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

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

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

APPROACH

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

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

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

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

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

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

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

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

SOURCE: Office of Technology Assessment, 1994.

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

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

CAESAREAN DELIVERY IN A COMPLICATED LABOR

Scenario

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

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

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

Annual number of head injuries[a]	1,975,000
Proportion of head injuries that are apparently minor[b]	x 070
Annual number of apparently minor head injuries	-1,382,500
Proportionof emergency room visits for head injury in persons aged 5 to 24 in 1992C	X O 3837168
Annual number of apparently minor head injuries in persons aged 5 to 24	-530,488
PROCEDURE-SPECIFIC CALCULATIONS	
Skull x-ray:	
Proportion of American College of Surgeons (ACS) neurosurgeon respondents who chose skull x-ray primarily because of malpractice concerns in the head trauma scenario[d]	x 0.100
Annual number of skull x-rays performed primarily because of malpractice concerns, for apparently minor head injury in persons aged 5 to 24	= 53,049
Estimated private insurance reimbursement[e] for skull x-ray[f] in 1992	x $ 77
1. Aggregate cost of "defensive" skull x-ray for apparently minor head injury in persons aged 5 to 24 in 1992	*= $ 4,084,773*
Cervical ***spine x-ray:***	
Annual number of apparently minor head injuries among persons aged 5 to 24 (see above)	530,488
Proportion of ACS neurosurgeon respondents who chose cervical spine x-ray primarily because of malpractice concerns in the head trauma scenario[d]	x **o 112**
Annual number of cervical spine x-rays performed primarily because of malpractice concerns, for apparently minor head injury in persons aged 5 to 24	59,415
Estimated private Insurance reimbursement[e] for cervical spine x-ray[g] in 1992	x $72
2. *Aggregate cost of "defensive " cervical spree x-ray for apparently minor head injury in persons aged 5 to 24 in* 1992	-$4,277,880
Computed tomography (CT) scan of head:	
Annual number of apparently minor head Injuries among persons aged 5 to 24 (see above)	530488
Proportion of ACS neurosurgeon respondents who chose CT scan of head primarily because of malpractice concerns in the head trauma scenario[d]	x **0218**
Annual number of CT scans of the head performed primarily because of malpractice concerns, for apparently minor head inlury in persons aged 5 to 24	- 115,646
Estimated private Insurance reimbursement[e] for CT scan of the head[h] in 1992	x $315
3 *Aggregate cost of "defensive" CT scan for apparently minor head injury in persons aged 5 to 24 in* **1992**	**-$36,428,490**
Total annual cost of "defensive" radiology for apparently minor head injury in persons aged 5 to 24, 1992 (sum of aggregate costs for: 1) skull x-ray, 2) cervical spine x-ray, and 3) CT scan of head, shown above)	**= s** 44,791,143

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

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

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

[d] See table 3-3 in chapter 3

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

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

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

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

SOURCE Office of Technology Assessment, 1994

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

Method

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

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

DIAGNOSTIC RADIOLOGY FOR HEAD INJURY IN YOUNG PEOPLE

Scenario

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

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

Method

OTA used an estimate of the annual total number of head injuries per year (11 8), obtained from the National Health Interview Survey for 1985-87. OTA then estimated the proportion of all head injuries that are apparently minor. Discussions with clinicians indicated that the clinical features of a head injury (e.g., loss of consciousness, neurological deficit) are more important than its cause (e.g., fall from a skateboard) in determining severity. OTA therefore broadened the basis for this cost projection beyond the cause-specific ACS c1inical scenario to reflect all minor head injuries in young people.

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

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

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

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

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

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

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

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

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