

Trends in the United States Cesarean Section Rate and Reasons for the 1980–85 Rise

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Abstract: The rate of cesarean section delivery in the United States rose from 4.5 per 100 deliveries in 1965 to 22.7 in 1985, and in 1985 an estimated 851,000 live births were cesarean deliveries, according to data from the National Hospital Discharge Survey. This increase has been observed for all ages, and within all regions of the country. The rate for teenagers and mothers aged 20 to 29 was five to six times as high in 1985 as in 1965, and four times as high for mothers aged 30 years and older. Repeat cesareans account for an increasing share of all cesarean deliveries; in 1985 one in three cesareans were repeats.

The increase in the cesarean rate of 6.2 percentage points between 1980 and 1985 (from 16.5 to 22.7) was partitioned according to five complications of delivery recorded on hospital discharge records: previous cesarean delivery, breech presentation, dystocia, fetal distress, and all other complications. Nearly half (48 per cent) of the increase was associated with previous cesarean delivery, 29 per cent with dystocia, 16 per cent with fetal distress, 5 per cent with breech presentation, and 2 per cent with all other complications. (*Am J Public Health* 1987; 77:955-959.)

Introduction

There has been a continuous rise in the rate of cesarean birth in the United States during the last 20 years, from 4.5 per 100 deliveries in 1965 to 22.7 in 1985, according to data from the National Hospital Discharge Survey.¹⁻³ Numerous explanations have been offered for this fundamental change in obstetrical practice. They include:

- *Policy of subsequent cesarean delivery*—Because most women who have one cesarean delivery have their subsequent children delivered by cesarean section, vaginal birth after cesarean (VBAC) remains low, at about 7 VBACs per 100 previous cesareans in 1985. This is despite hospital and clinical practice studies in this country and others which show that rates of 40 to 80 VBACs per 100 previous cesareans are attainable.^{4-8*}

- *Technological monitoring of labor*—The increasing use of electronic fetal monitoring may increase the chances of detecting fetal distress and lead to an increased number of cesareans. Technological monitoring began in the early 1970s and was in fairly widespread use by the mid- and late 1970s. In 1980, it was estimated that 48 per cent of mothers of live births were electronically monitored.⁹

- *Breech deliveries*—Obstetricians may be increasingly reluctant to deliver breech babies vaginally. Although only about 3 per cent of all deliveries are breech presentations, 79 per cent of breech presentations in 1985 were delivered by cesarean section, up from 15 per cent in 1970.¹⁰

- *Less likelihood of forceps deliveries*—Forceps deliveries may be less likely to be attempted because of increased risk to the fetus, such deliveries now being done by cesarean section. Between 1972 and 1980, forceps deliveries of live births to married mothers declined by more than half, from 36.8 per cent to 17.8 per cent of all deliveries, concomitant with a rise in cesarean deliveries from 7.3 per cent to 17.2 per cent.¹¹

- *Changing childbearing patterns*—Women are having fewer children and begin childbearing at older ages.¹¹ Older primiparous mothers may be at greater risk of complications.

- *Fear of malpractice suits*—The practice of defensive medicine due to rising malpractice claims has been docu-

mented by the American College of Obstetricians and Gynecologists (ACOG). In 1985, 73 per cent of ACOG Fellows responding to an ACOG survey reported that one or more professional liability claims had been filed against them,¹³ compared with 67 per cent reported in a similar 1983 survey.¹⁴

These obstetrical issues provide compelling reasons to monitor the cesarean trend, and to examine reasons for its continued rise. This study reviews the increase in cesarean rates since 1965, and focuses on the reasons for the rise in the 1980–85 period.

Methods

Data on discharges from short-stay hospitals are collected annually by the National Center for Health Statistics (NCHS) in the National Hospital Discharge Survey (NHDS). Medical information for NHDS is abstracted from the face sheets of medical records for a sample of over 200,000 inpatients discharged from more than 400 non-federal general and special short-stay hospitals that participate in the surveys. Data are coded according to the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). The statistical design, data collection, quality control procedures, and measurement and sampling errors of the NHDS have been published.¹⁵ Also published is an evaluation of the reliability of the hospital abstract data collection procedure used.¹⁶ The present analysis is based on nearly 10 per cent of the 200,000 NHDS sample abstracts—18,044 women discharged after delivery. Numbers are nationally representative estimates of rates of cesarean delivery for live births and late fetal deaths but do not include therapeutic abortions.

Using ICD-9-CM, deliveries in 1980 and 1985 were classified and grouped according to five complications: previous cesarean delivery, breech presentation, dystocia, fetal distress, and all other. Up to seven complications were abstracted from each medical record. Deliveries with two or more complications were assigned to a single diagnostic classification, using the same hierarchical order designated by Anderson and Lomas¹⁷ in their analysis of the 1979–82 rise in cesarean delivery in Ontario: 1) previous cesarean delivery; 2) breech presentation; 3) dystocia; 4) fetal distress; and 5) all other. Thus, a delivery with diagnoses of both breech presentation and dystocia would be assigned to the category breech presentation, while previous cesarean always supersedes all other diagnoses. In the United States, only 9 per

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cent of deliveries with a previous cesarean in 1985 were breech presentations, or had dystocia or fetal distress noted. According to a recently published study,¹⁸ in 1984, only 8 per cent of women with a previous cesarean delivery were allowed a trial of labor. Thus, the fact of a previous cesarean delivery plays a critical role in determining current delivery management. Breech presentation supersedes both dystocia and fetal distress because dystocia and fetal distress may be caused by the breech presentation; dystocia takes precedence over fetal distress because fetal distress may be a result of dystocia. Deliveries with complications other than previous cesarean, breech presentation, dystocia or fetal distress were classified as "all other", and fell last in the hierarchy.

Results

Trends in Cesarean Rates

In 1965, 4.5 of every 100 deliveries were performed by cesarean; this rate rose to 22.7 per 100 deliveries in 1985 (Table 1). The rate was four times as high in 1985 as in 1965 for mothers age 30 and over, but five to six times as high for teenage mothers and for mothers age 20 to 29.

When studying cesarean rates as indicators of changes in obstetrical practice, it is important to examine first and repeat cesareans separately, as well as vaginal births after cesarean delivery. The primary cesarean rate and the estimated number of live births with first and repeat cesarean delivery for 1970-85 are shown in Table 2. In calculating the primary cesarean rate, repeat cesareans are removed from both the numerator (first cesareans) and denominator (mothers who have never had a cesarean). This rate rose from 4.2 per 100 deliveries in 1970 to 16.3 in 1985. The percentage of cesareans that are repeats increased from 25.2 per cent in 1970 to 34.6 per cent in 1985.

Reason for the 1980-85 Increase

In 1980, 51.2 per cent of all deliveries (vaginal and cesarean) had one or more complications; in 1985, 64.0 per cent had one or more complications (Table 3). This represents a 25 per cent increase over 1980. A detailed NHDS study of the rise in reported complications in cesarean and non-cesarean delivery suggests that better diagnosis and more complete reporting may account for much of this increase.¹⁰

Table 3 also indicates that 5.1 per cent of all deliveries in 1980 and 8.4 per cent of deliveries in 1985 were to women who had had a previous cesarean. Increases since 1980 are also

TABLE 2—Primary Cesarean Rate, Estimated Number of Live Births with Cesarean Delivery and Per Cent Repeat Cesareans, United States, Selected Years, 1970-85

| | Cesarean Rate | | Estimated Number of Live Births by Cesarean Delivery (in thousands) | | | Per Cent Repeat |
|------|--------------------|----------------------|---|-------|--------|-----------------|
| | Total ^a | Primary ^b | Total ^c | First | Repeat | |
| 1985 | 22.7 | 16.3 | 851 | 557 | 294 | 34.6 |
| 1984 | 21.1 | 15.0 | 774 | 509 | 265 | 34.2 |
| 1983 | 20.3 | 14.3 | 739 | 482 | 257 | 34.8 |
| 1980 | 16.5 | 12.1 | 596 | 418 | 178 | 29.9 |
| 1975 | 10.4 | 7.8 | 327 | 238 | 89 | 27.1 |
| 1970 | 5.5 | 4.2 | 205 | 153 | 52 | 25.2 |

^aNumber of cesarean deliveries per 100 total deliveries.
^bNumber of first cesareans per 100 deliveries for mothers who have not had a previous cesarean.
^cComputed by applying NHDS cesarean rates to the number of live births from national vital registration data.

TABLE 3—Per Cent of All Deliveries (Vaginal and Cesarean) with Specified Complication, United States, 1980 and 1985

| Complication | ICD-9-CM Code | | | Per Cent Change 1980-85 |
|--------------------------------------|---------------|------|------|-------------------------|
| | | 1985 | 1980 | |
| Total with one or more complications | | 64.0 | 51.2 | +25.0 |
| Previous cesarean delivery | 654.2 | 8.4 | 5.1 | +64.7 |
| Breech presentation | 652.2 | 2.9 | 3.1 | -6.5 |
| Dystocia | ¹ | 10.2 | 7.2 | +41.7 |
| Fetal distress | 656.3 | 3.9 | 1.2 | +225.0 |
| All other complications | ² | 38.5 | 34.6 | +11.3 |

¹Includes ICD-9-CM codes: 653 (disproportion); 660 (obstructed labor); 661 exclusive of 661.3 (abnormality of forces of labor other than precipitate labor); 662 (long labor).
²Includes all other deliveries not coded 650 (delivery in a completely normal case).

evident for the diagnosis of dystocia (from 7.2 per cent to 10.2 per cent) and for fetal distress (1.2 per cent to 3.9 per cent). Thus, fetal distress was indicated for only 3.9 per cent of deliveries in the absence of a previous cesarean delivery, breech presentation, or dystocia. Breech presentation occurred in 3 per cent of all deliveries in both 1980 and 1985.

Cesarean rates for 1980 and 1985 deliveries with these complications are shown in Table 4. In both 1980 and 1985, over 90 per cent of all deliveries were cesarean for mothers with a previous cesarean delivery. In 1985, 79 per cent were by cesarean if there was a breech presentation, 65 per cent

TABLE 4—Number of Cesarean Deliveries per 100 Deliveries with Stated Complication, United States, 1980 and 1985

| Complication | ICD-9-CM Code | | | Per Cent Change 1980-85 |
|----------------------------|---------------|------|------|-------------------------|
| | | 1985 | 1980 | |
| Previous cesarean delivery | 654.2 | 93.4 | 96.6 | -3.3 |
| Breech presentation | 652.2 | 79.1 | 66.2 | +19.5 |
| Dystocia | ¹ | 65.2 | 66.7 | -2.2 |
| Fetal distress | 656.3 | 45.6 | 62.8 | -27.4 |
| All other complications | ² | 10.7 | 11.4 | -6.1 |

¹Includes ICD-9-CM codes: 653 (disproportion); 660 (obstructed labor); 661 exclusive of 661.3 (abnormality of forces of labor other than precipitate labor); 662 (long labor).
²Includes all other deliveries not coded 650 (delivery in a completely normal case).

TABLE 1—Cesarean Rates* by Age of Mother: United States, Selected Years, 1965-85

| Year | Age of Mother | | | | | |
|------|---------------|----------------|-------------|-------------|-------------|-------------------|
| | All Ages | Under 20 Years | 20-24 Years | 25-29 Years | 30-34 Years | 35 Years and Over |
| 1985 | 22.7 | 16.1 | 21.2 | 22.9 | 26.6 | 30.7 |
| 1984 | 21.1 | 16.5 | 19.6 | 20.8 | 24.6 | 28.7 |
| 1983 | 20.3 | 15.0 | 19.0 | 20.5 | 24.6 | 25.4 |
| 1980 | 16.5 | 14.5 | 15.8 | 16.7 | 18.0 | 20.6 |
| 1975 | 10.4 | 8.4 | 9.0 | 11.1 | 13.6 | 15.0 |
| 1970 | 5.5 | 3.9 | 4.9 | 5.9 | 7.5 | 8.3 |
| 1965 | 4.5 | 3.1 | 3.5 | 4.3 | 6.4 | 7.9 |

*Rates are number of cesarean deliveries per 100 deliveries in specified group.
 NOTE: Age-specific rates for 1970-83 have been previously published.²

were by cesarean for dystocia, and 46 per cent were by cesarean for fetal distress. The rate of repeat cesarean delivery for women who had previously delivered by cesarean (the repeat cesarean rate) remained about the same from 1980 to 1985 (96.6 cesareans per 100 deliveries in 1980 and 93.4 in 1985). Thus, the rate of vaginal birth after previous cesarean (VBAC) was 6.6 per 100 in 1985, up from 3.4 in 1980 (and 2.2 in 1970¹⁰).

The rise in the cesarean rate between 1980 and 1985 (from 16.5 to 22.7 cesareans per 100 deliveries) is partitioned according to each of these five classes of complications in Table 5. The rates for complications shown in this table are derived by dividing the number of cesarean deliveries for the complication by the total number of deliveries in the year. (These cesarean rates can also be derived by multiplying the cesarean rate for the complication from Table 4 by the proportion of deliveries with that complication from Table 3.) A comparison of these partitioned rates for 1980 and 1985 enables us to determine the relative contribution of each complication to the overall rise in the cesarean rate. The relative contribution is a function of the change in the reported incidence of the complication (Table 3) and the change in the rate of cesarean delivery for the complication (Table 4).

The most important contributor to the increase in the overall rate between 1980 and 1985 was previous cesarean delivery, which accounted for 48 per cent of the rise. This reflects the substantial increase of 65 per cent between 1980 and 1985 in the proportion of all women giving birth who had a previous cesarean delivery (Table 3), which far overshadowed the 3 per cent drop in the cesarean rate for this indication (Table 4).

Breech presentation contributed only 5 per cent to the rise in the rate because the increase in the cesarean rate for this diagnosis (from 66.2 per cent in 1980 to 79.1 per cent in 1985) (Table 4) was almost exactly offset by the small drop in incidence (3.1 per cent in 1980 and 2.9 per cent in 1985) (Table 3). Dystocia contributed 29 per cent to the overall increase, a reflection of the increase in reported incidence (from 7.2 per cent to 10.2 per cent), because the rate of cesarean delivery for this indication also remained almost unchanged during this period. Although the rate of cesarean delivery for fetal distress dropped by 27 per cent between 1980 and 1985, the more than tripling in reported incidence (from 1.2 per cent in 1980 to 3.9 per cent in 1985) produced a net contribution of 16 per cent to the 1980-85 increase. Other complications contributed only 2 per cent to the 1980-85 rise, a reflection of the increase in reported incidence.

Although this analysis of reasons for the 1980-85 cesarean rate increase has been in terms of complications, the changing age structure of mothers in that period also accounts for a small part of the increase. The United States has experienced a rise in births to older mothers, who have high rates of cesarean delivery. In 1980, one out of five deliveries were to mothers 30 years or older, but in 1985 one out of four deliveries were to mothers in this age group. Had the age distribution of mothers remained constant from 1980 to 1985, but with the age-specific cesarean rates reported for 1985, the cesarean rate would have risen from 16.5 in 1980 to 22.2 (rather than 22.7) in 1985. In other words, only 8 per cent of the increase in the cesarean rate is attributable to the changing age-of-mother distribution.

Discussion

The method of partitioning the 1980-85 rise in the cesarean rate in the United States described here was done in consultation with and replicates the approach taken by Anderson and Lomas with 1979-82 Ontario data.¹⁷ The rise in the Canadian cesarean rate since 1970 has been remarkably similar to that in the United States, with the US rate leading the Canadian rate by about 1 percentage point in recent years, and both countries leading all other 15 developed countries studied⁸.

The indications for the recent US and Ontario rise are fairly comparable. The most striking similarity is that previous cesarean section is the major contributor, and that indications other than previous cesarean, dystocia, and fetal distress are negligible contributors. In the United States, as in Ontario, there has been a large increase in the per cent of women delivering who had a previous cesarean, and little change in the obstetrical management of subsequent deliveries (in both areas, more than 9 in 10 such women continue to have cesareans). The primary cesarean rate in the United States for teenagers and women in their twenties has been increasing and reached 14-16 per cent in 1985. Unless management practices change in the future, almost all their subsequent deliveries will be by cesarean. There has been some speculation that the history of a previous cesarean may be underreported in the medical record (i.e., uterine scar from previous surgery) for mothers who deliver vaginally. If true, this would reduce the observed VBAC rate. However, a longitudinal study which linked New York State birth certificates for the years 1975-80 for the same mothers derived VBAC rates of the same limited frequency as derived

TABLE 5—Partition of 1980 and 1985 Cesarean Delivery Rates (Cesarean Deliveries for Stated Complication per 100 Total Deliveries) and Increase in Rates for Selected Complications, United States

| | ICD-9-CM Code | 1985 | | 1980 | | Increase 1980 to 1985 | |
|----------------------------|---------------|------|-----------------------|------|-----------------------|-----------------------|-----------------------|
| | | Rate | Per Cent Distribution | Rate | Per Cent Distribution | Rate | Per Cent Distribution |
| Total | | 22.7 | 100.0 | 16.5 | 100.0 | 6.2 | 100.0 |
| Previous cesarean delivery | 654.2 | 7.9 | 34.8 | 4.9 | 29.7 | 3.0 | 48.4 |
| Breech presentation | 652.2 | 2.3 | 10.1 | 2.0 | 12.1 | 0.3 | 4.8 |
| Dystocia | ¹ | 6.6 | 29.1 | 4.8 | 29.1 | 1.8 | 29.0 |
| Fetal distress | 656.3 | 1.8 | 7.9 | 0.8 | 4.8 | 1.0 | 16.1 |
| All other complications | ¹ | 4.1 | 18.1 | 4.0 | 24.2 | 0.1 | 1.6 |

¹See Table 3.

from these NHDS data.*

In 1982¹⁹ and again in 1985,²⁰ the American College of Obstetricians and Gynecologists (ACOG) held news conferences announcing relaxed restrictions on trial of labor in order to reduce the number of repeat cesareans. While VBAC has historically been avoided because of the fear of rupture of the uterine scar and its consequent effect on maternal and perinatal mortality, in 1985, then President Luella Klein of ACOG pointed out that cesarean delivery carries a risk of maternal mortality two to four times that of vaginal delivery²¹ and that:

"Mortality fears for mother and infant due to rupture of the uterus in trial of labor are unjustified by present statistical data. As far as is known, no mother has died due to trial of labor in recent years, regardless of scar type. Since 1950, only 2 infants are reported to have been lost due to rupture of a transverse scar during trial of labor."²¹

While the Ontario analysis concluded that dystocia played only a minor role in the increase in cesarean rates, in the United States it accounted for 29 per cent of the overall rise because of a 42 per cent increase in reported incidence. One reason for this difference is the definitions of dystocia used. This study includes disproportion (ICD-9-CM code 653) in the dystocia category, while the Ontario study does not. Twenty per cent of 1985 US cesarean deliveries had fetopelvic disproportion (ICD-9-CM code 653.4) indicated on the hospital record while only 1 per cent had "obstruction of bony pelvis" (code 660.1) indicated. As noted by Anderson and Lomas, further investigation of the reporting of this diagnosis is critical to the understanding of cesarean delivery rates.

Breech presentation was only a negligible contributor to the overall rise but this was due to the relatively unchanged proportion of deliveries with this indication. There has been a continuous rise in the surgical management of breech presentations, and 79 per cent were delivered surgically in 1985. Yet two recent Canadian studies have questioned whether the policy of routine cesarean delivery for either term or preterm breech presentations is advantageous.^{22,23}

Although surgical management of fetal distress declined by 27 per cent, fetal distress accounted for 16 per cent of the increase in the cesarean rate between 1980 and 1985, due to the more than tripling in the recording of this diagnosis. The use of fetal monitors has become widespread and is probably related to the increased identification of fetal distress on medical records. Researchers are divided on the question of whether or not their use has contributed to the increase in the cesarean rate.²⁴

While this study documents reasons for the recent rise based on information entered on maternal hospital discharge records, NHDS data cannot be used to evaluate the effect of the increasing cesarean rate on infant health. The hospital records sampled pertain to the mother and there is no linkage with the newborn's record. Therefore, no assessment can be made of relative risk to the mother against relative benefit for the infant. In addition, the NHDS does not provide information on many obstetrical procedures which may be related to cesarean delivery, and the sample size is insufficient for comparative studies of state and local areas practices.

The proposed 1989 revision of the US Standard Certificate of Live Birth contains an item on method of delivery,

which identifies primary and repeat cesareans, and vaginal births after previous cesarean delivery. Presently 21 states and the District of Columbia request method of delivery on the birth certificate, and it is hoped that this item will be adopted by all states. Information from the revised birth certificate and linkage with maternal and infant death certificates may help to determine the optimum cesarean rate.

The National Institutes of Health Consensus Development Conference on Cesarean Childbirth held in 1980 concluded that the "... rising cesarean rates may be stopped and perhaps reversed, while continuing to make improvements in maternal and fetal outcome."²⁵ However, the failure of the 1980 conference to attenuate the rising rate and ACOG's 1982 guidelines¹⁹ to decrease the rate of repeat cesareans are evidenced by this study. Public perception of the validity of the rising cesarean rate in improving perinatal outcomes may play an increasingly important role in the level of future rates. Rates of 25 to 28 per cent in 1985 in six of 56 hospitals in Massachusetts with active maternity units (at least 100 births) were of sufficient public concern that landmark legislation was passed in 1985²⁶ requiring disclosure by admitting hospitals upon request of maternity patients of the rates of primary and repeat cesarean delivery, and vaginal birth after a previous cesarean. Other important factors influencing future cesarean rates are changes in criteria for reimbursement and in accepted standards of obstetrical care—the benchmarks for judicial malpractice decisions. Whether laws, willingness to change obstetrical practices, and public attention on the rising rate will have an impact on future cesarean rates remains to be seen.

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U. Hawaii SPH Named WHO Collaborating Center

As a result of its accomplishments in international health and the special competence of its faculty in health leadership development and primary health care, the University of Hawaii's School of Public Health has been designated as a World Health Organization Collaborating Center for Health Leadership Development. The Center will be under the direction of Jerrold M. Michael, ScD, DrPH, Professor of Public Health and Dean of the School of Public Health.

The Collaborating Center designation for the University of Hawaii is consonant with Hawaii Governor John Waihee's initiative for a Pacific Basin Health Promotion and Development Center which is also being managed by the School of Public Health. Specific tasks to be carried out by the school include the following:

- Assist WHO in the development of plans for carrying out leadership training for primary health care;
- Share its resources and stimulate the sharing of resources by other schools in Asia and the Pacific;
- Assist the utilization of all resources of the Asia and Pacific health science schools in collecting and disseminating information on this subject;
- Participate in the development of a prototype approach for terminology, technology, methods, and procedures for leadership training;
- Participate in pilot testing such training programs with multi-sectoral groups of leadership training in other Asian countries;
- Serve as an additional WHO resource arm for broad efforts in this important area;
- Provide reference materials, and
- Participate in the coordination of Asia-Pacific public health academic efforts in the leadership training area.