | 2.1 | 2.7 |
| Color flow doppler | 8.4 | 0.0 | 0.0 | 0.8 | 0.8 | 1.4 | 2.0 |
| Transesophageal echo | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Angiogram | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 |

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details).
[b] Results shown for "case" versions of scenarios only (see appendix D for explanation).

KEY: 2 D/M = 2 dimensional/time-motion mode, ECG = electrocardiogram, EEG = electroencephalogram, NSAID = nonsteroidal anti-inflammatory drug

NOTE: Starting with definition 1, the data are cumulative.
- Definition 1: Malpractice Concerns double-checked with no checks for any other reason.
- Definition 2: definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed.
- Definition 3: definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed.
- Definition 4: definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed.
- Definition 5: definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single checked, and single or double checks allowed for other reasons.
- Definition 6: definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double checked, and single checks for other reasons allowed.

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

## TABLE E-2: Percentage of Clinical Actions Chosen for Malpractice Concerns, Cardiologists[a]

| Scenario[b]/ clinical action | % of respondents who chose the clinical action | Of clinical actions chosen, percent done for malpractice concerns | | | | | |
|---|---|---|---|---|---|---|---|
| | | *Most restrictive definition* | | | | *Least restrictive definition* | |
| | | Definition 1 | Definition 2 | Definition 3 | Definition 4 | Definition 5 | Definition 6 |
| **Syncope(N=346)** | | | | | | | |
| Admit | 66.3% | 0.8% | 0.8% | 10.8% | 12.5% | 23.5% | 57.2% |
| Exercise ECG | 29.8 | 0.0 | 1.0 | 7.1 | 8.0 | 16.2 | 27.8 |
| Stress thallium | 10.7 | 0.0 | 0.0 | 2.3 | 2.3 | 11.4 | 31.0 |
| 2 D/M mode | 83.0 | 0.0 | 0.0 | 1.1 | 1.1 | 6.5 | 24.9 |
| Doppler | 67.0 | 0.3 | 0.3 | 2.2 | 2.2 | 5.2 | 21.6 |
| Color flow doppler | 56.2 | 1.0 | 1.0 | 3.2 | 3.2 | 6.8 | 19.2 |
| Transesophageal echo | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 29.9 |
| Hotter monitor | 83.5 | 0.4 | 1.0 | 3.3 | 4.2 | 10.8 | 27.2 |
| Tilt table | 39.6 | 0.0 | 0.0 | 0.0 | 0.6 | 4.4 | 9.4 |
| Carotid doppler | 26.5 | 3.5 | 7.1 | 13.7 | 16.2 | 26.4 | 39.8 |
| EEG | 23.1 | 7.2 | 8.7 | 14.9 | 16.3 | 29.7 | 48.9 |
| Brain MRI | 7.6 | 8.6 | 12.7 | 20.3 | 28.9 | 36.3 | 53.0 |
| **Chest pain (N=162)** | | | | | | | |
| Discharge home w/NSAID | 67.8 | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 13.0 |
| Admit and observe | 8.8 | 0.0 | 0.0 | 8.7 | 8.7 | 13.8 | 55.6 |
| Admit/obtain enzymes | 21.5 | 2.1 | 5.1 | 13.9 | 23.0 | 30.2 | 62.3 |
| Admit and obtain ECG | 22.4 | 2.0 | 2.0 | 19.5 | 25.7 | 36.1 | 62.4 |
| Exercise ECG | 50.2 | 5.0 | 5.0 | 17.2 | 22.1 | 27.8 | 47.7 |
| Stress thallium | 8.5 | 0.0 | 0.0 | 9.0 | 9.0 | 17.9 | 30.7 |
| 2 D/M mode | 18.8 | 0.0 | 0.0 | 7.6 | 7.6 | 14.5 | 39.1 |
| Doppler | 7.8 | 8.7 | 8.7 | 18.4 | 18.4 | 26.6 | 34.6 |
| Color flow doppler | 8.4 | 0.0 | 0.0 | 9.1 | 9.1 | 16.7 | 24.1 |
| Transesophageal echo | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0[c] |
| Angiogram | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 |

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details)
[b] Results shown for "case" versions of scenarios only (see appendix D for explanation)

KEY 2 D/M = 2 dimensional/time-motion mode, ECG = electrocardiogram, EEG = electroencephalogram, NSAID = nonsteroidal anti-inflammatory drug

NOTE Starting with definition 1, the data are cumulative.
- Definition 1 Malpractice Concerns double checked with no checks for any other reason
- Definition 2 definition 1 *plus* Malpractice Concerns double-checked no checks for Medical Indications, but single checks for other reasons allowed
- Definition 3 definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed
- Definition 4 definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed
- Definition 5 definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single-checked, and single or double checks allowed for other reasons
- Definition 6 definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double-checked, and single checks for other reasons allowed

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

## TABLE E-3: Percentage of Respondents Who Chose a Clinical Action for Malpractice Concerns, General Surgeons[a]

| Scenario[b]/ clinical action | % of respondents who chose the clinical action | Percent of respondents who chose clinical action for malpractice concerns | | | | | |
|---|---|---|---|---|---|---|---|
| | | *Most restrictive definition* | | | | | *Least restrictive definition* |
| | | Definition 1 | Definition 2 | Definition 3 | Definition 4 | Definition 5 | Definition 6 |
| **Breast pain (N=1,412)** | | | | | | | |
| Needle biopsy | 13 3% | 0 2% | 0 3% | 2 7% | 3 0% | 4 6% | 9 7% |
| Open biopsy | 8 4 | 0 2 | 0 5 | 2 1 | 2 1 | 3 0 | 6 3 |
| Other | 14 5 | 0 0 | 0 1 | 1 0 | 1 1 | 1 8 | 6 2 |
| **Rectal bleeding (N=738)** | | | | | | | |
| Air contrast barium enema | 19 2 | 0 0 | 0 5 | 2 3 | 2 4 | 4 8 | 11 5 |
| Colonoscopy | 26 2 | 0 6 | 1 3 | 5 0 | 5 0 | 7 1 | 16 5 |
| Other | 9 7 | 0 0 | 0 0 | 0 3 | 0 4 | 1 1 | 2 0 |

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details)
[b] Results shown for "case" versions of scenarios only (see appendix D for explanation)

NOTE Starting with Definition 1, the data are cumulative
- Definition 1 Malpractice Concerns double-checked with no checks for any other reason
- Definition 2 definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed
- Definition 3 definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed
- Definition 4 definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed
- Definition 5 definition 4PM Malpractice Concerns single-checked Medical Indications single-checked and single or double checks allowed for other reasons
- Definition 6 definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double-checked and single checks for other reasons allowed

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

## TABLE E-4: Percentage of Clinical Actions Chosen for Malpractice Concerns, General Surgeons[a]

| Scenario[b]/ clinical action | % of respondents who chose the clinical action | Of clinical actions chosen, percent done for malpractice concerns | | | | | |
|---|---|---|---|---|---|---|---|
| | | *Most restrictive definition* | | | | *Least restrictive definition* | |
| | | Definition 1 | Definition 2 | Definition 3 | Definition 4 | Definition 5 | Definition 6 |
| **Breast pain (N=1,412)** | | | | | | | |
| Needle biopsy | 13.3% | 1.7% | 2.1% | 20.3% | 22.5% | 34.7% | 73.5% |
| Open biopsy | 8.4 | 2.4 | 6.5 | 24.5 | 25.5 | 35.4 | 75.5 |
| Other | 14.5 | 0.0 | 0.4 | 6.6 | 7.6 | 12.2 | 42.6 |
| **Rectal bleeding (N=738)** | | | | | | | |
| Air contrast barium enema | 19.2 | 0.0 | 2.5 | 11.8 | 12.4 | 25.1 | 60.0 |
| Colonoscopy | 26.2 | 2.4 | 4.9 | 19.0 | 19.0 | 27.0 | 63.1 |
| Other | 9.7 | 0.0 | 0.0 | 2.8 | 3.8 | 11.8 | 20.7 |

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

[b] Results shown for "case" versions of scenarios only (see appendix D for explanation).

NOTE: Starting with definition 1, the data are cumulative
- Definition 1: Malpractice Concerns double-checked with no checks for any other reason
- Definition 2: definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed
- Definition 3: definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed
- Definition 4: definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed
- Definition 5: definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single-checked, and single or double checks allowed for other reasons
- Definition 6: definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double-checked, and single checks for other reasons allowed

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

## TABLE E-5: Percentage of Respondents Who Chose a Clinical Action for Malpractice Concerns, Neurosurgeons[a]

| Scenario[b]/ clinical action | % of respondents who chose the clinical action | Percent of respondents who chose clinical action for malpractice concerns | | | | | |
|---|---|---|---|---|---|---|---|
| | | *Most restrictive definition* | | | | | *Least restrictive definition* |
| | | Definition 1 | Definition 2 | Definition 3 | Definition 4 | Definition 5 | Definition 6 |
| **Head trauma (N=503** | | | | | | | |
| Skull x-ray | 33 7% | 1 4% | 3 5% | 10 0% | 10 3% | 12 4% | 22 6% |
| C spine x ray | 21 2 | 2 4 | 3 1 | 11 2 | 11 4 | 13 0 | 17 5 |
| CT of head | 48 8 | 5 2 | 7 9 | 21 8 | 22 5 | 27 0 | 40 0 |
| Other | 3 9 | 0 4 | 0 4 | 0 4 | 0 4 | 0 4 | 1 3 |
| **Back pain (N=252)** | | | | | | | |
| Lumbosacral x-ray | 24 4 | 0 3 | 0 6 | 3 4 | 4 1 | 5 0 | 2 3 |
| CT | 3 4 | 0 0 | 0 0 | 1 0 | 1 2 | 1 2 | 1 7 |
| MRI | 12 6 | 0 7 | 0 7 | 2 0 | 2 0 | 4 3 | 6 6 |
| Other | 9 3 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 |

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details)
[b] Results shown for "case" versions of scenarios only (see appendix D for explanation)

KEY: CT = computed tomography, C-spine = cervical spine, MRI = magnetic resonance image

NOTE: Starting with definition 1, the data are cumulative
- Definition 1: Malpractice Concerns double-checked with no checks for any other reason
- Definition 2: definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed
- Definition 3: definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed
- Definition 4: definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed
- Definition 5: definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single-checked, and single or double checks allowed for other reasons
- Definition 6: definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double-checked, and single checks for other reasons allowed

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

## TABLE E-6: Percentage of Clinical Actions Chosen for Malpractice Concerns, Neurosurgeons[a]

| Scenario[b]/ clinical action | % of respondents who chose the clinical action | Of clinical actions chosen, percent done for malpractice concerns | | | | | |
|---|---|---|---|---|---|---|---|
| | | Most restrictive *definition* | | | | Least restrictive definition | |
| | | Definition 1 | Definition 2 | Definition 3 | Definition 4 | Definition 5 | Definition 6 |
| **Head trauma (N=503)** | | | | | | | |
| Skull x-ray | 33.7% | 4.3% | 10.5% | 29.6% | 30.6% | 36.8% | 67.0% |
| C-spine x-ray | 21.2 | 11.3 | 14.7 | 52.9 | 53.9 | 61.4 | 82.6 |
| CT of head | 48.8 | 10.7 | 16.1 | 44.7 | 46.0 | 55.3 | 81.8 |
| Other | 3.9 | 9.3 | 9.3 | 9.3 | 9.3 | 9.3 | 33.3 |
| **Back pain (N=252)** | | | | | | | |
| Lumbosacral x-ray | 24.4 | 1.2 | 2.4 | 13.9 | 16.9 | ***20.4*** | **50.3** |
| CT | 3,4 | 0.0 | 0.0 | 29.8 | 36.2 | 36.2 | 51.1 |
| MRI | 12,6 | 5.7 | 5.7 | 16.0 | 16.0 | 33.7 | 52.0 |
| Other | 9.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

[a]Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details)
[b] Results shown for "case" versions of scenarios only (see appendix D for explanation)

KEY: CT = computed tomography, MRI = magnetic resonance image

NOTE: Starting with Definition 1, the data are cumulative
- Definition 1: Malpractice Concerns double-checked with no checks for any other reason
- Definition 2: definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed
- Definition 3: definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed
- Definition 4: definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed
- Definition 5: definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single-checked, and single or double checks allowed for other reasons
- Definition 6: definition 5p/us Malpractice Concerns single-checked, Medical Indications double-checked, and single checks for other reasons allowed

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

## TABLE E-7: Percentage of Respondents Who Chose a Clinical Action for Malpractice Concerns, Obstetricians and Gynecologists[a]

| Scenario[b]/ clinical action | % of respondents who chose the clinical action | Percent of respondents who chose clinical action for malpractice concerns | | | | | |
|---|---|---|---|---|---|---|---|
| | | *Most restrictive definition* | | | | *Least restrictive definition* | |
| | | Definition 1 | Definition 2 | Definition 3 | Definition 4 | Definition 5 | Definition 6 |
| **Breast lump (N=1,230)** | | | | | | | |
| Breast sonography | 23 6% | 0 2% | 0 4% | 2 3% | 2 5% | 6 3% | 13 1% |
| Mammography | 45 6 | 0 2 | 0 8 | 5 6 | 6 3 | 11 4 | 28 8 |
| Needle aspiration | 24 6 | 0 2 | 0 2 | 1 1 | 1 2 | 2 5 | 9 5 |
| Fine needle biopsy | 7 0 | 0 2 | 0 2 | 0 5 | 0 5 | 0 6 | 2 9 |
| Open biopsy | 1 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 1 | 0 6 |
| Refer to surgeon | 29 2 | 1 8 | 2 4 | 6 3 | 6 7 | 9 5 | 20 1 |
| Other | 2 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 3 |
| **Complicated delivery (N=1,230)** | | | | | | | |
| Continue pushing now | 8 8 | 0 1 | 0 1 | 0 2 | 0 2 | 0 6 | 2 2 |
| Rest for 30 minutes | 8 1 | 0 1 | 0 1 | 0 2 | 0.2 | 0 8 | 1 4 |
| Operative vaginal delivery | 67 7 | 0 2 | 0 2 | 1 4 | 1 5 | 5 0 | 20 4 |
| Caesarean section | 23.8 | 0 4 | 0 4 | 6 0 | 6 0 | 8 6 | 18 0 |
| Other | 4 8 | 0 1 | 0 1 | 0 2 | 0 2 | 0 4 | 1 0 |
| **Perimenopausal bleeding (N=634)** | | | | | | | |
| Hematocrit/hemoglobin | 73 4 | 0 2 | 0 3 | 1 3 | 1.5 | 6 0 | 12 2 |
| Pregnancy test | 49 5 | 2 7 | 2 8 | 5 5 | 5.8 | 10 0 | 22 5 |
| Endometrial sampling | 85 4 | 0 0 | 0 1 | 1 6 | 2 0 | 6 4 | 35 2 |
| Pelvic ultrasound | 54 3 | 1 1 | 1 3 | 4 2 | 4 3 | 9 5 | 21 0 |
| Hysteroscopy | 14 3 | 0 1 | 0 1 | 0.6 | 0 6 | 0 9 | 4 0 |
| D & C | 4 2 | 0 0 | 0 0 | 0 5 | 0 5 | 1 0 | 2 0 |
| Hysterectomy | 0 2 | 0 0 | 0 0 | 0 0 | 0 0 | 0 2 | 0 2 |
| Other | 4 5 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 5 |

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

[b] Results shown for "case" versions of scenarios only (see appendix D for explanation)

KEY: D & C = dilation and curettage

NOTE: Starting with Definition 1, the data are cumulative

- Definition 1: Malpractice Concerns double-checked with no checks for any other reason
- Definition 2: definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed
- Definition 3: definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed
- Definition 4: definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed
- Definition 5: definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single-checked, and single or double checks allowed for other reasons
- Definition 6: definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double-checked, and single checks for other reasons allowed

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

## TABLE E-8: Percentage of Clinical Actions Chosen for Malpractice Concerns, Obstetricians and Gynecologists[a]

| Scenario[b]/ clinical action | % of respondents who chose the clinical action | Of clinical actions chosen, percent done for malpractice concerns | | | | | |
|---|---|---|---|---|---|---|---|
| | | *Most restrictive definition* | | | | | *Least restrictive definition* |
| | | Definition 1 | Definition 2 | Definition 3 | Definition 4 | Definition 5 | Definition 6 |
| **Breast lump (N=1,230)** | | | | | | | |
| Breast sonography | 23.6% | 0.7% | 1.8% | 9.7% | 10.4% | 26.9% | 55.6% |
| Mammography | 45.6 | 0.3 | 1.8 | 12.3 | 13.8 | 24.9 | 63.2 |
| Needle aspiration | 24.6 | 0.7 | 0.7 | 4.5 | 4.8 | 10.4 | 38.8 |
| Fine needle biopsy | 7.0 | 2.5 | 2.5 | 6.5 | 6.5 | 9.2 | 41.9 |
| Open biopsy | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.1 | 57.4 |
| Refer to surgeon | 29.2 | 6.3 | 8.3 | 21.4 | 23.1 | 32.4 | 68.8 |
| Other | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.7 |
| **Complicated delivery (N=1,230)** | | | | | | | |
| Continue pushing now | 8.8 | 0.9 | 1.9 | 1.9 | 1.9 | 7.1 | 24.5 |
| Rest for 30 minutes | 8.1 | 0.9 | 0.9 | 2.1 | 3.1 | 9.4 | 17.4 |
| Operative vaginal delivery | 67.7 | 0.3 | 0.4 | 2.0 | 2.2 | 7.5 | 30.1 |
| Caesarean section | 23.8 | 1.8 | 6.1 | 25.0 | 25.4 | 35.9 | 75.5 |
| Other | 4.8 | 2.0 | 2.0 | 3.7 | 3.9 | 9.0 | 20.0 |
| **Perimenopausal bleeding (N=634)** | | | | | | | |
| Hematocrit/Hemoglobin | 73.4 | 0.2 | 0.5 | 1.8 | 2.0 | 8.2 | 16.6 |
| Pregnancy Test | 49.5 | 5.4 | 5.7 | 11.1 | 11.7 | 20.2 | 45.4 |
| Endometrial Sampling | 85.4 | 0.0 | 0.2 | 1.9 | 2.3 | 7.5 | 41.2 |
| Pelvic Ultrasound | 54.3 | 2.0 | 2.3 | 7.6 | 8.0 | 17.6 | 38.7 |
| Hysteroscopy | 14.3 | 1.0 | 1.0 | 4.4 | 4.4 | 10.5 | 27.6 |
| D & C | 4.2 | 0.0 | 0.0 | 10.9 | 10.9 | 23.3 | 46.3 |
| Hysterectomy | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 100.0 |
| Other | 4.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.9 |

[a] Results are weighted to reflect the total population of professional society members on which the survey sample was based (see appendix D for details)
[b] Results shown for "case" versions of scenarios only (see appendix D for explanation)

KEY D & C = dilation and curettage

NOTE Starting with Definition 1, the data are cumulative
- Definition 1 Malpractice Concerns double-checked with no checks for any other reason
- Definition 2 definition 1 *plus* Malpractice Concerns double-checked, no checks for Medical Indications, but single checks for other reasons allowed
- Definition 3 definition 2 *plus* Malpractice Concerns double-checked, a single check for Medical Indications, and single checks for other reasons allowed
- Definition 4 definition 3 *plus* Malpractice Concerns single-checked, no checks for Medical Indications, but single or double checks for other reasons allowed
- Definition 5 definition 4 *plus* Malpractice Concerns single-checked, Medical Indications single-checked, and single or double checks allowed for other reasons
- Definition 6 definition 5 *plus* Malpractice Concerns single-checked, Medical Indications double-checked, and single checks for other reasons allowed

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

## TABLE E-9: Differences in Attitude Scale Scores in the OTA Clinical Scenario Surveys

| Attitude scale/scenario | Mean attitude scale scores: Respondents citing malpractice concerns as primary reason for choosing "one or-more clinical actions"[a] | Mean attitude scale scores: All other respondents | Difference | 950/o confidence limits |
|---|---|---|---|---|
| **Malpractice concern** (5 items, range 5-25) | | | | |
| ACC syncope (N-339) | 15.55 | 16 18 | -0 63 | (-1 39, 0 13)) |
| ACS breast pain (N-1 377) | 1442 | 15 24 | -0 82* | (-1 40 -0 24) |
| ACS head trauma (N-492) | 1774 | 15.61 | 2 13* | (1 51 2 75) |
| ACOG breast lump (N-1 192) | 1403 | 15 17 | -1 14* | (-1 62, -0 66) |
| **Cost consciousness** (6 items, range 6-30): | | | | |
| ACC syncope (N-340) | 1841 | 1890 | -049 | (-1 49, 0 51) |
| ACS breast pain (N -1 369) | 1874 | 1886 | -012 | (-0 72 0 48) |
| ACS head trauma (N - 488) | 2191 | 2263 | -072 | (-1 45 0 03) |
| ACOG breast lump (N-1 185) | 1842 | 1846 | -004 | (-0 52 0 44) |
| **Discomfort with clinical uncertainty** (3 items, range 3-15) | | | | |
| ACC syncope (N-330) | 794 | 9 07 | -1 13* | (-1 93 -0 33) |
| ACS breast pain (N - 1,368) | 770 | 8 39 | -0 69 | (-1 41 0 03) |
| ACS head trauma (N-486) | ***955*** | 9 51 | 0 04 | (-0 56, 0 64) |

*Statistically significant at the p < 05 level

[a] Excludes respondents who did not complete the attitude questionnaire

[b] Because the ACOG survey included only one item on discomfort with clinical uncertainty rather than three (see appendix D), ACOG attitude scale scores for discomfort with clinical uncertainty are not included in the comparison

KEY: ACC = American College of Cardiologists; ACOG = American College of Obstetricians and Gynecologists; ACS = American College of Surgeons

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

# Appendix F: Estimates of the Costs of Selected Defensive Medical Procedures

Projecting the overall cost of defensive medicine based on the Office of Technology Assessment (OTA) clinical scenario survey data is not possible, for two reasons. First, the OTA surveys covered only 13 clinical scenarios, nine of which were deliberate] y designed to increase the likelihood of a defensive response (see chapter 3 and appendix D). (The other four were "control" scenarios, in which concern about liability was expected to be much less important.) Second, reliable incidence and cost data could not be readily obtained for most of the procedures listed in the OTA scenarios.

OTA was able to estimate the annual cost of defensive medicine associated with procedures selected in two scenarios: a complicated obstetrical delivery (American College of Obstetricians and Gynecologists (ACOG) survey) and head injury in a 15-year-old (American College of Surgeons (ACS) neurosurgeons survey). These two scenarios were chosen because they exhibited a high frequency of defensive practice and because national incidence and cost data were available.

## APPROACH

OTA's basic approach was. first, to obtain national data on the incidence of the clinical condition described in the chosen scenario. Such data are not available for patients who match each and every demographic and clinical characteristic of the simulated patient. OTA applied the results to patients in a similar age range who fit the broader diagnoses into which the simulated patient might be classified.

Second, the estimated incidence of the clinical case was multiplied by the percentage of OTA survey respondents who chose the selected procedure primarily due to malpractice concerns (see table 3-3 in chapter 3), resulting in a national estimate of the annual frequency with which the procedure was performed primarily because of malpractice concerns in similar situations.

Finally, OTA obtained estimates of the average cost of performing the procedure and multiplied this per-service cost by the estimated number of "defensively'" performed procedures to arrive at an estimated aggregate annual cost of "defensive"

**TABLE F-1: Computation of Estimated Annual Cost of Defensive Caesarean Delivery in Cases of Prolonged or Dysfunctional Labor, United States, 1991**

| | |
|---|---|
| Number of live births complicated by prolonged labor or dysfunctional labor among women aged 30 to 39 in 1991 [a] | 45,126 |
| Number of live births where the nature of any complications was known among women aged 30 to 39 in 1991 [a] | ÷ 1,169,963 |
| Proportion of live births complicated by prolonged labor or dysfunctional labor among women aged 30 to 39 in 1991 | = 0.0385704 |
| Total number of live births among women aged 30 to 39 in 1991 [a] | x 1,215,855 |
| Total number of live births complicated by prolonged labor or dysfunctional labor among women aged 30 to 39 in 1991 | = 46,896 |
| Proportion of American College of Obstetricians and Gynecologists (ACOG) respondents who chose Caesarean section primarily because of malpractice concerns in the complicated delivery scenario [b] | x 0.06 |
| Number of live births delivered by Caesarean section primarily because of malpractice concerns among women aged 30 to 39 in 1991 | = 2,814 |
| Incremental cost of Caesarean section over and above normal delivery in 1991 [c] | X $3,106 |
| **Aggregate cost in 1991 of defensive Caesarean section among women aged 30 to 39 with prolonged or dysfunctional labor** | **= $8,740,284** |

[a] U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Health Statistics, Division of Vital Statistics, Natality, Marriage and Divorce Statistics Branch, unpublished data on prolonged and dysfunctional labor among women aged 30 to 39 obtained from Selma Taffel, Statistician, Oct. 18, 1993.

[b] See table 3-3 in chapter 3.

[c] Health Insurance Association of America, *Source Book of Health Insurance Data, 1992* (Washington, DC, 1992), table 4.15, p. 73. Separately listed data for hospital and physician costs were summed, and separately listed data for Caesarean section and normal delivery were differenced.

SOURCE: Office of Technology Assessment, 1994.

performance of the procedure. These calculations, discussed in further detail in the following two sections, are displayed in tables F-1 (Caesarean section in a complicated delivery) and F-2 (diagnostic radiology for head injury in young people).

These estimates do not necessarily represent any savings in health care costs that might accrue from elimination of defensive medical practices. Ordering or performing a procedure defensively could save health care costs in the future if poor outcomes are avoided or the patient condition is managed better. OTA assumed that such savings would be negligible in the scenarios used here.

## CAESAREAN DELIVERY IN A COMPLICATED LABOR

### Scenario

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

**Clinical course:** *The patient has had 12 hours of labor, and is now 3 hours into the second stage. She has been receiving oxytocin augmentation for secondary arrest of dilatation since 7 cm. She is completely dilated and effaced at +2 station, ROP. There has been no change in the exam for over an hour. Moderate variable decelerations have been present for the last 30 minutes with*

## TABLE F-2: Computation of Estimated Annual Cost of Selected Diagnostic Radiologic Procedures for Head Injury in Young People, United States, 1992

| | |
|---|---|
| Annual number of head injuries[a] | 1,975,000 |
| Proportion of head injuries that are apparently minor[b] | x 070 |
| Annual number of apparently minor head injuries | -1,382,500 |
| Proportionof emergency room visits for head injury in persons aged 5 to 24 in 1992[c] | X O 3837168 |
| Annual number of apparently minor head injuries in persons aged 5 to 24 | -530,488 |
| **PROCEDURE-SPECIFIC CALCULATIONS** | |
| ***Skull x-ray:*** | |
| Proportion of American College of Surgeons (ACS) neurosurgeon respondents who chose skull x-ray primarily because of malpractice concerns in the head trauma scenario[d] | x 0 100 |
| Annual number of skull x-rays performed primarily because of malpractice concerns, for apparently minor head injury in persons aged 5 to 24 | - 53,049 |
| Estimated private insurance reimbursement[e] for skull x-ray[f] in 1992 | x $ 77 |
| *1. Aggregate cost of "defensive" skull x-ray for apparently minor head injury in persons aged 5 to 24 in 1992* | - $ 4,084,773 |
| *Cervical* ***spine x-ray:*** | |
| Annual number of apparently minor head injuries among persons aged 5 to 24 (see above) | 530,488 |
| Proportion of ACS neurosurgeon respondents who chose cervical spine x-ray primarily because of malpractice concerns in the head trauma scenario[d] | x o 112 |
| Annual number of cervical spine x-rays performed primarily because of malpractice concerns, for apparently minor head injury in persons aged 5 to 24 | 59,415 |
| Estimated private Insurance reimbursement[e] for cervical spine x-ray[g] in 1992 | x $72 |
| **2.** *Aggregate cost of "defensive " cervical spree x-ray for apparently minor head injury in persons aged 5 to 24 in* 1992 | -$4,277,880 |
| *Computed tomography (CT) scan of head:* | |
| Annual number of apparently minor head Injuries among persons aged 5 to 24 (see above) | 530488 |
| Proportion of ACS neurosurgeon respondents who chose CT scan of head primarily because of malpractice concerns in the head trauma scenario[d] | x 0218 |
| Annual number of CT scans of the head performed primarily because of malpractice concerns, for apparently minor head inlury in persons aged 5 to 24 | - 115,646 |
| Estimated private Insurance reimbursement[e] for CT scan of the head[h] in 1992 | x $315 |
| **3** *Aggregate cost of "defensive" CT scan for apparently minor head injury in persons aged 5 to 24 in* **1992** | **-$36,428,490** |
| **Total annual cost of "defensive" radiology for apparently minor head injury in persons aged 5 to 24, 1992 (sum of aggregate costs for: 1) skull x-ray, 2) cervical spine x-ray, and 3) CT scan of head, shown above)** | = $ 44,791,143 |

[a] J F Kraus, "Epidemiology of Head Injury *Head Injury,* 3rd Ed Cooper, P R (ed ) (Baltimore Williams & Wilkins 1993), data from 1985-87 National Health interview Survey

[b] M Eliastam E Rose, H Jones, et al "Utilizat on of Diagnostic Radiologic Examinat ons in the Emergency Department of a Teaching Hospital, " *The Journal of Trauma 2061-66* 1980

[c] Consumer Product Safety Commission National Electronic Injury Surveillance System, unpu blished data obtained from Kathryn Wallace Congressional Relations Specialist U S Consumer Product Safety Comm ssion. Jan 3, 1994 Data are for all head injuries presenting in an emergency room, for all levels of severity and all causes associated with all consumer products (excluding motor vehicles and public transportation) The proportion was calculated by summing the number of visits for ages 5 to 14 and 15 to 24 and dividing this sum by the total number of visits

[d] See table 3-3 in chapter 3

[e] Private insurance costs were estimated using Medicare data For outpatient hospitals, the average Medicare reimbursement was divided by O 542, obtained by dividing the payment-to-cost ratio computed from Medicare data (O 90) by that from a private multiple-insurer database (MEDSTAT) for 1991 (1 66) (Prospective Payment Assessment Commission unpublished data for 1990 but using 1992 reimbursement rules, supplied by Deborah Williams Senior Policy Analyst, Jan 21, 1994 and Feb 3, 1994 ) For physicians' offices (and free-standing Imaging centers), the average Medicare reimbursement (Physician Payment Review Commission unpublished data for 1992 supplied by Chris Hogan, Principal Policy Analyst, Jan 19, 1994) was divided by 0 70, the ratio of Medicare to private Insurance fees for physician imaging services (M E Miller, S Zuckerman, and M Gates "How Do Med care Physician Fees Compare with Private Payers? *Health Care Financing Review* 1425-39 1993) The resulting private Insurance reimbursement estimates for outpatient hospital; and physicians offices were averaged weighted bythe proportion of Medicare procedures performed in each setting (private Insurance data on this were not available)

[f] Identified by codes 70250 *and 70260* in American Medical Association Current *Procedural Terminology* 4th Ed (Chicago 1993) The reimbursement figures for these two codes were averaged weighted by the number of procedures performed for each

[g] Identified by codes 72040, 72050 and 72052 in American Medical Association *Current Procedural Terminology* 4th Ed (Chicago, 1993) The reimbursement figures for these three codes were averaged, weighted by the number of procedures performed for each

[h] Identified by code 70450 in American Medical Association *Current Procedural Terminology* 4th Ed (Chicago, 1993) This code is for CT scan of head or brain without contrast material wh ch is used to detect tumors rather than blood The reimbursement figures for this code for outpatient hospitals and physicians offices were averaged, weighted by the numbers of procedures performed in each setting

SOURCE Office of Technology Assessment, 1994

*good beat-to-beat variability. Estimated fetal weight is 7.5 lbs. and clinical pelvimetry is adequate. The patient is fatigued and can no longer push.*

## Method

National incidence data for women aged 30 through 39 for calendar year 1991 were obtained from birth certificate data compiled by the National Center for Health Statistics (250). Two kinds of delivery complications that most closely fit the simulated patient were "prolonged labor" and "dysfunctional labor." OTA divided the number of live births in the selected age category (30 to 39) involving these complications by the total number of live births for which the nature of any birth complications was known (250). This gave the rate of each complication in births to women in the selected age range. OTA then multiplied this rate by the total number of live births to women in the selected age range to obtain the total number of live births with the selected complications. This number was then multiplied by the percentage of ACOG survey respondents who chose Caesarean delivery primarily due to malpractice concerns (see table 3-3 in chapter 3), giving a national annual estimate of the number of times that a Caesarean delivery was performed primarily because of malpractice concerns in situations similar to the ACOG scenario.

National estimates of the incremental cost of Caesarean delivery over and above those of a normal delivery for calendar year 1991 were obtained from the Health Insurance Association of America (89). OTA multiplied this cost estimate by the estimated number of Caesarean deliveries performed primarily due to malpractice concerns in situations similar to the ACOG scenario. This gave the final aggregate estimate of the national annual cost of defensive Caesarean delivery in complicated deliveries involving prolonged or dysfunctional labor.

# DIAGNOSTIC RADIOLOGY FOR HEAD INJURY IN YOUNG PEOPLE

## Scenario

**History of present illness:** *A 15-year-old boy fell from his skateboard after riding over a crack in the sidewalk. He hit his head, got up and skated home. Thirty minutes after the fall he told his mother about the incident and she brings him to the ER. In the ER, the patient admits to lightheadedness and some tenderness at the site of impact.*

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

## Method

OTA used an estimate of the annual total number of head injuries per year (11 8), obtained from the National Health Interview Survey for 1985-87. OTA then estimated the proportion of all head injuries that are apparently minor. Discussions with clinicians indicated that the clinical features of a head injury (e.g., loss of consciousness, neurological deficit) are more important than its cause (e.g., fall from a skateboard) in determining severity. OTA therefore broadened the basis for this cost projection beyond the cause-specific ACS clinical scenario to reflect all minor head injuries in young people.

A conservative estimate of the proportion of all head injuries that appear to be minor upon clinical examination in the emergency room is available from a study by Eliastam and colleagues (63). In that study, the researchers reported the proportion of all head injuries presenting to the emergency room of a suburban teaching hospital for which diagnostic x-rays were ordered, but that were classified immediately prior to the x-ray as not meeting specified criteria for likely skull fracture. This estimate is conservative because it excludes all head injuries for which x-rays were not or-

[1] Although Eliastam and colleagues (63) used the term *medicolegal* to characterize such injuries, they did not attempt to determine whether the x-rays performed on those patients constituted defensive medicine.

dered. This proportion was applied to the National Health Interview Survey data to generate an annual estimate of the frequency of apparently minor head injuries.

National data on the age distribution of minor head injuries, or even all head injuries, do not exist. However, OTA obtained national data by age group on the number of head injuries (regardless of severity) caused by consumer products (excluding motor vehicles and public transportation) and treated in emergency rooms from the National Electronic Injury Surveillance System (242). The available age categories nearest age 15 (the age of the patient in the ACS head trauma scenario) were 5 to 14 and 15 to 24, which OTA combined into a single category of 5 to 24. Multiplying the estimated number of apparently minor head injuries by the percentage of consumer product-related emergency room visits for head injury among persons aged 5 to 24 gave the estimated number of apparently minor head injuries among persons aged 5 to 24.

This number was then multiplied by the percentage of ACS survey respondents (neurosurgeons) who chose each radiologic procedure (skull x-ray, cervical spine x-ray, or computed tomography (CT) scan) primarily due to malpractice concerns in the ACS head trauma scenario (see table 3-3 in chapter 3). This gave a national annual estimate of the number of times that each procedure was performed primarily due to malpractice concerns in clinical situations similar to the ACS scenario.

National estimates of the cost of performing each radiologic procedure under Medicare (the only readily available and reliable national data) were obtained from the Physician Payment Review Commission (PPRC) and the Prospective Payment Assessment Commission (ProPAC). Data on average per-service Medicare reimbursement rates for each procedure performed in physicians' offices and free-standing imaging centers during calendar year 1992 were obtained from PPRC (187). To estimate the average private insurance reimbursement rate for each procedure, OTA divided these Medicare rates by 0.707, the ratio of Medicare to private insurance fees for physician imaging services found in a recent study by Miller and colleagues (162).

Data on average per-service Medicare reimbursement rates for each procedure performed in hospital outpatient departments during calendar year 1990 (but using 1992 reimbursement rules) were obtained from ProPAC ( 192). To estimate the average private insurance reimbursement rate for each procedure, OTA divided these Medicare rates by 0.542, the ratio of Medicare to private insurance fees for all nonfee-schedule outpatient hospital services (1 92).[2]

OTA averaged these per-service private insurance cost estimates for radiology services in physicians' offices and outpatient hospitals, weighted by the number of Medicare services performed in each setting (private insurance data by setting were not available). This estimated average private insurance reimbursement rate was then multiplied by the estimated number of times that each procedure was performed primarily due to malpractice concerns in situations similar to the ACS scenario. This gave the final aggregate estimate of the national cost of "defensive" radiologic procedures for apparently minor head injuries among persons aged 5 to 24.

[2] This ratio was obtained by dividing the payment-to-cost ratio computed from Medicare data (0.90) by that from a private multiple-insurer database (MEDSTAT) for 1991 ( 1.66).