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MEDICALLY UNNECESSARY CESAREAN SECTION BIRTHS: INTRODUCTION TO A SYMPOSIUM

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Abstract—Between 1965 and 1986, the United States cesarean section rate increased from 4.5 to 24.1%. Increasingly, childbearing women and their advocates, along with many others, have recognized that a large proportion of cesareans confers a broad array of risks without providing any medical benefit. A growing literature examines the diverse causes of medically unnecessary cesareans and the diverse effects of surgical birth on women, infants, and families. Various programs and policies have been proposed or implemented to reduce cesarean rates.

In recent decades, many other nations have also experienced a sharply escalating cesarean section rate. *It is reasonable to conclude that a largely uncontrolled international pandemic of medically unnecessary cesarean births is occurring.* The level of political, analytic, and programmatic activity that has occurred in the U.S. regarding medically unnecessary surgical births does not seem to be paralleled in other nations with sharply escalating rates.

This symposium was organized with the objective of presenting the U.S. experience with various dimensions of the problem of medically unnecessary cesareans to an international audience. Although preliminary and inadequate, it is hoped that this experience will encourage policy leaders and investigators throughout the world to recognize and address the problem of run-away cesarean section births.

The first section of this introduction summarizes the U.S. experience with medically unnecessary cesareans from the perspective of trends, causes, consequences, and solutions. The second section covers the same topics, presenting selected material from various other nations throughout the world. In the course of these overviews, I introduce the symposium's seven contributions, most of which focus on circumstances in the U.S.

Key words—cesarean section, U.S., cesarean section international trends, cesarean section medically unnecessary, cesarean section pandemic

CESAREAN CHILDBIRTH IN THE UNITED STATES

Trends, and background to this symposium

In an earlier period in the United States, childbearing was viewed primarily as a social event and as a matter for women, families, and communities [1]. It continues to be viewed in such terms by large numbers of people in at least one western industrial setting [2, 3] and in most Third-World settings [4–6]. In the judgment of many, the great majority of pregnancies and births can proceed 'normally' and 'naturally' with appropriate care (85 and 90% are frequently cited estimates of this figure). Nonetheless, childbearing is now largely viewed as being intrinsically and primarily a medical phenomenon in industrial nations.

The United States has the most technology-intensive medical care system in the world, and this has profoundly affected patterns of childbearing. Despite the prepared childbirth movement, the desire of many women for as 'natural' an experience as possible, and the trend toward 'homelike' hospital birthing facilities, many new and continuing medical procedures have been applied to childbearing women at high rates and with increasing frequency [7, 8]. Notable among these has been a dramatic rise in the proportion of childbearing women who give birth by cesarean section, the most invasive and risk-bearing childbearing technology in widespread use. Between 1965 and 1986, the proportion of U.S. women giving birth by major abdominal surgery rose from 4.5 to 24.1%, a greater than 5-fold increase [9] (see Fig. 1). Thus, one childbearing woman in four is told either that she is incapable of giving birth vaginally or that to do so would endanger her child and/or herself. This run-away trend has been identified as an *epidemic* of cesarean births [10–12].

In recent years, cesarean section has been the leading *major* International Classification of Diseases (ICD-9-CM) procedure performed in U.S. hospitals. It is interesting to note that it is exceeded in numbers only by two other surgical procedures that also are used in connection with childbirth, involve iatrogenic risks, and are increasingly believed to make no clinical contribution in vast numbers of cases: circumcision and episiotomy [7, 13–15]. These and other prevailing patterns of maternity care in the U.S. raise critical and disturbing questions about the rationality and implications of routinely treating pregnancy, labor, and birth with a technology-intensive medical approach [16–25].

There is little evidence to support the common presumption that the greatly expanded use of cesarean section has been responsible for substantial improvements in perinatal mortality [11, 20, 26–32].

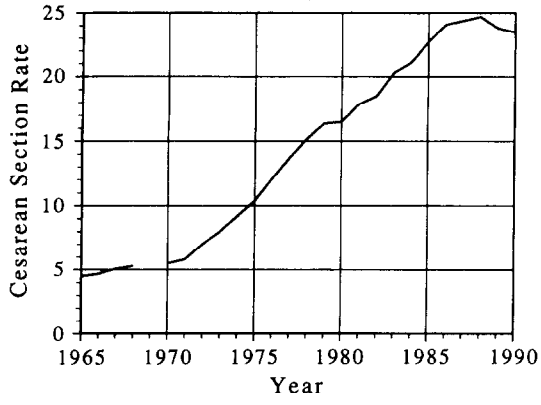

Fig. 1. Cesarean sections per 100 hospital births, United States, 1965–1990. Source: National Hospital Discharge Survey, National Center for Health Statistics. Cesarean section rate not available for 1969.

It is also unreasonable to suppose that the health status of childbearing women or their infants has declined precipitously in recent decades. Rather, much wide-ranging evidence indicates that a very large proportion of cesareans performed in the U.S. is medically unnecessary. Frequently, variations in cesarean rates by physician, hospital, geographic area, and other dimensions do not correspond to variations in the risk status of the populations being served [11, 12, 33–36]. By contrast, a large number of non-medical variables have been associated with the performance of cesarean section [37, 38]. Furthermore, some services in the U.S. have been able to considerably reduce cesarean rates without adversely affecting perinatal outcomes [39–42]. Women using midwifery care and/or out-of-hospital birth settings are consistently much less likely to receive a cesarean than women using the more usual care of physicians in hospitals [43–50]. In at least one case, ethnicity has been associated with an extremely low cesarean rate [51]. Several services in the U.S. and abroad suggest the great degree to which the current national cesarean rate is unnecessarily inflated: skilled in and committed to low-technology approaches, they have maintained excellent outcomes and cesarean section rates below two percent [45, 52, 53].* Finally, other nations with similar populations have been able to achieve similar or superior perinatal outcome indicators while maintaining much lower cesarean rates [27, 54, 55].

With the assumption that large numbers of medically unnecessary cesarean sections are being performed in the United States, childbearing women and their advocates [56, 57], purchasers of medical care [58, 59], selected leaders in the medical profession [11, 12, 46, 60, 61], and—with respect to one dimension of the cesarean epidemic problem—the leading professional association for obstetricians [62–64] have expressed concern. A growing literature has questioned the rationality of cesarean trends, and various programs and policies have been instituted to help eliminate medically unnecessary cesareans. As a consequence, the cesarean section rate has stabilized, and has not significantly changed between 1986 and 1990 [9, 65] (see Fig. 1). The many powerful impetuses for technology-intensive medicine make it difficult to predict whether this rate will substantively decline in the coming years.

Many have argued that the U.S. can and should have a much lower cesarean rate. Various analysts have sought to identify an optimal rate by estimating the proportion of births for which cesareans would offer medical benefits. Formal estimates have ranged from 6 to 16.5% [28, 35, 66–69]. In this issue, Francome and Savage present a detailed analysis of both relative (less clear-cut) and absolute medical indications for cesarean section and conclude that an optimal rate for industrial nations is about 7% [26]. As they note, however, several distinctive services in the U.S. and other industrial nations have fine outcome experiences and cesarean rates under 2% [45, 52, 53]. Official calculations may thus greatly underestimate the potential for appropriately conservative use of this technology.†

Many other nations have exhibited a similar trend of a sharply rising cesarean section rate in recent decades [54, 70]. The unnecessary interference with the childbirth process, the imposition of risk without benefit, and the squandering of scarce resources is deplorable in all cases. The U.S. seems to have had a perverse leadership role in international trends for high-technology obstetrics through the training of physicians who go on to practice in other nations, the exportation of medical technologies, the exportation of textbooks and professional journals, local production of medical technologies by subsidiaries of U.S. multi-national corporations, requirements for purchase of specific U.S. products in exchange for purchase of products of other nations or for foreign aid, and the general aura of prestige and efficacy attached to high-technology medicine. Moreover, less developed countries often have relatively autonomous private medical sectors and relatively

*As Lomas and Enkin note, perinatal outcomes may be compromised when cesarean rates fall below a certain level. Support for this perspective and for a specific threshold, however, seems to be limited to a single case of eight data points. A significant difference in perinatal mortality was associated with variation in cesarean rates (ranging from 4 to 7%) among Czechoslovakian provinces in 1986 [37]. At present, such a threshold is difficult to determine: very low cesarean rates could be hazardous by virtue of the fact that medical personnel generally lack low-technology skills and commitment to such an approach. As an urgent research priority, approaches of those attaining very low cesarean rates through low-technology practices [45, 52, 53] should be assessed with respect to their effectiveness, safety, and applicability to childbearing women more generally.

†Francome and Savage's contribution to this symposium addresses many dimensions of medically unnecessary cesareans. Other aspects are discussed below in the context of their various topics.

ineffective policy structures for assessing transferred technology and knowledge and for implementing appropriate planning and regulation. Biomedical approaches are often rotely presumed to have a use value superior to that of traditional approaches. Within this context, such nations often experience excessive use of many high-technology forms of care while many citizens lack access to basic primary and preventive services [71–73].

At this time, the United States might assume a more favorable international leadership role with respect to unnecessary surgical birth. Many childbearing women and policy leaders in the U.S. now recognize that a large proportion of the cesareans performed confers no medical benefit. Increasingly, the wide-ranging causes and broad array of untoward consequences of unnecessary cesareans are being examined. And various approaches are being used to intervene in the tendency for liberal use of this procedure. This level of political, analytic, and programmatic activity does not seem to be paralleled in other nations that have also experienced sharply escalating cesarean rates. This symposium was organized with the objective of bringing the U.S. experience with medically unnecessary cesareans to the attention of an international audience. While entirely inadequate and ineffective relative to the magnitude of the problem, these early U.S. initiatives represent an important recognition of the problem and first steps toward understanding and resolving it.

Remaining sections in the first part of this introduction suggest some of the dynamics that have propelled U.S. cesarean rates upward, point to physical and psychosocial consequences of cesarean birth, and discuss proposed and implemented solutions to unnecessary cesareans in the U.S. The second part of the introduction presents selected material on international cesarean trends, causes, consequences, and solutions. I introduce the various contributions to this symposium in the context of these broad issues. Contributors to the symposium address many dimensions of the problem of medically unnecessary cesareans, and offer a rich diversity of disciplinary perspectives, including sociology, psychology, anthropology, economics, obstetrics, and health education. With a single exception, the papers focus exclusively or primarily on circumstances in the United States. The contribution of Francome and Savage [26] provides extensive material on the U.K., thus serving as an important symbolic bridge to consideration of cesarean issues in other nations.

It is hoped that this symposium will encourage investigators to further document cesarean trends, attempt to disentangle complex underlying causes, and identify a full range of consequences in other nations. And it is hoped that this material will encourage policy leaders to develop and implement effective interventions.

Causes

A large and growing literature seeks explanations for the sharp escalation in the U.S. cesarean section rate and large proportion of medically unnecessary cesareans. To understand these phenomena, we must consider both specific standards of medical practice and other contextual factors that are brought to bear on medical practice. National health statistics in the U.S. link an official medical 'diagnosis' to every cesarean birth. In recent years, the great majority of cesarean births have been attributed to one of four diagnostic categories: previous cesarean, dystocia, breech presentation, and fetal distress [74].

The widespread belief that a *uterine scar* from a previous cesarean is at high risk of rupturing during a subsequent labor and birth led to a near-universal U.S. policy of routinely performing cesareans in subsequent pregnancies, regardless of subsequent medical status. This standard of care has played a major role in the rising rates of cesarean birth. A growing body of research literature has clearly demonstrated the safety of vaginal birth after cesarean (VBAC) [75–78], and policy statements from the leading professional association for obstetricians have supported VBAC under many circumstances [62–64]. Although some physicians have been willing to alter practice patterns, 80% of women who had previously had a cesarean and gave birth in 1990 again gave birth by cesarean; this figure was statistically similar to the rate of repeat cesareans in 1989 suggesting that any increases in VBAC rates in the near future may be modest [65].

Dystocia is a catch-all category involving a wide range of circumstances when it is believed that the baby will not fit through the pelvis and vagina or that the womb is incapable of doing the work of getting the baby out. Of particular interest here is the growing proportion of childbearing women that has been considered to have some form of dystocia in recent years. For example 1.1% of all births in 1980 were said to involve *obstructed* labor; by 1989, this figure had risen to 4.3%. Similarly, births given the designation *abnormal labor* rose from 3.0 to 7.4% of all births in the same period [9]. These trends reflect the increasing tendency to view birth as intrinsically pathological and to label greater and greater proportions of childbearing women as being at 'high-risk'. Reflecting the interests of professionals and bureaucratic institutions, birth is treated in an assembly-line fashion, with most women subjected to standards of efficiency that bear little relation to the physiology and individuality of birth [79]. In many institutions, one is now said to have dystocia after laboring for 12 hours or less, regardless of medical status of mother and child or of prospects for vaginal birth. The oppressive 'climate of doubt' that pervades medical childbearing inevitably affects the will, confidence, and capabilities of childbearing women [80, 81].

The assumption that cesarean birth is safer than vaginal birth for all babies in the bottom-down or *breech presentation* led to near-universal surgical birth in such cases. Simultaneously, such time-honored skills as manually inverting a breech baby by external manipulation (*external version*) and facilitating the vaginal birth of breech babies disappeared from the medical education curriculum. Use of external version at term, however, can turn babies from breech to head-first presentation in the great majority of cases [82], and some services have used selective vaginal breech birth with no apparent imposition of excess risk [83–85]. Previous findings of excess risk may be attributable to vaginal birth of both breech stillbirths and very low birthweight babies rather than vaginal breech birth *per se* [83].

The diagnosis of *fetal distress* has been associated with a growing proportion of cesarean births in recent years. Whereas 1.7% of all births were designated as involving fetal distress in 1980, 8.8% were so-designated by 1989 [9]. To a great extent, this rise is a function of growing reliance upon electronic fetal monitoring. In controlled trials, use of electronic fetal monitors has regularly been shown to falsely identify many fetuses as being 'distressed', to involve an excess number of cesareans, and to fail to confer expected benefits relative to intermittent auscultation with simple handheld devices. A statistical excess of cesareans and lack of expected benefits have been identified even in trials that 'corroborated' fetal distress by obtaining fetal scalp blood pH values [86]. Other types of analysis support these findings [87].

Several other clinical issues involved in cesarean trends are noteworthy. First, although risks of the surgery to mother and infants continue to be considerable, they have declined in recent decades; many physicians now seem to treat cesarean birth as a risk-free procedure, casually adopting 'why not' or 'just in case' attitudes. Second, U.S. physicians have demonstrated a growing concern about the risks of forceps, and to some degree cesareans seem to have been substituted as another method by which physicians can take control and remove babies [88]. Third, the escalation of cesarean rates must be viewed in the context of dramatic overall trends of intensified use of medical technologies for childbirth in the U.S. [8].

The brief discussion of major 'indications' for cesarean birth in the U.S. suggests the great degree to which medical practice diverges from consistent research evidence. As Shearer notes in this issue, all four of the leading diagnostic categories associated with cesarean birth in the U.S. are clinical grey areas; giving birth by cesarean in such cases confers much less clear-cut benefits than does cesarean birth in the case of some much rarer diagnoses such as when the placenta grows over the cervix (*placenta previa*) and when the cord emerges before the baby (*prolapsed cord*) [89]. The vast majority of cesareans performed in the U.S. are thus attributed to official 'diagnoses' that are ambiguous and/or for which a cesarean offers no or highly questionable benefit. This loose and flexible situation allows for the intrusion of many external considerations, and indeed a growing literature identifies a vast array of non-medical variables associated with performing cesarean sections [37, 38]. Nearly all of these studies have been published in the last decade, as medically unnecessary cesareans have increasingly been recognized and viewed as a problem. The avenues of investigation have primarily focused on characteristics of the childbearing woman, the delivery system, and the physician.

Perhaps the most striking finding in this literature is that with little exception [90] women who are healthier, of higher social class, better insured, and/or cared for in private services are regularly found to be at considerably higher risk for cesarean birth than their counterparts who are less healthy, of lower socio-economic status, under- or uninsured, and/or cared for in public services [34, 91–98]. We do not have much data to support or refute the common assumption that this pattern reflects physicians' direct interest in economic gain. Researchers suggest, however, that various other dynamics are clearly involved [34, 95]. Private physicians, for example, bear a personal risk of malpractice, in contrast to general service physicians whose institution bears the risk. Given the belief that performing a cesarean reduces risk of liability, private physicians would thus have a greater incentive to do so. These physicians also tend to feel greater scheduling pressure because of their need to attend regular office hours; housestaff, by contrast, frequently provide inpatient and outpatient care during separate rotations. Furthermore, housestaff in public services may be held more rigorously to conservative protocols than private physicians. Finally, private physicians tend to develop a stronger relationship with their clients; they may be more committed to them and more inclined to provide technology-intensive care for them with the belief that it is the safest and highest standard of care. Classism may thus be an important factor in these discrepancies, with less value being placed upon babies from low-income families.* Ironically, the more valued families seem to be receiving less appropriate care with respect to performance of cesareans.

In addition to the class and insurance status of the childbearing woman, other non-medical maternal variables that have been associated with receiving a cesarean include: maternal age [90, 91, 99–101], maternal employment status [90], women's social exigencies and constraints [102–105], women's ideologies about reproduction and motherhood [102, 103], women's feelings about previous births [102, 105], and negotiation strategies women use with physicians [103, 104]. Many may be surprised by the finding that

*One analysis suggests that racism is not a factor: when stratified by insurance status, crude discrepancies between 'whites' and 'blacks and other minorities' disappear for national cesarean rates from 1980 through 1987 [88].

women may readily concur with their physicians about the need for a cesarean and even have an independent preference for one. In this regard, it is important to recognize the degree to which women defer to their physicians as experts, physicians present cesarean births as contributing to better outcomes in babies, and both physicians and mothers are influenced by core values in the broader culture that support science, technology, patriarchy and institutions [16].

The role of the organization and practice of medicine in the performance of medically unnecessary cesareans is also noteworthy. To date, more studies have identified a causal role for these iatrogenic effects of the medical care system than for maternal or physician characteristics. Delivery system variables that have been associated with cesarean section rates include: county and hospital cesarean rates [90]; prepaid plan as opposed to fee-for-service payments [91, 92, 99, 106–108]; hospital ownership [34, 91, 96, 106]; hospital affiliation with a medical school [90, 94, 96, 106, 109–110]; annual volume of births or number of bassinets [90–91, 106]; time of day, day of week, and other factors reflecting hospital schedules [34, 90, 111–113]; availability of ancillary services such as staffed blood bank and 24-hr anesthesiologist [111]; level 3 hospital, presence of neonatal intensive care unit, or perinatology service [90, 94, 96, 106, 114]; use of electronic fetal monitors [86, 87, 115]; risk of liability [94, 116–118]; usual care by hospital-based physician as opposed to midwife and/or out-of-hospital birth setting [44–50, 119, 120]; and general philosophy of care [44].

Risk of liability warrants special attention because it has long been cited by physicians as playing a major role in cesarean decision making [36, 121]. The perception of the importance of this factor may be even greater in other countries: in their contribution to this issue, Francome and Savage report that the British obstetricians they surveyed overwhelmingly attributed U.S. cesarean trends to litigation (53% of explanations, with 15% for the next most common explanation given) [26]. In fact, the evidence is equivocal, with some studies and trends indicating a positive association and others indicating no association or even a negative one [90, 116–117, 122]. One physician who has been closely involved with cesarean issues for more than a decade argues that her colleagues are scapegoating when they attribute the rise in cesareans primarily to the liability environment and presume that the rate can only be lowered with tort reform [123]. Ironically, more claims and suits seem to be associated with the cesarean procedure than with the failure to perform it [124, 125].

Two of the contributions to this symposium identify many other elements of typical obstetrical care that seem to play a role in high cesarean rates. These factors range from the surgical orientation of obstetricians to many forms of interference with labor (e.g. presence of strangers and noise, having as birth attendant whomever is on call) to a host of clinical conventions (e.g. immobilizing the mother, using a flat-on-the-back (*lithotomy*) birth position, restricting the mother's oral nourishment). The authors argue that these factors contribute to the likelihood that physicians intervene in the birth process and that capabilities of mothers are undermined [26, 126].

A third category of variables that has been associated with performance of cesareans is physician characteristics. To date, relatively few studies have explored this avenue. Physician characteristics that have been found to be associated with cesarean rates include individual practice patterns [34, 127, 128] and age/experience [129, 130].

In their contribution to this symposium, Tussing and Wojtowycz present important new data on the relationship between physician characteristics and cesarean decisions. They analyze large data sets from New York State in 1986 using probit analysis to control for the effect of a large number of potential interaction variables. They find that all five of the physician characteristics tested in their model influence likelihood of performing a cesarean in general and/or for particular indications. To further illuminate one physician characteristic, graduate of U.S. vs foreign medical school, the authors analyze foreign medical graduate data both by country of birth (U.S., other) and by country of training. They find that both of these factors appear to influence cesarean rates. Tussing and Wojtowycz conclude that the fruitfulness of their research suggests that further investigation of the impact of physician characteristics on cesarean rates is warranted [131].

LoCicero's article in this symposium offers a largely unexplored perspective on nonmedical factors contributing to high rates of medical interventions. Her analysis of contemporary theories of gender and psychosocial development finds that current approaches to maternity care are likely to regularly thwart needs and expectations of childbearing women and their ability to labor effectively. She considers psychological components of interaction between laboring women and physicians from the perspectives of gender differences (in cognition, moral development, sense of self, empathy and helpfulness, and power), gender role expectations, and gender identity. She concludes that in each of these dimensions prevailing medical approaches are compatible with conventional masculine standards and fundamentally incompatible with common needs and expectations of women; midwifery care, she proposes, is far more compatible in these respects. LoCicero's well-argued synthesis bridges the maternal and physician characteristic perspectives and provides a critical complement to the multivariable analyses that predominate in the literature on nonmedical factors contributing to cesarean rates [132].

In their contribution to this symposium, Francome and Savage also stress the important contribution of a psychological factor, anxiety, to cesarean decision

making. They argue that expanded use of obstetrical screening technologies and interventions has increased anxiety for physicians and mothers and has undermined their confidence in childbearing processes. They propose that the politics and organization of medical care further contribute to physicians' anxiety. In this environment, women's competence may be diminished and physicians may be eager to resort to cesarean section as a tension-breaking solution [26]. One of the leading physicians in the movement for reduced U.S. cesarean rates provides extensive support for the role of anxiety in the decision to perform a cesarean [61].

In sum, performing cesareans is highly compatible with the technology-intensive approach of medical care in the U.S. and with the medical view of childbearing as a pathological process. A complex host of additional factors also appears to contribute to cesarean decision making. Existing research evidence suggests that the medical care system, maternal characteristics, and physician characteristics all make important contributions. The influence of nonmedical factors has contributed to striking shifts in the threshold for applying medical diagnostic labels that are considered to be indications for cesarean birth. The extent to which the organization and practice of medical care seem to have iatrogenic effects on childbirth raises profound questions about the appropriateness of the current system.

Consequences

The bias toward performing cesareans would be rational and appropriate if benefits for doing so clearly outweighed risks. We have seen that research evidence indicates that large numbers of cesareans are performed without benefit in the United States. Many risks of surgical birth to mothers, infants, and families are well-documented, and many possible risks have not been systematically investigated. Two of the contributions to this symposium examine risks of cesarean birth in detail.

In her contribution, Shearer considers physical risks and benefits of the cesarean procedure for mothers and infants. She critically assesses the major indications for cesarean birth in U.S. medical practice, and presents data showing that the growing tendency to perform cesareans has had little, if any, impact on infant mortality rates. She identifies situations in which infants benefit from cesarean birth and reviews morbid conditions in infants that have been attributed to cesarean birth, estimating the magnitude associated with the procedure apart from underlying complications. Similarly, she identifies benefits of cesarean birth for mothers, reviews maternal morbidity and mortality associated with cesareans, and again estimates the magnitude of iatrogenesis. Shearer concludes that cesarean section involves substantially increased risks for both mothers and infants [89].

In her contribution to the symposium, Mutryn reviews the considerable and growing literature assessing the psychosocial impact of cesarean birth on families. She notes that this literature is dispersed widely among various disciplines and academic journals, and is rarely published or cited in obstetrical journals. Her research synthesis is a profoundly disturbing one that shows many effects, the great majority of which are undesirable. Her review supports "the hypothesis that the impact of surgical birth may endure for months or even years, may have a far reaching influence on how the mother feels about herself and others, may influence the long term psychological stability of the family, and may, at least initially, impede optimum psychosocial development of the infant." Among the contributions of this wide-ranging paper are a description for lay readers of the sequence of tests, procedures and concerns involved in cesarean birth; a brief summary of the literature on psychosocial impact of surgery generally; a profile of a woman at relatively high risk of experiencing adverse psychosocial outcome from cesarean birth; and an assessment of methodological difficulties and shortcomings in this literature [133].

The childbearing period is the foundation of every person's life and is a critical juncture in the lives of women and families. Major challenges and changes are inherent in this period, and the preventable burden of the many iatrogenic effects that Shearer and Mutryn identify is unconscionable.

Despite the array of unintended and largely unanticipated consequences that Shearer and Mutryn identify, the study of iatrogenic effects of cesarean birth has been relatively underemphasized and underfunded. In light of the broad range of unfavorable findings to date, investigation of many additional possible effects of cesarean birth is imperative. Important avenues for investigation include longitudinal studies of gynecological morbidity (e.g. pain, infection, infertility), longitudinal studies of complications in future pregnancies (e.g. placenta previa, placenta accreta, complications from routine repeat cesarean birth), longitudinal studies of psychosocial effects (to date, Mutryn reports, effects have been identified for up to 8 years [133]), general population studies identifying the incidence of major associated psychosocial effects, relationship to such phenomena as postpartum depression and vulnerable child syndrome, and impact on future choices (e.g. in childbearing, childrearing, self care, medical care). Investigations of short- and long-term physical, social, and psychological effects of cesarean childbirth should be piggy-backed onto randomized controlled trials comparing vaginal and cesarean birth for certain breech positions and other possible but currently unclear medical indications for cesarean birth.

It is important to address one additional adverse implication of medically unnecessary cesareans, the squandering of limited resources. While many women in the U.S. lack access to basic prenatal care and/or

receive substandard maternity care [134–138], vast sums of money are needlessly expended on cesarean sections. The most recent figures available from the Health Insurance Association of America indicate that in 1989 average hospital charges and physician fees for a cesarean birth exceeded those for a vaginal birth by $2852 [139]. As noted above, formal estimates of a national cesarean rate than might be attained without compromising outcomes range from 6 to 16.5% [26, 28, 35, 66–69], and several distinctive services have fine outcome experiences and cesarean rates under 2% [45, 52, 53]. If the 1990 cesarean rate had been 16.5% and the average cost differential between vaginal and cesarean birth as noted above, over 292,000 cesareans would have been avoided in that year at a cost savings of more than $834 million. If the rate had been 6%, over 731,000 cesareans and $2.1 billion in expenditures would have been eliminated. If the rate had been 2%, nearly 900,000 cesareans and $2.6 billion in expenditures would have been eliminated. The actual present cost of medically unnecessary cesareans is considerably higher than these figures indicate, due both to continuing inflation of medical costs and additional cost items that are not reflected in these figures (e.g. anesthesiologist services, extra inpatient newborn pediatric visits, outpatient services and hospital readmissions for cesarean complications, high probability of routine repeat cesarean in subsequent pregnancies, and associated morbidity in future pregnancies).

Solutions

In general, three types of solutions have been proposed and pursued with respect to the problem of large numbers of medically unnecessary cesareans in the U.S. First, individual childbearing women and their advocates have engaged in various forms of resistance. Second, various managed care strategies have been proposed and pursued in an attempt to facilitate reform within the medical care system. Third, some analysts and advocates have argued for a fundamental change, with frontline maternity care largely in the hands of midwives based in out-of-hospital settings, in contrast to the hospital-based specialty care received by the vast majority of childbearing women in the U.S.

Childbearing women and their advocates were the first to express widespread concern about cesarean trends and to work toward solutions. Two U.S. organizations have played a central role: C/SEC (Cesareans/Support, Education, and Concern) arose in 1972 when a frustrated and angry cesarean mother's letter was published in childbirth education and breastfeeding newsletters and struck a sympathetic chord with many other women [140], and the Cesarean Prevention Movement was established in 1982. The latter has chapters throughout the country and in other nations as well, and has recently become the International Cesarean Awareness Network (ICAN). Both have published newsletters [56, 57] and have emphasized change and empowerment through providing information (to childbearing women, policy leaders, the general public), sharing of women's experiences, community organizing, and providing support for distraught recipients of cesareans. Similar local groups have been established in the U.S., many publications provide women with cesarean information [141–149], and cesarean support and prevention have also been elements of women's informal networks and the childbirth reform movement generally [150]. It is appropriate for women to resist unnecessary risk-bearing surgery, and the individual strategy has been effective in many cases. Despite efforts and intentions, however, many other women have been unable to avoid undesired and unnecessary cesareans when faced with powerful professionals and institutions during the relatively vulnerable period of pregnancy, labor, and birth. This strategy must be complemented with effective policies that intervene in cesarean trends in a more systematic way and use sources of power that are widely recognized as being highly authoritative.

The second major approach to limiting unnecessary cesareans, and the preferred intervention strategy of physicians and policy leaders, has been some form of managed care. Although escalating U.S. medical care costs have been the principal impetus for the introduction of mechanisms that shape patterns of medical practice, managed care also has important implications for the quality of medical care. Clearly, quality is adversely affected when managed care strategies deny or limit beneficial care. In the case of cesareans and other procedures that have been used excessively, managed care offers the possibility of both cost savings and enhanced quality.

In an overview of strategies that have been used or proposed to limit performance of cesareans, Stafford identifies five managed care approaches: external audit and review, changes in physician payment, changes in hospital payment, malpractice reform, and education and peer evaluation. A sixth strategy that he discusses, making cesarean rates available to the public, is one that is intended to provide individual childbearing women with information [122]. Others have proposed an additional strategy designed to alter incentives: groups of physicians would assign one or more physicians to attend all births from the practice and be released from office hours, hospital rounds, surgical schedules, and other commitments [123, 151].

Few external regulatory or reimbursement organizations in the U.S. have used *audits* of cesarean practice patterns, and studies have not assessed the effectiveness of these programs. The effectiveness of this approach may be expected to be limited by a questionable legitimacy granted to external groups

and other factors that have limited the success of this strategy in other clinical areas [122].*

Proposals to limit unnecessary cesareans through *physician payment* levels have primarily considered reimbursing vaginal and cesarean births at similar rates. A number of programs—including state-level Medicaid programs for low-income women and Blue Shield private insurance plans—have instituted such a system. Equalized fees had no effect on cesarean rates in two of three reported cases [122]. As noted above, investigators have argued that class and insurance status patterns associated with cesarean birth cannot be explained solely by crude economic incentives. Cesareans also offer physicians greater scheduling control and a sense that they are limiting their malpractice liability. Perhaps financial incentives would only be effective if cesarean births were reimbursed at considerably lower rates than vaginal births [123], an arrangement that would conflict with the high rewards that are given for specialized procedures and interventions in U.S. medical practice.

Proposals to influence cesarean rates through *hospital reimbursement* are based upon establishing payment levels reflecting an aggregate cesarean rate that the institution may be expected to attain without compromising safety. Case-by-case clinical decisions would remain internal matters. Although such an approach has not been assessed for cesarean birth, hospital prospective payment systems using a somewhat analogous approach have clearly influenced clinical practice [122].

Other financing mechanisms that might be used to influence both physicians and hospitals include selective contracting with those that have low cesarean rates and encouraging use of prepaid plans [122].

Medical malpractice reform is a major undertaking that might be expected to have some impact on cesarean decision making. Nonetheless, since concern for liability is only one among a large number of nonmedical factors that seem to be influencing cesareans trends, any impact may be expected to be relatively slight.

Education and peer review activities include: presenting research findings in professional publications and at professional meetings; developing special reports [11, 12, 35, 36], policy statements [153], and clinical guidelines [62–64]; and instituting departmental cesarean reduction programs [39–41, 154]. Perhaps the most well-known example of this approach in the U.S. is the Consensus Development Conference on cesarean birth that the National Institutes of Health (NIH) sponsored in 1980 [35]. Despite the prestige of NIH, the development of a major conference report, and the publication of summaries in major journals, the conference has generally been viewed as having had little or no impact on the national cesarean section rate [155].

In his review of managed care approaches to cesarean birth, Stafford concludes that departmental programs have had a clear impact on cesarean rates and "show the greatest promise" [122]. In the present symposium, Myers and Gleicher provide an update covering 6 years of experience with the cesarean reduction program at Mount Sinai Hospital in Chicago. This program uses protocols, detailed computerized data collection, and peer review comparing individual physicians' practice patterns to those of the department as a whole to influence cesarean decision making. It has been implemented by the teaching staff with voluntary cooperation of the private staff. In the aggregate, childbearing women at this hospital are at elevated risk for adverse perinatal outcomes by virtue of their social characteristics. The baseline cesarean rate before introduction of the program was 17.5% and the rate has ranged from 10.3 to 12.5% since the program was initiated. The authors argue that there is no evidence that the intervention has compromised neonatal mortality [83]. They attribute success to physicians' wishes that their practice patterns not be perceived as deviating considerably from their peers [156]. Despite the successful cesarean reduction experience at Mount Sinai and the ease with which it could be replicated at other institutions, few obstetrics programs in other hospitals have expressed an interest in emulating this program [157].

A deep reservation must be expressed about an apparently growing number of institution- and protocol-based programs for cesarean reduction. As greater consensus develops about unnecessarily high cesarean rates and as pressures for cost containment grow, increasing interest is being expressed in the "active management of labor" (AML) approach [93, 154, 158, 159]. Obstetricians at the National Maternity Hospital in Dublin have, since 1968, attained relatively low cesarean rates while using this approach. Emphasis is on achieving vaginal birth within 12 hr of hospital labor, and medical elements may include: use of explicit criteria for ascertaining that a woman is in labor, artificially rupturing membranes, artificially augmenting labor with synthetic oxytocin, repeatedly performing vaginal exams to monitor cervical dilation and chart it on a labor graph (with 'progress' less than 1 cm per hour viewed as abnormal), and considering a cesarean if labor extends beyond 12 hr [160]. Unfortunately, this approach to labor substitutes for one interfering, risk-bearing, and disempowering technology a series of others.

Several aspects of the active management of labor program suggest that it gives higher priority to such objectives as efficient processing and control of women and their labors than to cesarean prevention. For example, dilation rates of less than 1 cm per hour are "beyond the outer limit of normal progress" in

*In exploring the utility of an audit approach to cesarean reduction, investigators at a U.K. hospital found considerable inter- and intra-assessor inconsistencies. They conclude that the lack of clear standards for assessment make audit an inappropriate approach [152].

AML rather than mean values as many had previously presumed. Furthermore, women are eligible for a cesarean after 12 hr of labor regardless of their medical condition or prospects for a vaginal birth [160]. In certain financing contexts, including many U.S. settings, a financial element also comes into play: if the medical and hospital staff devote more than 12 hr to a particular laboring woman, they may arbitrarily perform a cesarean and claim the considerably higher fees and charges that are likely to be involved in such a birth. Institutions also reap economic benefits from the AML programs that encourage women to remain at home until well into labor [e.g. 161]. Some active management of labor programs emphasize strict control over the woman and her labor through highly standardized care and rigid control over the content of childbirth education [161]. AML is being promoted as a program with advantages for childbearing women while disadvantages for them and advantages for professionals and institutions have not been adequately acknowledged.

The provision of a supportive companion throughout labor (a student midwife) is an element of the Dublin approach to AML [160]. In a recently reported randomized controlled trial, a group of women receiving similar emotional support had an 8% cesarean rate, while a group with a silent observer had a 13% cesarean rate, and a usual care control group had an 18% rate. The supported group also had significantly shorter labors; lower rates of forceps, epidural anesthesia, and artificial oxytocin; and lower rates of infants hospitalized more than 48 hr, sepsis evaluation, and maternal fever [162]. The results from this Houston study are comparable to those of similar randomized controlled trials of support during labor conducted in Guatemala, Canada, Finland, and South Africa [163, 164].* These trials, as well as services that have had cesarean rates below 2% along with fine outcome experiences and judicious use of other obstetric technologies [45, 52, 53], suggest that routine use of the medical intervention component in AML may contribute nothing beyond that of a less expensive and less invasive midwife or supportive labor companion. Controlled trials have not established the relative contribution of AML's social support and medical intervention components, or any desirable or undesirable effects of medical intervention above and beyond social support.

Boylan, a Dublin advocate of AML argues that social support and other organizational aspects of AML are more important than the medical component [160]; yet as Francome and Savage note in this issue, it is the medical components that appeal to and are being eagerly adopted by those who are trained and practice in high-technology birth settings [26]. For example, reports of some applications of AML beyond Dublin focus exclusively on the medical protocol without even acknowledging other aspects [158, 159]. The experimental group in the first randomized prospective trial of active management of labor received only the medical intervention; the Chicago investigations justify the exclusion of organizational elements by suggesting that they are not suited for U.S. hospitals serving primarily private-pay women [154]. It would be more accurate to anticipate that although U.S. physicians and hospitals would not welcome this low-technology approach, large numbers of women would appreciate and prefer it. As Boylan observed while working in the U.S., "practice patterns are designed more with the interest of the health professional in mind than the interest of the mothers" [165]. Social science research has consistently corroborated this observation [166].

In contrast to the demonstrated effectiveness of social support and the low cesarean rates attained through many low-technology approaches [126], the prevailing medical presumption is that if cesareans are to be reduced, other obstetrical interventions must be introduced on a broad scale. In addition to AML, medical programs or proposals for cesarean reduction have substituted high rates of preterm induction of labor [167], X-ray assessment of the bony pelvis (finding that 50% or more women with breech babies have an inadequate pelvis) [84, 85], and forceps and vacuum extraction [168]. All of these approaches assume high rates of maternal incompetence in childbearing, which are not borne out by midwifery and other low-technology services.

The medical care strategy that Stafford considers to be most promising is one that few physicians have been interested in emulating; when departments do implement cesarean reduction programs, the substitution of high rates of other high-technology obstetric procedures seems to be very seductive. Because of the dim prospects for rational reduction of cesarean section rates within the prevailing medical care system, a growing number of analysts and organizations, including several contributors to the present issue, recommend a third major approach to the problem: midwives should have a much greater role in the care of childbearing women, and midwifery should be an autonomous profession [26, 126,132, 165, 169–172]. Moreover, many further specify that more maternity care should take place in supportive out-of-hospital community-based social environments that emphasize health and well-being, enable caregivers to provide responsive individualized community-oriented care, and enhance the involvement of childbearing women in their care [26, 126, 169, 170].

In her contribution to this symposium, Sakala addresses the relatively low likelihood of cesarean birth and other benefits of midwifery care and/or out-of-hospital birth in the U.S. She presents data from controlled cohort studies showing that women

*On the basis of these findings, one proposal for cesarean reduction is that insurance companies reimburse a labor support companion, sometimes called *doula*, *monitrice*, or childbirth assistant [123].

using these forms of care are significantly less likely to have cesareans than women using the predominant approach of physicians in hospitals. Both well-insured middle-class women (who are at high risk for cesarean birth in the U.S.) and more vulnerable women regularly experience relatively low rates of cesareans with these forms of care. Sakala considers how these forms of care involve lower cesarean rates by presenting data from interviews with midwives who work in home settings. She finds that the midwives' knowledge and practice regarding major medical indications for cesarean birth contrast strikingly with prevailing medical knowledge and practice. From the midwives' perspective, most women receive cesarean sections for pseudo-problems, for preventable problems, or for problems that might be resolved in less invasive ways. Although all knowledge and practice are socially constructed, Sakala argues that midwifery knowledge and practice are based much more directly upon the interests, needs, and circumstances of childbearing women than obstetrical knowledge and practice. The latter are shaped in important ways by such extrinsic factors as the biomedical model and the culture of medicine; core values of western industrial society; and interests of medical industries, professionals, and institutions [126].

THE EMERGING INTERNATIONAL PICTURE OF CESAREAN BIRTH

Trends

Figure 2 presents cesarean rates for 19 countries or regions from 1970 through 1987. Hospital birth is near-universal in these countries with the exception of The Netherlands where about one-third of births occur at home. Therefore, data points for The Netherlands in this figure describe all births; data points for all other countries are based upon hospital births. Officials at the U.S. National Center for Health Statistics solicited these data from government statistics offices and university researchers in European, North American, and Pacific countries [54, 70].

The most remarkable aspect of Fig. 2 is the steady—and in most cases dramatic—increase in cesarean section rates over a relatively brief period in these countries. Rates of increase, however, differ substantially. In 1970, cesarean rates for these countries were confined to a spread of 4 percentage points; by 1986, the spread had widened to nearly 18 percentage points.

National differences in cesarean rates cannot be primarily explained by variations in health status of mothers and infants. For example, North American nations with relatively high standards of living have highest cesarean rates for most of this period. Differences also cannot be justified on the basis of system outcomes. Although figures are unadjusted for differences in national populations, neither perinatal mortality ratios nor neonatal mortality rates are significantly associated with cesarean section rates [27, 54]. It is also improbable that differences can be explained by a mix of somewhat substitutable technologies. Cesarean rates, for example, are not significantly related to rates of use of forceps and vacuum extraction [54]. Rather, differences in cesarean section rates seem to reflect profound differences in the various countries with respect to practice patterns of maternity caregivers, the organization of medical care, and 'preferences' of childbearing women.*

These differences reflect a great degree of uncertainty about appropriate care for childbearing women. The data also suggest that nonmedical variables may, as in the United States, play a major role in decisions to perform cesareans in other countries. Lomas and Enkin argue that such variation would be expected if there were inadequate research evidence about appropriate clinical practice or if there were conflicting evidence about appropriate clinical practice. They conclude, however, that *maternity caregivers are ignoring much consistent research evidence with respect to cesarean birth* [37].

Notzon has compared rates of increase of cesarean section rates for nine countries for which data are available for the periods 1976 through 1980 and 1981 through 1985. In all cases, the rate of growth was significantly lower in the more recent period [54]. Nonetheless, Portugal, Sweden, and Japan are the only countries shown in Fig. 2 in which cesarean rates actually seem to stabilize.

Figure 3 provides cesarean section rates collected by the National Center for Health Statistics (NCHS) for a variety of countries for 1985 or the most recent year available at the time of compilation. This figure provides information about several countries that did not appear in earlier data from the Center. Of particular note are the strikingly high rates of Puerto Rico in Central America (29.3%) and Brazil in South America (26.1%). Because approx. 17% of Brazilian births occur out of hospitals, the Brazilian statistic reflects both in- and out-of-hospital births. The in-hospital rate for Brazil for the period 1981 through 1986 was an extraordinarily high 31.6% [54]. These figures suggest that this obstetrical technology is largely out of control in some less developed countries, and that precious resources are being used

*Preferences of childbearing women must be viewed as being strongly influenced by the medical care systems to which they have access, a phenomenon that has been called 'supplier-induced demand' [173, 174]. In 1985, 55% of Dutch birthing women who had previously given birth by cesarean had vaginal births, in contrast to less than 7% of U.S. women [54]. U.S. women would be far more likely to 'choose' repeat cesarean due to their caregivers' and peers' general lack of confidence in and inexperience with vaginal birth after cesarean. Moreover, as Lomas and Enkin note, "demands and expectations *for* an operative delivery ... are more easily satisfied than are those for less interventive approaches" [37].

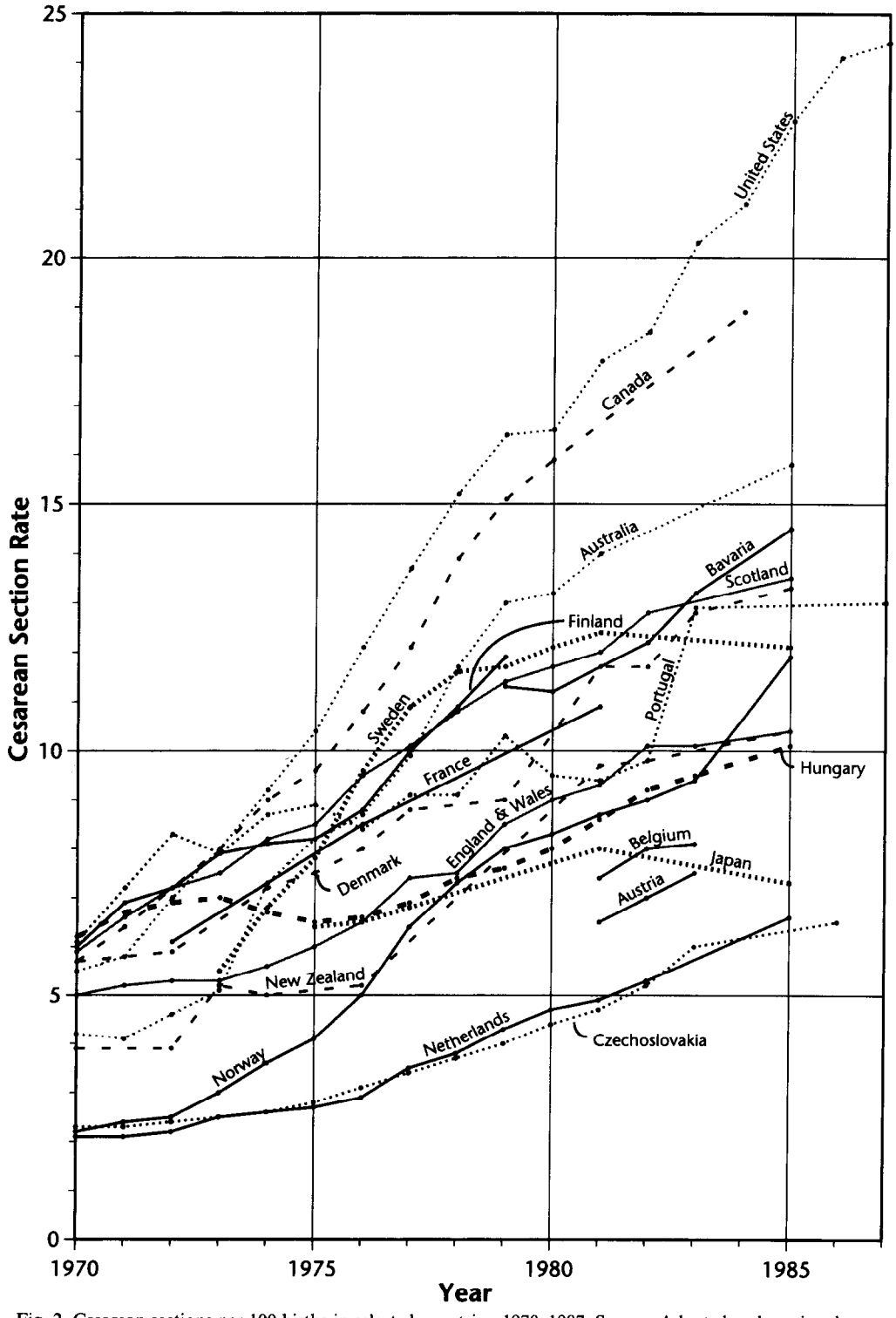

Fig. 2. Cesarean sections per 100 births in selected countries, 1970–1987. Source: Adapted and reprinted, by permission of *The New England Journal of Medicine* (**316,** 386–389, 1987), with updated rates provided by Francis C. Notzon, National Center for Health Statistics. All figures are for hospital births except for Dutch rates, which are for in- and out-of-hospital births. Australian rates for 1970 through 1973 are for Queensland only (15% of total); data for 1974 through 1981 are for New South Wales and Queensland only (50% of total). Austrian, Bavarian, Japanese, and Portuguese data are based upon incomplete coverage of births. Scottish rates for 1970 through 1974 are based on incomplete coverage of births and are probably overestimated.

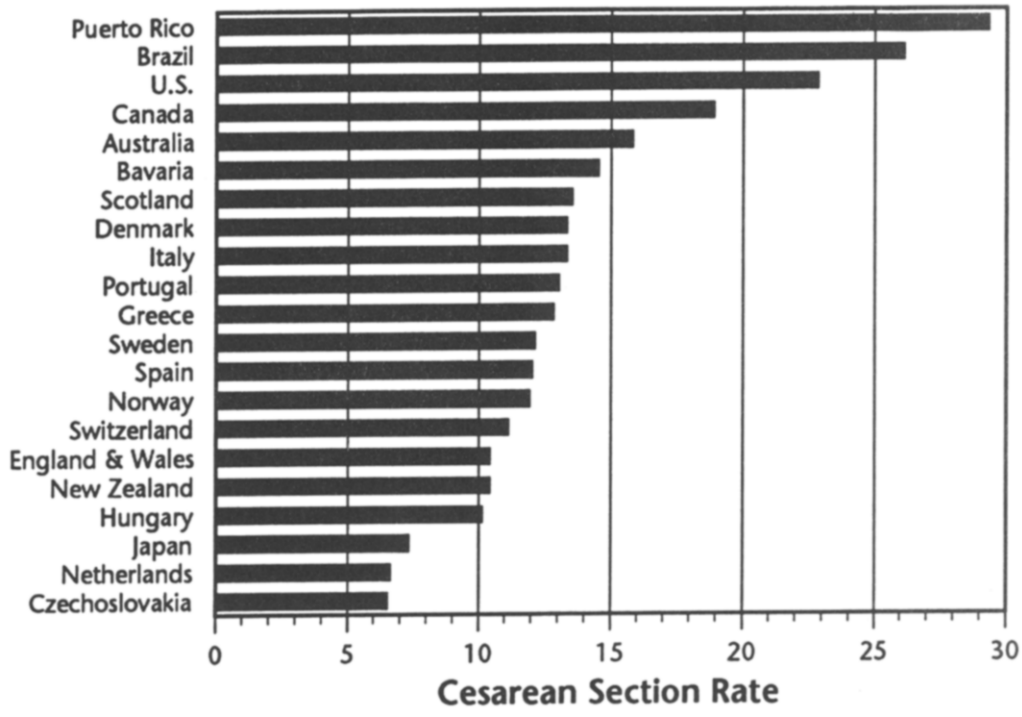

Fig. 3. Cesarean sections per 100 births in selected countries for 1985 or most recent year for which data were available. Source: Francis C. Notzon, National Center for Health Statistics. All figures are for hospital births except for Brazilian and Dutch rates, which are for in- and out-of-hospital births. Brazilian figure is for 1981 through 1986; Puerto Rican and Canadian figures are for 1984 and 1985; Italian figure is for 1982; Portuguese figure is for 1987; Greek figure is for 1983; Swiss figure is for 1983 through 1986; and Czechoslovakian figure is for 1986. There was incomplete coverage of cesarean section rates for Australia, Bavaria, Portugal, Spain, and Switzerland.

in profoundly irrational ways. The addition of these countries extends the spread of documented national cesarean section rates to 20 percentage points.

Four European nations that were not included in the previous NCHS report are also included in Fig. 3: Italy, Greece, Spain, and Switzerland. The spread for these nations is relatively compact, ranging from 11.1 to 13.3%.

As noted above, official recommendations for an optimal cesarean rate for the U.S. and other industrial nations have ranged from 6 to 16.5%. Puerto Rico, Brazil, the United States, and Canada exceeded the upper limit of this range by 1985. Given trends in Fig. 2, several other nations addressed in Figs 2 and 3 probably now have cesarean rates that exceed this range. Among the various nations included in Fig. 3, Czechoslovakia and The Netherlands had the lowest rates, 6.5 and 6.6%, respectively. Even these exceptionally low national rates exceeded by more than threefold the attainable rate of 2%.

The apparently independent regional clustering of national cesarean rates suggested by Fig. 3 may reflect the phenomenon of geographically-based variation in medical practice that Wennberg and colleagues have documented on a much smaller scale as "small area practice variation" [173, 174]. For example, Puerto Rico and Brazil have similar rates, as do the North American nations of the United States and Canada. The European nations tend to cluster from 10 to 14%. Its distinctive maternity care system, with a large number of births attended by midwives and occurring at home, makes The Netherlands an outlier. For less clear reasons the former Czechoslovakia is also an outlier. The 1985 Japanese rate of 7.3% and the almost flat slope of the Japanese trend line in Fig. 2 clearly reflect an independence from the general trends of the other nations. The five-point spread of New Zealand and Australia is relatively great, but small in comparison to the twenty-point spread for all of these nations. These clusters seem to be examples of large area practice variation.

Figures 2 and 3 contain national data reported to and accepted by the U.S. federal health statistics agency. Cesarean figures for various other countries have been reported in the literature, and I provide selected examples here. The focus is on nations with large populations, world leadership stature, and/or relatively extreme rates.

One report from South America provides contradictory but nonetheless extremely high rates. An official in Argentina estimates that a number of years ago Argentine cesarean rates ranged from about 10 or 12% in public hospitals to about 50% in the

private sector; by contrast, a lawsuit charges that about one-half of all births in Argentina are by cesarean section [175].

Cesarean rates in the Mexico City metropolitan area had reached 27%, apparently at some point in the 1980s [70].

In their contribution to this symposium, Francome and Savage report results of their national survey that identified a 12.1% cesarean rate for England in 1989. This figure, they argue, is more accurate than recent estimates available through a government reporting system that has been compromised in recent years. According to their survey, the cesarean rate was 13.5% for Wales, 14.2% for Scotland (singleton births only), and 12.3% for Great Britain as a whole in the same year [26]. If comparable to previous national figures, their data reveal that cesarean rates in these nations have continued to climb.

Analysis of birth certificate data from the Lazio region of Italy suggests that considerable cesarean practice variation occurs in that country. The national cesarean rate for 1985, as provided in Fig. 3, was 13.3%. By contrast, Bertollini and colleagues report that the 1985 rate in Lazio was 22.3%. By 1987, this rate had climbed to 24.3%, comparable to the U.S. rate of 24.4 during the same year. The investigators note that this is the highest rate reported in Europe thusfar and that provisional data for 1988 indicated a 25.2% rate. The report refers neither to a national Italian rate nor to rates in the other 19 regions and does not address the possibility of interregional variation [176]. Independent confirmation of the validity of the considerable discrepancy is warranted.

A report from the All-Union Research Center for Maternal and Child Health of the former Soviet Union estimates that the national cesarean rate was 3% (year unspecified) but provides escalating trend data for a series of 70,000 births conducted under the auspices of the Center. The Center's cesarean rate rose from less than 2% in 1951 to about 21% in 1986. The Center's rate of increase was especially steep between 1976 and 1986, when its cesarean rate more than doubled [177]. The degree to which this trend was limited to the referral Center warrants further investigation.

A report of cesarean rates in China indicates a steady increase from 2.4% in 1966 to 20.5% in 1981, with the sharpest rise after 1975 [178]. The 1981 Chinese rate exceeded the 1981 U.S. rate by 2.6 percentage points.

Chalmers presents data on the cesarean section rate in Singapore from 1978 through 1981. During this period, the relatively high Singapore rate was higher than Sweden's rate, less than Canada's rate, and rising more sharply than either. He also provides information on Fiji's rate in 1980 and 1981, about 5% and similar to the Dutch rate at that time [179].

A report from one of India's leading women's studies centers states that many urban hospitals in that country have rates exceeding 30%, up from 2% one decade earlier [180].

High cesarean rates in Brazil and some western industrial nations have been well-publicized in recent years. Many have falsely concluded that with its high rates Brazil is a rather unique aberration among less developed world nations. This perspective is no longer supportable. Given the trends identified in this section, *it is reasonable to conclude that a largely uncontrolled international pandemic of medically unnecessary cesarean births is occurring.*

Causes

I do not provide specific data on trends with respect to medical indications for cesarean section throughout the world except to note that many areas have been experiencing trends that have been associated with increasing cesarean rates in the U.S. These trends include increasing numbers of 'complicated' births, increasing use of electronic fetal monitoring, decreasing use of forceps and vacuum extraction, and increasing rates of routine repeat cesarean.

Moreover, various reports suggest that considerable uncertainty prevails regarding cesarean indications. For example, there is substantial variation among countries with respect to cesarean rates performed for particular medical indications [37, 54]. The differences can be considerable even when selecting countries with similar demographic, cultural, and economic characteristics—e.g. cesarean section is performed for nearly all breech births in Sweden but for less than one-half in Norway [37]. Nations also exhibit striking differences in the rate at which particular common indications for cesarean birth are attributed to childbearing women. For example, nearly 5% of U.S. births are attributed to fetopelvic disproportion, in contrast to 0.4% of births in Sweden [54].

Similarly, large intracountry variations have been identified in the proportion of diagnoses resulting in cesarean birth. For example, in Ontario teaching hospitals in 1982, 22% of cases of 'dystocia' involved cesareans in one region, in contrast to 71% of such cases in another region. In community hospitals in one region in the same year, 22% of cases of 'fetal distress' involved cesareans, in contrast to 77% in community hospitals in another region. The investigators also identified important variations in the percentage of all births having major diagnostic categories associated with cesarean birth among regions and types of hospitals. The magnitude of this variation cannot be accounted for by differences in population and technology [37, 181].

Investigators at a U.K. hospital performed and repeated an audit to consider whether this might be a useful approach to cesarean reduction. Their experience suggests tremendous uncertainty about indications for cesarean at the level of both the individual and local colleagues. In the initial audit, all five assessors agreed about the decision of whether or not

to perform a cesarean in only 28% of cases. When auditors reassessed the cases from 3 months to 2 years later, the new determinations differed from auditors' own original determinations in an average of 25% of the cases. They conclude that current fetal assessment methods are inadequate [152].

As with the U.S., a positive association between social class/payment mechanisms and cesarean rates has been identified in Brazil [182–186], Argentina [175], Puerto Rico [187], Italy [176], and India [180]. Reported rates in Brazil reveal an extraordinary variation in practice: cesarean rates at four Rio de Janeiro hospitals in 1977 and 1978 ranged from 14.9% at the facility serving the lowest socioeconomic group to 80.2% at the facility limited to private patients [188], and rates in 9 Sao Paulo hospitals in the late 1970s ranged from less than 25% for indigent women to about 75% for private patients [185]. Similarly, in a group of nearly 6000 women using a Brazil hospital in 1980 and 1981, 7.5% of indigent women had cesareans, in contrast to 49.6% of privately insured women [184].*

As in the U.S., maternal age, apparently independent of medical risk status, has been associated with cesarean birth in Canada [98], Italy [176], and China [190].

Some Brazilian women are said to prefer cesarean birth because they believe that the stretching of tissue during vaginal birth will adversely affect future sexual relations [191]. The role of this concern warrants further and systematic investigation.

As in the U.S., researchers elsewhere have associated nonmedical variables related to medical care arrangements with performance of cesarean section. For example, studies of temporal variation in performing cesareans suggest that staffing and scheduling patterns influence the cesarean decision in areas of Canada [112] and Italy [176].

High cesarean rates in Brazil are attributable, in part, to limited or inappropriate support for fertility control within the medical care system. During the 1970s, the government was opposed to family planning. By 1977, it agreed to provide contraceptives to women for whom pregnancy would pose a serious health risk, yet had not done so into the early 1980s. In this context, female sterilization had become one of the country's most important forms of fertility control [186]. Barros *et al.* report:

> . . . many caesarean sections are done to carry out an intraoperative sterilisation via tubal ligation. In Brazil, sterilisations are allowed only under very special circumstances (e.g. when two independent physicians certify that future pregnancies would be contraindicated) and are not reimbursed by the national health insurance programme. Consequently, doctors and families usually agree that the sterilisation should be carried out during a caesarean section; doctors then charge the women an extra fee and may give other reasons for the operation in the hospital case-notes [182].

In Brazil, one contraindication for pregnancy is having had a previous cesarean. By the time women have had three cesareans, a future pregnancy is considered to be very risky and their chances of sterilization become great [186]. I am unaware of any studies that explore the degree to which women may be motivated to seek cesareans for the purpose of accumulating a history of cesareans to justify tubal ligation.

Barros and colleagues present data from a Brazilian city showing that among women giving birth for the third or greater time, the majority who had cesareans had a concurrent tubal ligation. Both cesarean section and concurrent tubal ligation were positively associated with income level [182]. In a study of women using a large Campinas maternity hospital in 1979 and 1980, women having cesarean births were 16 times more likely to receive postpartum sterilization than those with vaginal births [186].

Policies relating to fertility control have also been linked to cesarean decisions in Argentina, where women who cannot afford to purchase services of private physicians have limited access to family planning services. A Ministry of Health resolution provides an incentive for cesarean birth by making family planning services available to those who have had two previous cesareans [192].

Population policies also seem to have influenced the sharp rise in the cesarean rate in China. With strong support for single-child families, that child has become a 'premium' baby. Cesarean section is widely believed to improve the likelihood of a good outcome relative to vaginal birth. In this context, more families are requesting cesarean birth and criteria of medical personnel for cesarean birth have relaxed. These policies have also sharply increased the proportion of women giving birth for the first time, a group that is regularly associated with higher cesarean rates than those who have previously given birth [178].

Jordan raises an issue that warrants exploration with respect to high cesarean rates in less developed settings: independent of its use value, biomedicine has in many less developed areas of the world a symbolic value [71, 72]. It is important to ask whether cesarean birth connotes progress and modernity and vaginal birth is associated with purportedly backward indigenous ways in less developed countries and regions with high cesarean rates. Support for this proposition is limited but provocative. Without providing details, Barros *et al.* note that "some groups" do view cesarean section as the safest and most modern way to give birth [182]. Another report notes that some in Brazil believe that a cesarean is more 'civilized' and a vaginal birth more 'primitive' [191]. The prestige associated with this technology may help to explain views in Puerto Rico and elsewhere that cesareans are

*The anthropologist Nancy Scheper-Hughes notes that cesarean birth is so common among more advantaged Brazilian women that she witnessed their daughters playing 'hospital' by enacting cesarean birth; similarly, low-income women complained of the 'maltreatment' of being forced to give birth vaginally [189].

safer, more convenient, and less painful than vaginal births [e.g. 187]. A physician in India argues that cesarean section has become a fashionable status symbol among upper-class women there because it indicates the ability to pay for a considerably more expensive type of birth than vaginal birth [180].

In an analysis of the dramatic trend toward more liberal use of cesareans and other obstetric interventions in Denmark, Vallgårda rejects the possibility that these patterns are justified by either declining health status of childbearing women or favorable impact on childbearing outcomes. The author attributes this trend to supplier-induced demand—the availability of more obstetricians, more hospital beds, and more technology relative to the number of birthing women. The specialists seem to believe in the efficacy of their approaches and women seem to accept this rationale and accede to the system [193].

In this issue, Francome and Savage provide data showing that British obstetricians tend to believe in the rationality of the profession's cesarean decision-making patterns. Consultants responding to their survey were asked to provide explanations for the considerable escalation in the British cesarean rate in recent decades. Responses suggesting that the rise was based upon appropriate and reasonable factors outnumbered those suggesting inappropriate factors by about three to two [26].

Overtly self-interested physician behavior with respect to quicker births and scheduled births that do not interfere with other activities have been associated with high cesarean rates in Brazil [191].

Although limited information is available regarding the impetus for the increasing cesarean rate in many areas of the world, several patterns emerge relative to the U.S. trends described above. First, some of the same nonmedical variables have been identified as being operative in various other areas. These include maternal factors, medical system factors, and physician factors. Second, in several nations, a considerable proportion of the dramatic rise in cesarean birth seems to be attributable to national population policies that either severely limit forms of fertility control or impose standards for single-child families. Finally, although not systematically examined, various observers report that in some areas of the world cesarean birth has very favorable connotations, including prestige, modernity, superior safety, and greater pain control. Clearly, extensive research is warranted to further explore these and other avenues of investigation regarding rising cesarean rates.

Consequences

It is important to underscore that medical risks of cesarean birth in less developed nations are much greater than risks in industrial nations (e.g. as summarized by Shearer in this issue [89]) due to such factors as poorer health status of childbearing women; limited availability of medical supplies, surgical equipment, and transfusable blood; problems with supply of water or electricity; personnel shortages; unsanitary conditions; and transportation and communication difficulties. Under such circumstances, hemorrhage, infection, uterine rupture, anesthetic complications, and maternal mortality are relatively common complications [194]. As Jordan notes, iatrogenic problems inherent in a medicalized approach to birth are compounded under such conditions by problems involved with practicing biomedicine poorly [71, 72]. She comments: "I have myself observed massive postnatal infections in women operated on under (almost unavoidably) unsterile conditions, and others have cited evidence that in many developing countries maternal mortality in Cesarean section reaches 20%" [71]. It is reasonable to conjecture that cesarean morbidity and mortality in western industrial nations is similar to the profile presented by Shearer in this issue [89]. Reports of morbidity and mortality associated with cesareans in other areas are sketchy and uneven. Systematic investigation of risks of cesarean section in diverse settings is an important research priority.

The findings in Mutryn's report in the present issue suggest important questions about the impact of cesarean birth on families in less developed nations. In her synthesis of studies conducted in the U.S. and other western industrial nations, Mutryn finds a broad range of adverse psychosocial effects on various family members and their relationships [133]. The question of the psychosocial impact of surgical birth on families in less developed nations appears to be entirely unexplored. Given the high and escalating cesarean rates in many of these nations, this question is also an urgent research priority.

Jordan raises important related concerns about the social and psychological impact of substitution of high-technology approaches to birth for indigenous low-technology systems that continue to be in place in many areas of the world. All participants in low-technology birthing systems share access to authoritative knowledge about the artifacts and process of labor and birth; relationships are relatively egalitarian and birthing women have a prominent role in decision-making. By contrast, only the medical staff may use and speak authoritatively about, and often see or touch, tools required for cesarean and other high-technology births; relationships are hierarchical and women are often excluded from decision-making. Traditionally a women's domain, pregnancy and birth come to be "colonized by a male-identified top-down power structure" in an approach that serves interests of elites rather than the general public [71, 195].

Finally, the opportunity costs of cesarean birth warrant special attention. These may be expected to be considerable in industrial nations and of exceptionally great magnitude in less developed nations. Throughout the world, nations are struggling with the problem of scarce resources for health and

medical services and other basic human needs. The expenditure of extensive resources for medically unnecessary yet risk-bearing surgical births has no place in rational approaches to resource allocation.

Solutions

Few published reports in English have addressed attempts to intervene in cesarean rates outside of the U.S. Such interventions appear to have occurred primarily in Canada or through implementation of an active management of labor protocol.

Using the active management of labor protocol, the largest obstetric unit in the British Isles has maintained relatively low cesarean rates (between 4 and 5% in the 108,987 births occurring from 1965 through 1980) while realizing gains in perinatal mortality comparable to those of other western nations [196]. As noted above, this protocol includes medical interventions and social support and other organizational features. Although there is excellent evidence that the contribution of social support and other relatively inexpensive and low-risk nonmedical features is very great,* the relative contributions of the various components of AML have not been assessed. Beyond Dublin, it seems, active management of labor is coming to be defined primarily or solely as a set of medical interventions. Presumably reflecting a concern about rising cesarean rates, some variant of the Dublin active management of labor protocol has been used on at least four continents. Dublin proponent Boylan reports that some form of this protocol has been assessed and/or adopted in Europe (Dublin, London), North America (Moncton, Houston), South America (Valparaiso), and Asia (Singapore) [160].

The cesarean trend line for Canada has a slope similar to that of the U.S., and the Canadian rate has been only slightly less at any given time. To address this trend, a National Consensus Conference on Aspects of Cesarean Birth was held in 1985. The report, which circulated in interim form throughout the country and which is endorsed in final form by leading professional associations, provides practice guidelines for women with breech presentation, previous cesarean, and dystocia [197].

Several approaches have been used to assess the impact of the Canadian consensus report in Ontario. In 1987 and 1988 surveys, the great majority of obstetricians indicated that they were aware of the consensus statement and in general agreement with its recommendations. However, only 26% responded correctly to four questions about breech recommendations in the report, while 9% responded correctly to four questions about previous cesarean recommendations, and 3% responded correctly to all 8 questions. Surveys mailed to Ontario obstetricians just before and 2 years after the issuing of the conference statement found no significant differences in the physicians' recommended approach to two hypothetical cases (breech presentation, previous cesarean). Although physicians reported a significantly lower rate of repeat cesarean after the report, actual rates of repeat cesareans were not significantly different for the two time periods. For both indications and for both time periods, actual provincial cesarean rates were far higher than aggregate reported rates. Other baseline and follow-up surveys found that most hospitals continued to have no explicit policies for the two indications and those that did were not restrictive with respect to report recommendations. The investigators conclude that although practice guidelines may predispose physicians to consider changes in practice, actual rapid change requires use of incentives or removal of disincentives [198, 199].

The same group of investigators conducted a randomized controlled trial of community hospitals in Ontario in 1988 and 1989 to compare two interventions for influencing rates of 'trial of labor' (in women with previous cesareans) and of vaginal birth after cesarean: audit and feedback versus education and leadership of local opinion leaders. Physicians practicing in control hospitals merely received a mailing of the 1986 consensus guidelines. Whereas outcome rates in audit and feedback hospitals were not significantly different from those in control hospitals, outcome rates in opinion leader hospitals were significantly more favorable than in the other groups. Nonetheless, more than one-half of women eligible for trial of labor experienced elective cesareans in the opinion leader hospitals [200].

Jordan explores external cephalic version as a less invasive alternative to cesarean section for breech and other non-cephalic presentations. She notes that skills and knowledge for turning babies through external manipulation are widespread beyond modern scientific obstetrics and have also been retained in industrial nations such as Holland, Sweden, and Germany. She reviews the literature on risks and benefits of external cephalic version, describes both the earlier low-technology medical approach to version and a more recent high-technology medical approach, and provides ethnographic data on use of this technique by Maya midwives in Yucatan, Mexico. Finally, she identifies various other approaches that are used in different areas of the world to turn babies, including lying on slant boards and other postural exercises, acupuncture, and use of pharmacological agents [201]. With her colleague, Jordan has created a videotape of a Maya midwife performing a version [202].

Due to the great risks of cesarean section in less developed countries, the procedure of symphysiotomy has been proposed and performed as an alternative. This incision from the skin through the midline cartilage of the pubic bone, however, has itself been associated with a high rate of serious complications [194].

*For example, the cesarean rate for nearly 12,000 women admitted during labor to freestanding birth centers in the U.S. from mid-1985 through 1987 was a comparable 4.4% [43].

More effective policies and programs for fertility control could eliminate many medically unnecessary cesareans in countries where this method of birth is used as an opportunity for tubal ligation.

In many areas, both the general public and medical professionals seem to both underestimate risks of surgical birth and overestimate its benefits. Educational campaigns directed toward both groups could be useful elements of cesarean reduction campaigns in many nations.

Supportive labor companions—known variously as *doulas*, *monitrices*, or childbirth assistants—have been shown to have a favorable impact on cesarean rates in several nations [163] and could easily be used in a wide variety of circumstances.

Unfortunately, cesarean reduction strategies that seek fundamental change from medical personnel and institutions are akin to asking the proverbial leopard to change its spots. The modern biomedical enterprise is fundamentally oriented toward pathology rather than toward health, toward high technology rather than simpler interventions, toward efficient standardized processing rather than the individual unfolding of women's own biological rhythms, toward treatment and intervention rather than watchful waiting, and toward the exigencies of professionals and institutions rather than of individual laboring women.

Therefore, the most effective solution to the pandemic of medically unnecessary cesarean births is to demedicalize birth, and to limit the involvement of obstetrical specialists and acute medical settings to cases of genuine medical need. This approach recognizes that while birth is inherently a matter for women, families, and children, it is not inherently a medical matter. Many nations continue to have extensive systems of midwifery care in place. Others, such as Canada, are in the process of incorporating midwifery care into the official system for health and medicine. Supporting and strengthening midwifery care and designating midwifery care as the most appropriate form of care for healthy childbearing women may be expected to lead to far more conservative and appropriate use of cesarean section than is now occurring, along with a broad array of additional benefits. Critical elements of a strong midwifery profession include: making available outstanding midwifery training programs, providing enabling practice environments such as freestanding community-based birth centers [43, 203, 204] or the home setting that has been so successful for childbearing women in The Netherlands [2, 3, 53, 205] and in many other areas of the world [71, 195], giving midwives the stature of independent practitioners with rights and responsibilities to refer and consult similar to general practitioners, having reliable medical back-up readily available, providing midwives with respectable and secure incomes, and helping policy leaders and girls and women to understand and value the contributions of midwifery care through broad public education campaigns.

The solution to the problem of medically unnecessary cesareans is in one sense very simple: just don't do them. For this, women throughout the world need primary maternity caregivers who understand and are skilled in and committed to physiological rather than technological approaches to birth and who work in supportive environments.

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