

Economic Incentives in the Choice between Vaginal Delivery and Cesarean Section

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THE FINANCIAL STAKES IN OBSTETRIC DECISION making have become enormous. In 1989, the 3.9 million American hospital deliveries represented 12.7 percent of all admissions and 5.6 percent of hospital days, at a cost of almost \$20 billion. Cesarean section (C-section) was the most common major hospital surgical procedure in the United States, accounting for 24 percent of all deliveries, more than four times the 1970 rate of 5.5 percent (Taffel et al. 1991).

These C-sections are more expensive than vaginal deliveries. A national survey in 1989 revealed that the average charge for a C-section (including both physician and hospital components) was \$2,850 greater than the average charge for a vaginal delivery (Health Insurance Association of America 1989). Although most of this difference can be attributed to the two to three extra days of inpatient care required for mother and baby after a C-section, the average physician fee for a C-section, which survey figures showed to be more than \$500 greater than the fee for a vaginal delivery, was a significant factor as well. These estimates imply that a 1 percent decrease in the U.S. C-section rate would cut annual medical charges in 1992 by \$170 million.

The dramatic rise in the overall rate of C-sections, their high cost, and

the wide variations observed in rates for them among various populations and practice settings have raised questions concerning their appropriateness. The RAND Management and Outcomes of Childbirth (MOC) study is designed to evaluate childbirth management strategies based on pertinent clinical and nonclinical factors. The study team will also design, implement, and evaluate intervention programs that seek to improve outcomes by modifying the current decision-making environment for both providers and patients.

The economic incentives of providers and mothers is one of several areas reviewed in the MOC study to better understand the determinants of childbirth management. We located literature published between 1970 and July 1992, using a Medline keyword search in U.S., British, and Canadian medical, economic, and health services research journals. We also reviewed the bibliography of the most relevant articles retrieved and conducted a hand search of the most applicable journals for the past seven years. By using these methods, we located 255 relevant journal articles, three dissertations, and nine books.

The Review Outline

We first introduce an economic model of obstetric decision making. We then discuss the prevalence and the effects of incentives that apply in turn to physicians, hospitals, health maintenance organizations (HMOs), and mothers. Payers also have interests and incentives, but we will focus on the effects of payments, rather than their determinants. We will conclude with some suggestions for research to fill the gaps in the literature, and for insurance reforms to reduce the effects of current dysfunctional economic incentives.

Determinants of Obstetric Decisions

In our health care system, hospitals, payers, and patients can select physicians and influence their decisions, but physicians ultimately are responsible for what is done. In this section, we will briefly discuss the clinical and cultural factors that determine most treatment decisions and will then present a model of the economic incentives surrounding decisions to perform C-sections. Later we will examine the evidence on how well the model fits the real world.

Clinical and Cultural Determinants of Decisions. Cesarean section is usually performed for a specific set of conditions including prior C-section, dystocia (failure of labor to progress, a discretionary diagnosis that has increased in parallel with C-section rates), breech, or fetal distress. Physicians try to use their expertise to deal with the mother's clinical condition and to support her values and expectations (Eisenberg 1986, chap. 3). Ignoring financial costs, a C-section is best if the price in terms of morbidity and risk to the mother of the operation is less than the discomfort and risks to mother and child of prolonged vaginal delivery. For economic optimality, the better outcomes for mother and child from a C-section must be worth more than the required additional resources.

Differences in mothers' preferences and physician skills, available technology, and staff may lead to divergent management approaches. However, most of the great variation in C-section rates, even within clinical categories, must reflect uncertainty and disagreement about the indications for and outcomes of a C-section (Wennberg, Barnes, and Zubkoff 1982; Stafford 1991; Heilbrunn and Park 1992). The 1980 National Institutes of Health (NIH) consensus conference on C-section concluded that "information on benefits particularly relating to morbidity and development of the infant is inadequate to allow comparison of benefits with costs" (National Institutes of Health 1981).

In the absence of clear-cut differences in expected outcomes of various treatments, attributes of physicians, like training, age, culture, or social norms, may lead them to act as if they were following different textbooks of obstetrics when they are treating the same clinical condition (Eisenberg 1986, chap. 4). These cultural differences and varying social norms for acceptable treatments may be based on differing beliefs and uncertainty about health outcomes or they may result from the continuing effect of economic incentives.

Economic Incentives. Standard economic theory assumes that profit-maximizing suppliers provide goods and services for utility-maximizing consumers within a market. There is a long-standing controversy about how well medical care fits into this economic model, but we will try to use it to understand obstetric decisions.

To be specific, suppose a physician must choose in some clinically equivocal case whether to perform a C-section or a vaginal delivery. Many factors (organization of practice, hospital facilities, type of monitoring, condition, and insurance coverage of mother) have an impact on the costs of each action, but these factors are the result of earlier choices

by the physician. The baby will emerge through one route or another, and the choice is based on the differences between vaginal delivery and C-section in cost and outcome. Other parties—the mother, the hospital, and the insurance company—have their own interests, which the physician has to accommodate to the degree necessary for continuing a successful practice. Thus, we might expect the interests of these other parties to be reflected in C-section rates.

The economically motivated physician attempts to maximize some combination of self-respect, immediate profits, time for other activities, and reputation. Self-respect derives from the satisfaction of physician and patient with the process and outcomes of care (Eisenberg 1986, chap. 2; Ellis and McGuire 1990). Immediate profits are the difference between the payments for the service and the costs of supplying the service. It is important to distinguish profits from payments to avoid fallacious arguments that ignore costs and assume providers are only affected by payments. Economic costs include both dollar outlays and opportunity costs. In addition to paying for personnel and equipment to help with delivery, a physician has the opportunity cost of giving up the time needed to provide care personally. The opportunity cost is the value of the next best use of that time, which may be a loss of leisure time or loss of income from providing other kinds of care.

The opportunity costs of waiting for labor to progress depend on the expected remaining length of labor and on physicians' ability to structure their practice to make efficient use of that time. To avoid waiting through a long labor, they may operate. Also, physicians can reduce the opportunity costs of waiting by substituting (other physicians, nurses, or midwives) to attend the mother or by attending to other patients.

Reputation is important in obstetrics because of tough competition for first-time mothers-to-be, who are typically not bound by long-term ties with their obstetricians. Competition requires providers who want substantial future business to satisfy their customers and referring colleagues by providing good service at a cost insurers find reasonable. Recently, insurers have been able to use competition for mothers to extract fee concessions in exchange for providing those mothers to obstetricians. Obstetricians may suffer the time and energy demands of delivering babies to feed their gynecologic practice (Baumgardner, Marder, and William 1991).

The incentives of independent hospitals are in many ways similar to those of physicians. They profit from more births and more C-sections,

and they have to balance immediate gains against reputation. HMOs and managed care insurance plans have incentives to minimize the cost of services, but they must provide adequate care to preserve their reputation. Insured mothers typically pay a very small percentage of the cost differences between C-section and vaginal delivery, but uninsured mothers and their providers (to cut their losses) have strong incentives to keep down costs.

Many people naively assume that economic incentives only affect greedy providers looking for a quick buck. In this review, we will emphasize incentives that distort good practice, but economic incentives can lead to good as well as bad outcomes. Competition gives physicians incentives to efficiently provide high-quality care that takes patient values into account. Economic incentives more likely will lead to unnecessary costs than to damaged health. Hillman comments that “whereas most physicians will act in the patient’s best interest when the medical decision is clear-cut, the effect of financial incentives may be most important in cases where the correct decision is not obvious” (1990, 893). The incentives of insurers and the insured to control unnecessary costs and thereby limit health insurance premiums may beneficially save money for other worthwhile uses.

Physician Economic Incentives

Economic considerations may influence the decision to practice obstetrics, to accept particular patients, and to choose a treatment for that patient. The first two decisions influence the treatments offered to mothers indirectly. For example, the enormous rise in malpractice premiums is believed to have caused family practitioners with small obstetric practices, midwives, and even some obstetrician/gynecologists (Ob/Gyns) to drop obstetrics. (Heilbrunn and Rolph [1993] review malpractice issues.) The resulting shift to obstetricians probably leads to more C-sections. Similarly, the lower payments collected from Medicaid and uninsured mothers make them less desirable patients, and many private practitioners refuse to take them (Alan Guttmacher Institute 1987). Despite continuing federal and state efforts to enroll more poor pregnant women in Medicaid and to raise obstetric payments, access problems persist (Fossett et al. 1991). Rejected mothers often end up in city and county hospitals, which have low C-section rates.

In discussing the direct effects of incentives on choice of treatment, we will begin with the costs of providing C-section and vaginal delivery and continue with the effects of fees, competition, and malpractice liability.

Costs to Physicians of Vaginal Deliveries and Cesarean Sections

A cesarean section is major surgery requiring anesthesia, but its time costs to the obstetrician are fairly predictable. By contrast, the duration of labor is uncertain, but can be estimated from various clinical factors, such as whether the patient is multiparous or primiparous, how labor has progressed so far, and other variables. Sectioning women whose vaginal labors are progressing very slowly can save time and effort for both mother and obstetric team. If standing by a long vaginal labor is the alternative, the true costs to the physician may be lower with the more predictable C-section, even though overall costs, including anesthetic services, and especially extra hospital days for the mother and infant, will be higher. The costs of vaginal birth after a prior C-section (VBAC) may be particularly high because of the extra concern and necessary standby capability.

Indirect Evidence on the Costs of Waiting for Vaginal Delivery. Practice characteristics that increase the costs of waiting are associated with more C-sections. Carpenter et al. (1987) linked a 1984 survey of 59 Maine physicians to C-section rates for dystocia calculated from hospital discharge data. They found no association with previous liability or payment differentials, but physicians with lower C-section rates were more likely to share night call with other colleagues, which would reduce their costs of waiting. de Regt et al. (1986) investigated C-section delivery rates by type of practice in 65,647 deliveries in four Brooklyn hospitals during the years 1977 to 1982. Private physicians performed significantly more total and complication-specific C-sections than salaried clinic physicians. The authors suggest that clinic physicians may be less constrained by tight schedules and have fewer liability concerns than private physicians.

Solo practitioners, who have higher costs of uncertain waiting than group practitioners, might be expected to have higher C-section rates. Porreco et al. (1989) propose that independent doctors organize into groups that agree on obstetric protocols and rotate periods during which

delivery is their only responsibility. The resulting lower waiting costs for vaginal delivery should reduce the C-section rate. Similarly, the low rates of C-section for mothers who begin at birth centers (4.4 percent according to Rooks et al. 1989) or are attended by midwives elsewhere may be due in part to the lower opportunity costs of waiting for midwives than for obstetricians (and to selection of mothers who do not need C-sections; Chambliss et al. 1992).

Convenience and Timing of Deliveries. Three studies investigated whether C-sections or vaginal speedup are performed so that providers can leave the hospital at a "decent" time of day to retain some leisure, and can schedule their work days for maximum productivity. The studies focused on dystocia because it is not a reason for scheduling, but by nature it is not acute, and allows some diagnostic discretion.

If only clinical factors influenced decisions, we could expect a random distribution of vaginal deliveries and nonscheduled C-sections across time periods and days of the week. Evans et al. (1984) found reductions in both vaginal and C-section deliveries on the weekend in four Chicago hospitals, but no peaks on Friday afternoon or Monday morning. There were sharper decreases in dystocia than in acute C-sections in the time between midnight and 6 AM. Phillips, Thornton, and Gleicher (1982) also found lower weekend deliveries, but no differences between weekend and weekday rates of C-section for dystocia in a New York teaching hospital. Finally, Fraser et al. (1987) found that C-sections were performed for dystocia significantly more often in the evening (6 PM to midnight) than at other times at a McGill teaching hospital, especially for patients with fewer than 16 hours of labor. Reducing the evening rates for dystocia to other rates would have decreased the overall primary C-section rate by only 0.7 percentage points.

These studies show that convenience, particularly in avoiding lengthy labor at night, may play a role in some decisions, but is not a major cause of increased C-sections. They point out the need for clinical detail in doing such studies because repeat, acute, and nonacute C-sections will have different predictors and varying patterns.

Direct Estimates of Costs. The resource-based relative value scale (RBRVS) research attempted to estimate "work," defined as the product of intensity and time. Estimates were collected by surveying physicians and were combined with estimates of other practice and malpractice costs to compute the cost of various physician services (Hsiao et al. 1988). The 1992 national estimates were surprisingly low: \$809 for the package

of prenatal and postnatal care and vaginal delivery, and \$1,066 for the total C-section package. Hsiao used a narrow definition, "bedside time," to measure the time spent by the physician and, in response to criticism of these estimates, the obstetric services costs were totally revised. The 1993 revisions have left C-section costs about the same, but they raised vaginal delivery costs to a slightly higher level than C-section costs. These estimates are averages, that is, they do not vary with labor time or practice characteristics.¹

Physician Fees and Payments

Many studies, including one randomized trial, have shown that fees and payments influence physician actions (Hickson, Altemeier, and Perrin 1986). There has been considerable outcry (Relman 1988) and regulations have been established to prevent physicians being diverted by financial incentives from their roles as agents of the patient and from acting as responsible members of society.

Fees for Vaginal Deliveries and for Cesarean Section. The survey by the Health Insurance Association of America (1989), which was referred to earlier, showed that physician charges for C-section in 1989 were \$2,053, compared with \$1,492 for vaginal delivery. Not all charges are paid, but there is no evidence that payment rates for C-sections are different from those for vaginal delivery. Physician charges to privately insured patients for maternity services have increased faster than the Consumer Price Index for such services over the period from 1982 to 1989 (approximately doubling, whereas the price of professional services as a whole has only risen by 57 percent), reflecting higher costs and an increased intensity of services. The average physician charge for vaginal delivery has remained at about 70 percent of the C-section charge. Regional differences have persisted.

Medicaid obstetric-allowed reimbursements vary widely from state to state and are typically half or less of the fees paid by commercial insurers. In 1986, average Medicaid reimbursement for vaginal delivery was \$554, and for C-section, \$767 (Alan Guttmacher Institute 1987). The percentage markup for C-section is similar to private insurance, but eco-

¹ *Federal Register* November 25, 1992, 56056.

nomically motivated providers will act based on differences in profits. If private insurance pays twice as much as Medicaid for both C-sections and vaginal deliveries, the payment differential for a privately insured C-section is twice that of Medicaid. This and the recent switch of many Medicaid plans to equalized payments for deliveries may partly explain why Medicaid rates of C-section in 1989 around the country were 20 percent, compared with 27 percent for privately insured mothers (Taffel et al. 1991).

Family practitioners who do not do C-sections provide an interesting example of the effects of fees. Because the fee for the operation goes to the surgeon, these practitioners have more to lose from proceeding to C-section than physicians who do both vaginal deliveries and C-sections. This may explain why mothers who start with such physicians have lower rates of C-sections (Krikke and Bell 1989).

Effects of Payment Reforms on Utilization. A few studies of physician payment reforms show that modest financial incentives have modest expected effects on behavior. Payers have experimented with reforms, using payment incentives to reduce length of stay (LOS) and decrease the number of operations. Sims et al. (1984) reports a Blue Shield of Massachusetts experiment that essentially rewarded six fee-for-service (FFS) Ob/Gyns \$50 for each day less than agreed-upon LOS targets for normal deliveries, C-section deliveries, and hysterectomies. Average length of stay dropped for all three procedures, but the drop was not significant.

Many private insurers and state Medicaid plans have recently attempted to equalize fees for C-sections and vaginal deliveries. A report on the experience of several Blue plans that did so showed only a small impact on rates (Darby 1992, 8-10).

Effects of Payment Source on C-Section Rates. A number of studies have looked at the effect of payment source on rates of C-section and have found that they are strongly related. Such studies face the problem that payment source may be associated with other factors that affect C-section rates independently. To avoid the oversimplified conclusion that payment incentives cause all the rate differences, researchers try to adjust for the effects of these other factors to the extent that their data allow. Stafford (1990b, 1991) looked at all California hospital deliveries in 1986. Differences were dramatic, as shown in table 1. Accounting for maternal age and race/ethnicity did not change these unadjusted find-

TABLE 1
Rates of C-Section by Source of Payment in California, 1986

Payer	Overall (%)	Mothers with prior section (%)
Private insurance	29.1	91.9
Non-Kaiser HMO	26.8	91.6
Medicaid	22.9	90.6
Kaiser	19.7	80.1
Self-pay	19.3	82.0
Indigent services	15.6	74.8

ings. C-section performed for each specific reason (prior section, breech presentation, dystocia, and fetal distress) followed a similar pattern by payer type (see the last column of table 1).

Many factors are responsible for these results, but they can be used to argue that physician, hospital, and patient financial incentives do affect C-section rates. Private insurance pays physicians the highest fees and manifests the highest rates of C-section. Rates in HMOs other than Kaiser closely resemble those of private insurance. Physicians in Kaiser, a staff model HMO, are salaried and thus have no financial incentive to manage deliveries in any particular way, whereas most other HMO physicians are paid on a FFS basis. In 1986, California physicians received somewhat more from Medicaid for C-sections than for vaginal deliveries, but, as we argued earlier, financial incentives to perform C-sections on privately insured patients are stronger. Self-pay and indigent mothers have the lowest rates, which is attributable partly to constraints at the hospital where they deliver, and partly, perhaps, to the mothers' wish to save money, but this situation may also be the result of providers who do not expect full payment cutting their losses by offering less expensive care. Similar results were found for C-section rates in 1986 data on the State of Illinois (Oleske et al. 1991). The low rates for self-pay patients have been observed for many years (Goldfarb 1984).

Other Economic Incentives

Effects of Competition. Several factors will cause obstetricians to experience more competition:

1. a low fertility rate as the baby boomers near the end of their child-bearing years
2. an increase in the supply of obstetricians per population—the profession experienced an 18.6 percent growth from 1980 to 1986 (Baumgardner et al. 1991)
3. a pricing structure that is ideal for competition: a homogenous package (complete maternity care) with a substantial price tag
4. the growing interest in “natural” births
5. increased use of HMOs, which provide many more deliveries per obstetrician than FFS practice

Staff model HMOs service about twice as many adults per primary care physician as do general FFS practices, and, by using nurse midwives backed up by obstetricians, they could do the same for obstetric care. The Graduate Medical Education National Advisory Committee (GMENAC) predicted a large surplus of obstetricians by the year 2000 (Steinwachs et al. 1986).

Competition from a surplus of obstetricians has not yet hurt the specialty financially: in the 1990 Continuing Medical Economics Survey of office-based private practice physicians, Ob/Gyns netted a median of \$202,000, compared with \$142,000 for all surveyed physicians (Azevedo 1991). Rates of return on obstetrician specialty training remained high (14.5 percent) until 1980—higher than internists, lawyers, or dentists (Burstein and Cromwell 1984). Mothers in 1989 had to wait an average of 13.5 days to see an Ob/Gyn for a visit and had to wait, on average, 22 minutes after arriving at the office—up slightly from previous levels (Baumgardner et al. 1991). Obstetricians have the advantage over other primary care doctors: they do not have to compete with self-care (such as bed rest or over-the-counter remedies.)

A study of over 68,000 deliveries in upstate New York in 1986 found some interesting effects of competition (Tussing and Wojtowycz 1992). Contrary to the supply-creates-demand hypothesis that doctors in competitive areas induce more patient visits and procedures to keep up their income, areas with greater numbers of obstetricians per mother had fewer C-sections (and other gynecologic procedures). This was also true for areas with more HMO penetration. The authors speculate that the lower rate may derive from obstetricians with more competition having more time to give to patients, or from more competitive pressure to heed mothers wanting vaginal deliveries. The C-section rate increased with

the spread between cesarean and vaginal fees (a 10 percent increase in cesarean fees was associated with a 1.5 percent increase in the rate).

Competition from Midwives and Birthing Centers. Despite increasing interest in simple natural births, the share of births that take place in birthing centers or at home, which are not supervised by a physician, remains tiny in the United States. Among other reasons, insurance coverage of such care is sometimes restricted. The Netherlands provides a striking contrast with mainly home births delivered by midwives, C-section rates below 7 percent, and low infant mortality (Notzon 1990). The Dutch insurance system gives preferential reimbursement to midwife deliveries and covers home assistance by nursing aides, creating strong incentives for delivery by midwives at home rather than by physicians in hospitals (Torres and Reich 1989). In addition, malpractice insurance premiums in the United States have had a bigger impact on potential competitors, such as independent midwives and family practitioners, than on obstetricians. Indeed, physician-owned insurance companies have acted anticompetitively by setting premiums for physicians who use midwives higher than their claims experience warrants (Goldstein 1991). Hospitals have quickly moved to provide their own homelike birthing centers (Breindel and Breindel 1981), leaving low-tech alternative delivery systems such as home deliveries by midwives and free-standing birthing centers with just 1 percent of deliveries (U.S. Department of Health and Human Resources 1990).

The benefits of competition from nonphysicians for health care services has long been more apparent to economists and nonphysician providers than to physicians (Pauly 1988). None of the economics literature advocating competition is specific to obstetrics. Both sides have rightly concluded that insurance coverage of nonphysicians is a major battleground for competition. Even competition within medicine at one time was frowned upon as ungentlemanly. According to Kessel (1958), such a professional culture and ethics helped preserve the medical cartel. In recent years, antitrust actions have been brought more aggressively against physician practices that are deemed to be in restraint of trade, such as nonreferral agreements (California chiropractors) and restrictions on hospital privileges (Oregon).

Malpractice Liability Incentives on Treatment. Heilbrunn and Rolph (1993) extensively discuss malpractice issues in the management of childbirth. We will mention them here because liability provides strong incentives to physicians. Because premiums are generally unrelated to

claims experience, their impact on treatment decisions should be limited; furthermore, the money costs of suits to physicians are mainly covered by insurance. However, the psychic and time costs that the legal system imposes on defendants are a great concern to many obstetricians. We could not find any estimates of the true costs to physicians of a suit.

To escape the costs of a suit, obstetricians say they order additional tests (Firth et al. 1988) and may perform "defensive" C-sections, whose costs exceed their expected benefit to the infant or mother. Their purpose is to reduce the chance of a claim or successful suit after a bad outcome (in fact, or in the physician's fancy), but there is no direct study of the effect of C-sections on the probability of a suit, so we, like practicing obstetricians, cannot tell when defensive C-sections make sense. No one knows how many C-sections are performed for defensive reasons.

If C-section rates are a good defense, then doctors practicing in areas marked by more suits might choose to do more C-sections out of fear. However, studies that have attempted to link higher C-section rates to higher premiums or rates of suits have had mixed results: the Metropolitan Insurance Company (1988b) recorded a low correlation between state premiums and state malpractice rates, and Stafford (1990a) noted studies in which neither prior involvement in litigation nor payment of higher malpractice premiums was associated with higher C-section rates. He also noted that the C-section rates rose between 1985 and 1987 while malpractice claims against obstetricians were decreasing. Tussing and Wojtowycz (1992) found that cumulative obstetric suit rates were negatively related to C-section rates in their New York State data. On the other hand, Rock (1988) found a positive simple correlation between the malpractice premiums of seven insurance territories in New York and Illinois and their unadjusted average primary C-section rates.

The mixed results are not surprising: even if physicians believed they could lower their risk by doing C-sections, areas with low C-section rates might generate more suits. In cross-sectional analyses, one cannot decide whether the suits affect the rates or vice versa. Also, the very weak connection between negligent adverse events and malpractice claims, as shown in a random sample of 31,429 New York hospitalization records in the Harvard Medical Practice study, makes any direct causal effect of suits and premiums on negligence unlikely (Localio et al. 1991).

Electronic Fetal Monitoring. Treatment decision may be affected indirectly by incentives to use tests and procedures that are complementary to C-section. Electronic fetal monitoring (EFM) is a prime example in

obstetrics of the technological imperative to use new devices, without much consideration of costs or of their marginal advantage over older methods (Hillman 1990). EFM use skyrocketed in the 1970s because of the promise of identifying fetal problems in time for successful interventions. Unfortunately, EFM has failed to live up to that promise (Ryan 1988). In the eight published clinical trials, EFM did not help outcomes, whether for normal (e.g., Leveno et al. 1986) or for high-risk preterm deliveries (Luthy et al. 1987).

Nevertheless, legal pressure to create a record that can be defended has made EFM the standard of care in many places. These legal pressures reinforce other economic incentives toward its use. In 1989 direct charges for EFM were approximately \$100 per monitored delivery (Health Insurance Association of America 1989). Two studies showed that matched patients supervised by certified nurse midwives had lower charges for hospital services because they were given less EFM and anesthesia services (Cherry and Foster 1982; Krumlauf et al. 1988). In addition to the direct costs, EFM may result in false positive identifications of fetal distress, thereby starting a technological cascade that ends in a C-section. Banta and Thacker (1979) estimated that an additional 96,500 C-sections were performed for this reason in 1978.

Hospital Incentives

In the United States, almost all deliveries take place in hospitals. Hospital incentives are similar to those of obstetricians. They profit from more births, particularly from more C-sections. Even nonprofit hospitals need to break even and therefore try to do more business rather than less. Their profits give them the flexibility to pursue their aims. Hospitals also need a good reputation to attract mothers, and often view increased deliveries as strategically attractive for image and future business. The value of these long-run benefits may offset some short-run losses on deliveries, but hospitals will try to minimize such losses. On the other hand, unpaid maternity and newborn care constituted over \$2 billion in lost revenues in 1985, representing 13 percent of maternity charges (Alan Guttmacher Institute 1987).

Hospitals with low occupancy rates benefit from payments for the two extra days of inpatient care that mothers with C-sections (and their infants) typically receive. C-sections may increase hospital profits and re-

duce their malpractice liability. Smaller hospitals may find prolonged delivery inconvenient. The true differential costs of a C-section depend generally on the costs of obstetric services and how they relate to occupancy, volume, and other hospital characteristics, as well as on the clinical details of a case.

Costs

The advent of prospective payment by diagnostic related groups (DRGs) has stimulated work on accurate cost accounting (Orloff et al. 1990). Hospital profits on any particular case are the difference between payment and variable costs. (Fixed costs for the plant, interest payments, and so on are sunk and so are not variable costs.) Staff model HMOs that are capitated have always had the incentive to collect and use the true costs of their hospital services, and several of their studies are reported in the HMO section below.

Unpredictability of Labor and Economies of Scale. Obstetric services are inherently expensive because of the unpredictable nature of labor. Klein (1986) notes that "obstetric services are often a financial loss to hospitals because of the standby services and personnel required for the unpredictable hours and numbers of deliveries and the varying occupancy rate." Schneider's (1981) analysis of overall and maternity costs in seven small hospitals in three New York communities corroborates Klein's view. Schneider found that the cost per day of obstetric cases exceeded the average by \$275 to \$600 in these hospitals because obstetric cases used nursing staff and the delivery or operating room heavily and lengths of stay were short.

In theory, the unpredictable timing of deliveries should lead to economies of scale for larger units that can operate at higher occupancy rates because these units will not be paying as much for staff to stand by for business. Schneider (1981) estimated that each additional birth at a hospital cost only 50 percent of an average birth because of the fixed costs of underused capacity. Despite the theory, empirical cost functions show that bigger obstetric services (except for the very biggest) produce more expensive deliveries (Hein and Ferguson 1978; Baron 1978). Most of the cost increase resulted from the service constituting a higher-tech product (more procedures, tests, anesthesia).

The big-city county hospitals of last resort do produce cheaper deliveries because they lack the resources to do otherwise. In such hospitals,

limitations on capacity may constrain the number of C-sections performed. The costs of vaginal delivery, even for prolonged labor, are kept low by instituting economies of scale in standby emergency backup and substituting less expensive personnel, such as nurses and midwives, for obstetricians. These constraints made the Los Angeles County Women's Hospital (15,000 births annually) a pioneer in shorter length of stay following birth and in VBAC (Erwin Silberman, MD, 1991: personal communication).

Cost Differentials of C-Sections and Hospital Organization. Although there is considerable information on charges, the true cost differences between a C-section and a vaginal delivery for a hospital are not known. The higher charges for C-sections clearly reflect additional use of resources. Danforth (1985) notes the added cost of the hospital room, increased anesthesia costs, additional drug and IV charges, and the extra days of hospital stay. The true cost differentials will vary greatly depending on occupancy of the specialized delivery services, staffing patterns, use of technology, and length of stay.

Control over scheduling can be achieved with C-sections and may result in a more efficient use of space and staff, especially for smaller non-teaching hospitals. Larger teaching hospitals may have staff available at all times, but smaller hospitals may worry about the additional costs of adequate coverage. For example, the 1988 American College of Obstetricians and Gynecologists (ACOG) guidelines for VBAC require "professional and institutional resources to respond to acute intrapartum obstetric emergencies, such as performing cesarean delivery within 30 minutes from the time the decision is made. . . ." However, they continue with the phrase, "as is standard for any obstetric decision in labor," suggesting that hospitals with inadequate facilities for VBAC should not be delivering babies at all.

Better organization can reduce the standby costs of prolonged vaginal deliveries and thereby increase the relative costs of C-section. Carpenter et al. (1987) found benefits of better organization in a study that linked a 1984 survey of Maine physicians to their discharge data. C-section rates for dystocia were not associated with teaching or hospital size. They were lower at hospitals with a 24-hour blood bank and better anesthesia services that could quickly respond to the need for a section.

Teaching hospitals may have more difficult cases, through referral, but they have better resources in standby equipment and staff. In 1977, the presence of a neonatal intensive care unit (NICU) correlated strongly

with a higher C-section rate in data from the Hospital Cost and Utilization Project (Goldfarb 1984). In California hospitals at that time, higher C-section rates (and lower infant standardized death rates) were found in "high technology" hospitals characterized by high use of EFM, a high proportion of deliveries by obstetricians, a perinatal study committee, and nonprofit status (Williams and Hawes 1979).

More recently, as performance and practice with C-sections have increased and practice with difficult vaginal deliveries has decreased in the community, teaching hospitals have switched from having higher C-section rates to having similar or lower rates than average, especially for VBAC. This result was seen in Ontario (Anderson and Lomas 1985) and in California (Stafford 1991).

Payments and Their Effects on C-Section Rates

In a recent survey, hospital charges for C-section averaged \$5,133 in contrast to \$2,842 for vaginal delivery (Health Insurance Association of America 1989). When physician fees of \$1,492 for vaginal delivery and \$2,053 for C-section were added, the C-section total of \$7,186 was 66 percent more expensive than the vaginal delivery total of \$4,334, with about three-fourths of the difference attributable to higher hospital charges. These relative charges agree with earlier studies, such as those based on Metropolitan Life claims in 1986 (Metropolitan Life Insurance Company 1988a,b).

Although the relative charges for C-section and vaginal delivery have not changed, charges for all types of maternity services have increased faster than the Consumers Price Index for such services over the period 1982 to 1989 (134 percent versus 71 percent), reflecting an increased intensity of services for both vaginal deliveries and C-sections. Nursery charges were about 20 percent of total hospital obstetric charges in 1989.

LOS has fallen for both vaginal and C-section deliveries in recent years. For 1982, Metropolitan Life showed the national average LOS to be three and six days, respectively (Gleicher 1984). Recent California data show LOS of 1.6 and 3.7 days, respectively (Blue Cross of Southern California 1992: unpublished data).

Effects of Ownership. Part of the variation in hospital-specific C-section rates is related to hospital ownership (Heilbrunn and Park 1992). Private hospitals that are not owned by HMOs are primarily paid by in-

insurance that reimburses their costs, and so have more to gain from C-sections than public hospitals, whose funds are less tied to what is done. Nonprofit hospitals may place more emphasis on quality of care, as opposed to profit, than proprietary hospitals do. In 1989, national raw C-section rates for private nonprofit hospitals were 24 percent and for proprietary hospitals they were 30 percent, much higher than the 21 percent rates for government hospitals (Taffel et al. 1991). Similarly, in 1986 in California, proprietary hospitals had the lowest VBAC rates, and private nonprofit, Kaiser, and county hospitals had progressively higher rates (Stafford 1991). The same relationship between C-section rates and hospital ownership has been observed in the Lazio region of Italy (Bertollini et al. 1992).

Prospective Payment. In 1984, the U.S. government initiated the prospective payment system for its Medicare beneficiaries. This has become an enormous natural experiment in the effects of payments on hospital behavior. Hospital payments went from cost reimbursement to a fixed fee based on patient diagnosis, and hospitals' financial incentives switched from providing the highest quality of care, regardless of cost, to finding the least expensive way to provide acceptable quality of care. As hospitals began to share the costs of additional hospital days, LOS dropped dramatically.

Currently, hospitals not owned by HMOs have the incentives related to cost reimbursement for obstetric care. Based on a comparison of the marginal incentives in payment systems, Grazier and McGuire (1987) estimate that moving to DRG-style payments from cost-based reimbursement would decrease obstetric LOS by 36 percent. Although DRG-style payments to hospitals are not common yet, insurers have used other (managed care) tools such as utilization review to put pressure on hospitals. These tools have led to major reductions in LOS.

DRGs are used by some states for their Medicaid obstetric payments, and the effects have been remarkably similar to those of the Medicare prospective payment DRGs. Table 2 displays some topics and findings from this literature.

With obstetric DRGs, as with Medicare, the introduction of prospective payment slowed the rate at which expenditures increased, but expenditures did not fall. Coding "creep" is the phenomenon of increased coding of diagnoses, which moved cases into higher-paid categories. Carter, Newhouse, and Relles (1991) have shown that creep has occurred, but often as a result of complications that were not coded in ear-

TABLE 2
Medicaid Obstetric DRG and Medicare DRG Research Results

Topic	Medicaid study	Obstetrics results	Medicare study
Cost control	Hellinger (1986)	Increase in expenditures slowed in eight states reviewed	Coulam and Gaumer (1991)
Coding "creep"	Baker and Kronenfeld (1990)	Complications rate tripled to 24 percent in South Carolina claims	Carter, Newhouse, and Relles (1991)
Clinical improvements to DRG prediction of costs	Resnick et al. (1987)	Found 19 variables that substantially increased R-squared of predictions of high-risk obstetric costs	Keeler (1991)
Impact of DRGs on quality of care	None	None	Kahn et al. (1990)

lier years when recording clerks had no reason to do so. The DRGs typically comprise a small set of categories that unavoidably contain cases of varying expense. It is not hard to find clinical variables that can improve predictions (Resnick et al. 1987), but unless they are reasonably cheap to collect—and hospitals differ systematically in the prevalence of these variables—a finer division of cases is not useful. We found no study of obstetric DRGs that corresponded to the finding for hospitalized elderly patients that quality of care did not decline under prospective payment (Kahn et al. 1990).

HMO Incentives

Managed-care systems provide cost control services that relieve the problem of overuse that occurs because traditional insurance blindly pays all billed fee-for-service. Although managed-care systems vary in the way they pay providers, they generally give rise to incentives for mothers and providers that differ widely from traditional fee-for-service. The differing incentives can be seen in starkest form in staff model HMOs, which accept capitation and pay salaried physicians to treat patients. In the short run, such HMOs profit from giving less expensive care to their members. At the same time, they must maintain a reputation for quality that allows them to recruit and maintain members. The Health Insurance Experiment confirmed earlier findings from observational studies (reviewed in Luft and Morrison 1991) that HMOs can save money by reducing the number of hospital admissions without a negative impact on patient outcomes (Newhouse et al. 1993). Although each expectant mother needs an admission, the same incentives and control methods may apply for reducing use of expensive services during her stay.

Financial incentives also affect physician behavior within HMOs. Hillman, Pauly, and Kirstein (1989) analyzed data from a survey of HMOs and found that profit-sharing HMOs, group model HMOs paying salaries, and independent practice associations (IPAs) that paid physicians by capitation had lower rates of hospitalization than IPAs that paid physicians fee-for-service. HMOs that placed physicians at financial risk provided fewer tests, fewer outpatient visits per enrollee, and enhanced financial viability. In recent years, as conventional insurers have adopted more managed-care techniques, their incentives are about the same as IPAs that pay fee-for-service. Carey, Weis, and Homer (1991)

found little difference between C-section rates of Medicaid IPAs and Medicaid FFS physicians who were paid similar lump sums for obstetric care.

The lower rates of surgery and hospitalization of staff-model HMOs as a whole may be attributable as much to the way HMOs organize themselves to implement their goals as to the financial incentives they offer their physicians (Eisenberg 1986). HMOs may also structure their business to reduce the impact of malpractice fears on their physicians. For example, many HMOs require enrollees to sign binding arbitration agreements for malpractice claims.

Established HMOs often can organize their hospitals to allow nurses and midwives to deliver most babies while obstetricians rotate as backup. The physician group can review practice to ensure that HMO quality and efficiency objectives are met. HMOs using this practice model have been the site of successful campaigns to reduce C-section rates (Flamm et al. 1990). Even aside from HMOs, obstetrician-midwife teams have worked together similarly to keep costs down to the level of Medicaid obstetric fees for poor rural women in West Virginia (Cotton 1991). Besides saving money, the obstetrician-midwife teams have been successful in other ways. Telephone surveys and cost analysis in an HMO revealed that:

1. Maternity patients accepted midwife care despite little prior knowledge of midwives.
2. The midwife reduced inpatient costs, but not costs associated with prenatal care.
3. Use of a midwife did not affect perinatal outcomes.
4. Physicians and midwives can work together as teams (Bell and Mills 1989).

The analysis of risk-adjusted variable costs and outcomes in eight Kaiser hospitals showed that staffing patterns had a bigger effect on costs than did C-section rates (Finkler and Wirtschafter 1991). Costs were computed from staffing hours per delivery, supplies per delivery, and imputed expenditures for other services, depending on length of stay. The most expensive hospital had the fewest deliveries, and used no midwives. Costs per delivery were not associated with the adjusted C-section rate, which did not vary much among these hospitals. Outcomes were not strongly associated with either C-section rates or costs.

Many reports show C-section rates and, consequently, average LOS to be lower for mothers in HMOs than for mothers with comparable FFS

insurance, but infant outcomes are similar (e.g., Wright, Gardin, and Wright 1984). Table 1 showed that Kaiser, the staff model HMO, has much lower rates than fee-for-service or the other California HMOs (Stafford 1990b).

A recent analysis of births in Los Angeles was able to use the detailed Cedars Sinai clinical database to study the differences between C-sections received by private practice and a staff model HMO operating there (McCloskey, Petitti, and Hobel 1992). The rates for first births were 15 percent for the HMO and 21 percent for the private patients. Controlling for clinical factors reduced the differences to fewer than those seen by Stafford, but in this study all the births were in one hospital, and hospital norms may have led to some leveling of differences. The differences were strongest for mothers aged 25 to 29. The authors speculate that the effects of HMO organization (shift-based practice, peer accountability, prepayments, and limited exposure to liability) are strongest when the mother's age is optimal for childbearing, and presumably the risks of deciding to prolong labor are smaller.

Mothers' Incentives

Each mother must find a provider that she trusts with the health of herself and her child despite the fact that she often has scant information on which to base her choice. After selecting a provider, the mother will convey her preferences for care, weighing the psychological and financial costs to her of different treatments against the provider's evaluation of the probable course of the birth and its outcomes. Financial costs do affect behavior; in a randomized trial of insurance, people with substantial cost sharing used fewer services of all kinds than people with free care (Newhouse et al. 1993).

Financial Costs

Out-of-Pocket Costs for Insured Mothers Are Small. Insurance for deliveries, as for other hospital services, is widespread. The 1978 Pregnancy Discrimination Act requires most employers to cover pregnancy-related care in the same way that they cover all other kinds of medical care. Nine percent of women of reproductive age have private insurance policies that do not cover maternity care. Small firms, private policies,

and nonspouse dependents are not covered by the 1978 pregnancy discrimination law. In 1986, 68 percent of women of reproductive age had private work group health coverage, 5 percent had individual policies, and 17 percent had Medicaid (Gold, Kenney, and Singh 1987).

Mothers typically pay a small part of the charges for maternity care out of pocket (11 percent of total paid charges in 1985; see Gold, Kenney, and Singh 1987). The extra financial cost to an insured mother of a C-section is even smaller because charges for a vaginal delivery reach the out-of-pocket limit of a typical policy.

A typical vaginal delivery will have charges of \$6,000, compared with \$9,000 for a C-section. In a 1989 insurance survey, one-third of the people with work-related group insurance would be in a preferred provider organization or HMO, and pay none of this difference, and for the two-thirds with conventional insurance, three-fourths had 20 percent coinsurance. The median out-of-pocket limit was \$1,000, which would be reached by charges of \$6,000. Only the 20 percent of persons with a limit greater than \$2,000 would be likely to pay 20 percent coinsurance on the full \$3,000 of difference (Gabel et al. 1990). Grazier and McGuire (1987) estimate that mothers paid only 1 percent of the costs of an extra day, on average, at the large urban hospital they studied. Because the insured mother is not the payer, providers must satisfy competing demands of mothers, who want high-quality care that is sensitive to their wishes, and payers, who want efficiently produced, cost-effective care.

Uninsured Mothers. Uninsured mothers are typically younger, unmarried, and more likely to be Hispanic than insured mothers (Alan Guttmacher Institute 1987). Such mothers are unattractive to hospitals because of the risk of unpaid bills and may be asked to pay a deposit. However, Congress has authorized penalties for physicians and institutions who turn away women in active labor, and a recent conviction in Texas has made providers aware of this law.

Because of limited resources to pay for the care of mothers who are on Medicaid or are uninsured, mothers, physicians, and hospitals all have incentives to keep costs down. It is hard to tell who is most responsible for the decisions to economize on care, but the C-section rates of such mothers are low, possibly lower than optimal, despite increases in predisposing clinical factors such as undiscovered prenatal problems. Hadley, Hoffman, and Feder (1989) analyzed a large (211,000+) national sample of hospital discharge abstracts and found C-section rates and LOS to

be lower among uninsured mothers than among those covered by Medicaid, whose rates in turn were lower than privately insured mothers. Newborn charges followed the same pattern (controlling for birthweight and diagnosis). Stafford's (1990b) comparisons, displayed in table 1, show that C-section rates for Medi-Cal reflect the same pattern of difference between private insurance and both self-pay and indigent services. Oleske et al. (1991) found a similar pattern in 1986 Illinois deliveries.

Other Costs to Mothers

Other costs include travel time, recovery time, costs to other family members of caregiving, and psychological costs (see DiMatteo et al. 1992).

Travel Costs. Travel costs are primarily an issue for rural mothers. In 1979, more than half of rural mothers lived more than ten miles from an Ob/Gyn and 9 percent lived more than 30 miles distant (Williams et al. 1983). As a result, two-thirds of obstetric providers in rural areas are family or general practitioners. Mothers in communities with no active obstetric providers experience poorer outcomes. In 1986 in Washington State, women who had to go outside their own communities to obtain obstetric care had 50 percent more complicated births, premature births, and newborns with charges over \$5,000 than women from communities in which most women stayed (Nesbitt et al. 1991).

People with the resources to do so apparently avoid care in some small rural hospitals. Bronstein and Morrissey (1990) found that rural women often bypassed the closest hospital to get obstetric care elsewhere, that higher-income persons were more willing to travel long distances for obstetric care and to bypass nearby hospitals, and that coverage by Medicaid increased travel distance, although their travel was not increased to the level of higher-income persons.

Costs of Morbidity. Despite an enormous clinical literature on in-hospital outcomes, not much is known about medium-term consequences of childbirth. Our project is surveying recent mothers to quantify the differences in functional and psychological outcomes between vaginal deliveries and C-sections. The extra hospital days and rules for postpartum disability payments support the presumption that recovery is slower after a C-section. Three extra weeks are given for recovery in Sweden (Eckerlund and Hakansson 1989) and two extra weeks in Califor-

nia (Employment Development Department 1990: personal communication).

Developing countries keep hospital costs down by allowing some nursing and hotel-type services to be delivered by family or friends of patients. This concept has been tried in "cooperative care" units in the United States. Woods, Saywell, and Benson (1988) found that cooperative-care patients had significantly lower total hospital costs than similar patients treated in a traditional unit, but the cost savings for hospitals is at the expense of the care partner who has his or her own opportunity costs and lost wages. In their treatment decisions, mothers must consider the need for some nursing and support (whether paid for or supplied by family members), which continues after discharge from the hospital, particularly now that discharge is so quick.

Maternal Income and C-Section Rates. Here and abroad, most studies have found that rich women have higher C-section rates than poor women. For example, the rates for women with government insurance in Italy (Bertollini et al. 1992) and in Brazil (Janowitz et al. 1984) were much lower than for presumably richer private patients, even after adjustment for age and parity. Hospitals in wealthy suburbs of the United States are often marked by very high C-section rates (Van Tuinen and Wolfe 1992).

Gould, Davey, and Stafford (1989) investigated the relation between the primary C-section rate and socioeconomic status by looking at 1982 and 1983 birth certificates in Los Angeles County. Overall, C-sections were performed 76 percent more frequently in women from higher-income neighborhoods than in women from low-income neighborhoods; 42 percent of the difference was attributed to a higher rate of reported complications, and 41 percent was the result of a higher C-section rate in the absence of complications. The higher rate of complications may be an artifact of justifying C-sections, because richer women should be as healthy as poor ones. A cohort study in southern Brazil found that 16 percent of mothers from the lowest-income group, compared with 47 percent in the highest-income group, had operative deliveries (Barros et al. 1991).

On the other hand, in the study by Tussing and Wojtowycz (1992) of New York State births, mothers with more education had a lower rate of C-section, and mothers from higher-income zip codes had insignificantly higher rates. This different result may be the effect of a richer data set that allowed the researchers to control for many other supply and de-

mand variables, or it may reflect recent interest in natural childbirth among educated women.

The rich can afford top-quality care. Did these presumably well-informed women have higher C-section rates because of time pressures, in order to avoid pain or risk to their infants, or because they are better able to deal with the resulting disability? Mothers with elective C-sections can more easily schedule their job responsibilities and enlist help from family members who live out of town. Having a C-section just to save labor pain and time seems short-sighted because the savings are paid back in additional morbidity. Rich women may find it easier to cope with the extra recovery time required for a C-section through family support or hired help to deal with the demands of their life. The low price of servants in Brazil may help to explain the high C-section rates of rich women there.

Patient Preferences and the Market for Obstetric Services

Patient desires are important determinants of treatment. Patients can select providers who are sympathetic to their views or can later negotiate for specific treatments. Eisenberg notes that “the simplistic view of the need for medical care as a biological phenomenon neglects differences in patient’s tastes and desires, the price they pay, and the resources available to them” (1986, 67). He hypothesizes that the variations in physician practices may result from patients choosing physicians whose practice styles are consistent with their own desires, and that wide variations among physicians simply serve to satisfy the heterogeneous preferences of the population. Patients can have additional influence through later discussion. Joseph, Stedman, and Robichaux (1991) recorded the choices and judgments of women with prior C-section and their physicians with respect to VBAC. Ultimately, half of the patients who were encouraged by their obstetricians to attempt VBAC opted for elective repeat C-section without trial of labor.

Information for Mothers about Providers. Recently, some have tried to improve the health care market by supplying information on provider style, charges, and outcomes. The *Yellow Pages* has long been used as a rudimentary source of information about physicians. More complete information on medical credentials, philosophy, hours, billing practices, and even fees was provided successfully at a local level in a doctors’ direc-

tory (O'Rourke and O'Rourke 1981). Although the directory was voluntary, as were the items to be included in each physician's profile, competitive pressures led most of the physicians (including obstetricians) in the Champaign, Illinois, area to join.

From the point of view of an insured mother, charges are less important than practice style. Hibbard and Weeks (1989) found that disseminating physician fee information had little impact on expenditures for care in a quasi-controlled trial of Oregon state employees and Medicare patients. Wennberg, Barnes, and Zubkoff (1982) suggest that a better-informed and more sophisticated role for the consumer as a purchaser of health care is essential to any strategy to improve market performance. They realize that this requires more cost sharing, if cost containment is a goal.

Information about C-section rates could represent either style or outcomes. The C-section rates in hospitals in 34 states have been given by Van Tuinen and Wolfe (1992) and have been listed in numerous newspaper stories. Performance statistics, such as C-section rates or the Medicare mortality rates published by the Health Care Financing Administration (HCFA), have several inherent problems. Because it is too expensive to collect the information to adjust fully for patient characteristics and desires, the statistics can be misleading and are not popular with hospitals (Berwick and Wald 1990). Providers fear that people will overestimate the relationship between the information collected, for example, in the providers' malpractice data bank, and provider quality. Finally, if people seriously rated hospital obstetric quality by adjusted C-section rates, there might be pressure on which patients to take and how to code reasons for the procedure.

Research and Policy Recommendations

Each choice of delivery method must be decided on its own clinical merits. However, there are many close decisions, and the reviewed evidence shows that economic concerns do have some impact on doctors and hospitals. Insured mothers are now essentially unaffected by economic incentives, except when they choose managed care that limits coverage. We believe that the cumulative effect of the reviewed economic incentives has been to increase the U.S. C-section rate above the optimum, and that if removing some distortions in incentives made U.S. rates

closer to those seen in Western European countries, or to staff model HMOs, valuable resources would be saved. The policy would be good for mothers as well.

We will conclude with five suggestions for research that could be the basis for reforms and with four suggestions for insurance reforms.

Research Ideas

Little is known about the true physician costs of C-sections and of vaginal delivery for particular lengths of labor and practice characteristics. Better estimates of costs would allow insurance to equalize profits for different options. These costs could be estimated by a survey of physicians that asks about the costs to them of several waiting scenarios and of operating. Alternatively, one could use labor and delivery logs to estimate performance times (as Cromwell, Mitchell, and Stason 1990 did for heart surgery).

Because behavioral trials are so difficult, we should continue with research on variations using richer data sets. Many recent articles have shown the value of controlling for clinical factors using multivariate methods with such data sets in studying the impact of payment or organization on C-section rates. Earlier observational studies were weakened by the possibility of alternate explanations for the observed relationships.

To estimate the impact of payment reforms, we need to know more about the effects of payments on physician behavior. Working with insurance companies to help them evaluate their own initiatives to reduce C-sections is one promising approach. Credible estimates of payment effects depend on experiments that are uncontaminated by ever-changing ways that payers try to manage care. Studying states that have equalized Medicaid fees is less promising because the fee differentials were small before, and Medicaid C-section rates are low already.

To determine the currently unknown true costs to hospitals of vaginal deliveries and C-sections, one could work with particular HMOs, hospitals, or chains that have installed better accounting systems. This information would be highly useful for their strategic decisions, and for making insurance payments fairer.

Finally, to enable mothers and physicians to make more informed trade-offs, we need better estimates of the true health, satisfaction, and financial costs of labor and postpartum morbidity following vaginal de-

livery and C-section. The RAND MOC study will obtain such information through a survey of recent mothers. We will have to control carefully for predelivery differences between the mothers to ensure that any reported variations in the many dimensions of mothers' costs resulted from treatment.

Insurance Reforms

Many different strategies could reduce the perverse effects of economic incentives on obstetric care. Here we limit ourselves to insurance reform proposals, which we will discuss after some general comments. A full range of interventions is presented in Stafford (1990a) and Mittman and Tonesk (1992).

General Comments. Payment reforms need not pit physicians and hospitals against mothers and payers, even though one person's medical care payments are another's income. Some of the \$3,000 difference in charges between C-section and vaginal birth represent profits, but most of it represents true costs to the hospital. Thus, more than \$2,000 in cost savings may result from a switch to a vaginal delivery. Payers could split these savings to simultaneously reward mothers for their labor pains, physicians for their time and effort, and hospitals for the backup capability that allows them to persist with difficult vaginal deliveries. Avoiding unnecessary C-sections is good for payer profits and can help keep premiums down, making insurance more attractive.

Increased volume may offset the direct financial losses to hospitals and physicians occasioned by the reduction of inappropriate care. Such volume increases depend on convincing patients that the style of delivery using lower technology and resulting in fewer C-sections is safe and desirable. Such a marketing strategy was partially successful for St. Luke's in Denver (Oberman 1989) and for Chicago's Mt. Sinai Hospital (Koska 1989).

Any information or incentives to improve the market must be aimed at the people who make the relevant decisions. Fully insured mothers may benefit from information about physician style, but it is the payers who need to know about costs. Incentives aimed at hospitals will not work for hospitals that passively conform to their physicians' decisions.

The reforms and their rationale are similar for both physicians and hospitals. The first two try to reduce the difference in (perceived or real) profits from performing C-sections rather than vaginal deliveries. If the

profits, including time costs, were the same, then the choice could be based solely on benefit to the patients.

Reduce the Difference in Fees for C-section and Vaginal Delivery. Physician fees for C-section could be the same as for vaginal delivery, especially for mothers with prior C-sections (Danforth 1985; Porreco et al. 1989). Although costs to the physician of a vaginal delivery vary widely, the reviewed evidence showed them to be similar to C-sections, on average. Equalizing fees may reduce patient suspicions of physician motives.

The literature shows equalizing payments may have a modest effect (Sims et al. 1984; Stafford 1990a; Darby 1992). Private insurers may find equalizing physician fees attractive because the total cost differentials (including hospital) are so substantial. Suppose that C-section fees are \$3,000 and vaginal delivery fees are \$2,400, that C-sections represent 25 percent of births, and that hospital costs are \$2,000 higher per C-section on average. An equal fee of \$2,550 would not change average payments to physicians who do not change behavior, and would typically save \$20 per birth for each percent reduction in the C-section rate.

Because primary C-sections lead to additional C-sections, there is some rationale for setting physician fees slightly lower for C-sections. A more extreme policy of paying hospitals one set fee for any childbirth episode has been considered in Australia and by the Minnesota Blues (Barclay, Andre, and Glover 1989). The hospital would break even on average, with its "winnings" on vaginal deliveries offsetting its big losses on C-sections; however, distorting decisions in favor of vaginal deliveries is undesirable, even with countervailing distortions in favor of C-sections. It is better to reduce those other distortions directly.

Pay Physicians and Hospitals through a Refined DRG System. Physicians are now often paid, in effect, by a prospective DRG system with two "groups": vaginal deliveries and C-sections. In this reform, the two groups would be subdivided, and payments would be based on true cost differences associated with different types of mothers. Thus, more would be paid for VBAC, or for prolonged labor, than for an easy delivery. Spellacy (1991), for example, recommends paying obstetricians \$200 more for VBAC than for C-section, and penalizing mothers who do not accept a trial of labor. (Readers can guess whether Spellacy is an obstetrician or a mother!) Break-even fees that are the same for C-section and vaginal delivery can be much closer to current C-section fees for cases where C-sections are now typically performed (such as prior C-section).

Using the previous hypothetical fees, if C-sections were 80 percent of births with a prior C-section, the break-even fee for such mothers would be \$2,880. Ideally, one would want to base payments on average true costs for both physicians and hospitals, but for VBAC there is a good chance that even a reform based on old charges would reduce insurance costs without upsetting providers.

Basing payments on the length of labor may be impractical at this time. Data are not yet available on the marginal costs of prolonged deliveries. Even if they were available, we would need to develop rules for defining and coding prolonged labor that would not distort admissions or management of labor. Still, the underlying idea of matching payments more closely to true costs is good in theory for both physicians and hospitals.

Make Providers Share in the Costs of Their Decisions. The perverse effects of cost reimbursement can be mitigated by modern cost control tools or by increasing staff model HMO enrollment. Cost-control tools include preadmission certification for elective C-section (now used by Blue Shield of California), retrospective review, and contracting to physicians or hospitals with low C-section rates. Staff model HMOs can structure an environment with fewer convenience, malpractice, or financial incentives to perform unnecessary C-sections. The reviewed literature consistently showed lower C-section rates with no ill effects. Many interventions have been proposed to encourage people to move to HMOs. For example, large employers have been required to offer an HMO option and might be prohibited from making a larger contribution for FFS than for HMO coverage (Enthoven and Kronick 1989).

Make Mothers Share in the Costs of Their Decisions. Most insured mothers are currently unaffected by the costs to society of their treatment choices because of out-of-pocket limits on copayments. They would be more sensitive to differences in costs if they had to share some of them. Enthoven and Kronick (1989) speak for most American economists in advocating tax reforms that make workers more sensitive to their health insurance premiums. If these reforms are made, increased cost sharing and other cost-control measures will become more attractive to mothers and insurers.

Once labor begins, mothers are in no position to challenge decisions, and it may seem harsh to penalize mothers who require more care. However, the trade-off between raising cost consciousness and penalizing the sick is an issue in all medical care with cost sharing, and the harm is lim-

ited in most insurance policies by caps on the patients' share of the payments. In FFS deliveries with insurance, a substantial fraction of cases are discretionary, but no one involved cares about an additional \$3,000 of costs. The challenge is to find a way to persuade someone, provider or patient, to care about costs in these cases without overly penalizing mothers who need a C-section.

Even mothers with complete insurance can be given incentives to economize on care, by rebates for the extent that their spending was less than average. Except for a minor transfer, rebates are formally equivalent to cost sharing. Rebate plans have been successfully tried in Germany (Zweifel 1988) and have been used to resolve a strike over health benefits in the United States (Keeler 1992). In obstetrics, bonuses of cash or home health services could be given to mothers in exchange for shorter stays, VBAC, or even for attempting VBAC (Sims et al. 1984).

In general, insurance companies do not cover care or amenities for which there is no clinical indication. If physicians could agree on clinical circumstances in which C-sections were inappropriate, this policy could be extended to childbirth. For example, a woman who demands a C-section without a compelling clinical reason might be asked to pay the difference, as she would for a private hospital room or for cosmetic surgery. Such policies are difficult to enforce because physicians will be tempted to supply a reason, but the policy still might "send a message."

Use Insurance Coverage to Promote Lower-Tech Care. Current financial and malpractice incentives promote procedure-oriented medicine. To level the playing field, insurance companies could reduce the profits derived from the used technology, like EFM, that may ultimately cascade into an unnecessary C-section. They could also cover reputable birthing centers and certified nurse midwives equally with other providers (Rooks et al. 1989; Porreco et al. 1989). So long as adequate backup for emergencies is available, it is foolish for society to penalize women who desire less costly care for themselves. Another promising reform would be the support of *doulas*. Doulas are experienced, but not highly trained, women who offer continuous emotional support during labor. A recent randomized trial showed their use reduced C-section rates, epidural use, duration of labor, and poor neonatal outcome. Savings from the observed 10 percentage point reduction in C-section rates alone would more than cover their average costs of \$200 per supported patient (Kennell et al. 1991).

These reforms will not eliminate unnecessary C-sections, but they

should help reduce inappropriate financial incentives to do them. Even if the financial incentives affect only a small fraction of equivocal cases, the reforms can be a valuable part of an overall strategy to improve the management of childbirth in the United States.

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