

Caesarean Delivery in Selected Latin American Hospitals

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Rates of caesarean birth vary widely in a selection of 20 Latin American hospitals, ranging from a low of under 3% to a high of almost 50%. Data from four of the hospitals with caesarean rates that span the wide range are analysed. Despite their disparate levels, these hospitals show the same pattern with respect to age and parity: higher rates for nulliparous and for older women. The proportion with reported indications for caesarean delivery increases with the incidence of the surgery. However, a higher proportion of emergency caesareans is evident in hospitals with a lower incidence. Variations in indications by institution may therefore be of limited use in explaining variations in the caesarean rate. Costs could be cut by reducing the rate, but only in hospitals where it is high; in hospitals with low rates, no cost savings may be realized and the health of the mother and child endangered.

TABLE I. Percentage caesarean delivery in selected hospitals in Latin America

Country and city	Dates of study	Number of cases	Percentage caesarean delivery (%)
Central America			
Costa Rica	7.77-2.78	2399	20.0
El Salvador			
San Salvador ¹	3.77-6.77	1470	7.1
San Salvador ²	1.77-6.78	10,358	6.0
Honduras			
San Pedro Sula	1.77-10.79	10,358	2.8
Tegucigalpa	11.77-9.79	8258	4.9
Mexico	4.77-1.80	7089	13.2
Panama	7.77-6.78	9891	9.5
South America			
Brazil			
Campinas ¹	9.77-4.79	6416	41.3
Campinas ²	9.77-3.79	2701	49.1
Chile			
Arica	4.77-6.79	6682	17.9
Santiago ¹	12.77-6.78	5939	21.6
Santiago ²	5.77-1.78	3998	20.1
Valdivia	4.77-6.79	4973	19.5
Colombia*			
Type of hospital			
University	3.77-12.78	4122	8.5
University maternity	---	1402	6.8
Social Security	---	1501	6.5
Large general	---	1965	5.8
Medium general	---	2238	9.4
Small general	---	2802	9.2
Venezuela			
Cumaná	8.78-6.80	13,586	11.8

* Random sample of hospitals.

Introduction

Recent years have witnessed an increased incidence of caesarean delivery in many European countries and in the United States, where estimates of 15.2% in 1978 are up from 5.5% in 1970¹. Much less is known about these rates elsewhere, particularly in the developing world.

This paper examines selected factors that affect variations in caesarean birth rates in Central and South America. The impact of sociodemographic and medical indicators is considered, as is the mix of emergency and elective caesareans by hospital. Finally, the resource costs of caesarean and vaginal delivery are compared.

Materials and Methods

Data have been collected by means of a Maternity Record developed by the International Fertility Research Program (IFRP) in collaboration with the International Federation of Gynaecology and Obstetrics (FIGO). Participating hospitals complete this record for each

woman admitted. This standardized instrument is designed to obtain information on the mother's sociodemographic characteristics, obstetric history and contraceptive practices. It also covers antenatal care, management of labour and delivery, maternal and perinatal outcome of this index pregnancy and plans for contraceptive use post-partum.

Results

Table 1 shows the wide variation in rates of caesarean birth for participating hospitals reporting at least 1000 deliveries. The lowest of these is for a hospital in San Pedro Sula, Honduras (2.8%), and the highest for one in Campinas, Brazil (49.1%). This disparity in rates is probably the reflection of cultural conditions specific to a particular country, including patient and physician preferences and the hospital type studied, including financial arrangements for care.

Data for four of the hospitals cited in Table 1 are analysed in detail. The basic criteria for selection were size of data base (large enough to permit detailed analyses) and rate of caesarean delivery (a wide range was desired). The hospitals are in Tegucigalpa, Honduras (rate 4.9%, similar to the USA's in 1970), Cumaná, Venezuela (rate 11.8%, similar to the USA's in 1976), Santiago, Chile (rate 21.6%, currently above the USA's), and Campinas, Brazil (rate 41.3%, markedly above the USA's).² The stillbirth and maternal mortality rates reported by these hospitals are shown in Table 2.

The Brazilian maternity hospital is a large facility, whose paying patients defray the cost of their care out of pocket or private insurance. The majority of patients have their costs covered through the social security system, and the remainder are indigent with no medical coverage. The large general teaching hospital in Chile is reimbursed mainly through its public insurance coverage, though there are private patients at this facility. In Honduras, the large maternity hospital is supported by the Ministry of Health. Since there is no charge to the patients, the clientele consists of the indigent; those with medical coverage obtain care at a social security or private hospital. In Venezuela, the large general teaching hospital is essentially supported by the Ministry of Health, so that patients do not pay for their care.

Age and parity

The age distributions are similar in the four hospitals, with approximately 80% less than 30 years old in each hospital. The percentage of women who have not had a previous delivery is higher in Santiago and Campinas - over 35% - than in Tegucigalpa and Cumaná - 30% or less. Figure 1 gives the number of deliveries and proportion of caesareans by age and parity (parity equals live births plus stillbirths, present delivery *not* included) in each of the four hospitals. For each of the parity levels, the percentage of caesareans is higher for older than for younger women in all the hospitals, though the difference is small for grand multiparas in Campinas. Distinctions are most pronounced for nulliparous women, the older patients having caesarean rates 20-30 percentage points above those of the younger.

The Mantel-Haenszel³ procedure is used to test whether, on the average, across hospital and parity levels, the rates of caesarean delivery are the same for the two age groups or are consistently different. This statistic is compared to the χ^2 distribution, with appropriate degrees of freedom, to determine statistical significance. Controlling for each of the parity levels in the four hospitals, the Mantel-Haenszel statistic is highly significant ($P < 0.01$). Furthermore, with the exception of the highest parity level in Campinas, older women have a significantly larger proportion of caesareans at each parity level in each hospital ($P < 0.05$).

TABLE 2. Selected indices of mortality and time in hospital for four hospitals in Latin America

	Tegucigalpa, Honduras			Cumaná, Venezuela			Santiago, Chile			Campinas, Brazil		
	Total	Vaginal	Caesarean	Total	Vaginal	Caesarean	Total	Vaginal	Caesarean	Total	Vaginal	Caesarean
Number of cases	8528	7850	408 (4.9%)	13,586	11987	1599 (11.8%)	5939	4656	1283 (21.6%)	6416	3763	2653 (41.3%)
Still birth rate per 1000 births	12.94	12.87	14.39	18.06	14.72	42.81	13.34	14.28	9.97	9.55	12.37	5.56
Maternal mortality per 1000	0.12	0.13	0	0.59	0.33	2.50	0.34	0.21	0.78	0	0	0
Median nights hospitalized post-partum	1.0	1.0	6.0	1.0	1.0	4.0	3.0	3.0	5.0	3.0	2.0	3.0
Infant deaths before discharge per 1000 live births*	2.43	2.18	7.35	14.91	12.83	30.96	13.74	9.85	27.93	11.96	11.87	12.08
Total foetal neonatal death rate per 1000 total births*†	15.34	15.01	21.58	32.55	27.28	71.56	29.02	26.21	39.11	21.40	23.96	17.80

* These figures, being based upon differing periods of exposure to risk, are not comparable and should be interpreted with caution.

† Includes foetal neonatal deaths where time of death was unknown (which were excluded in the stillbirth and neonatal death rates).

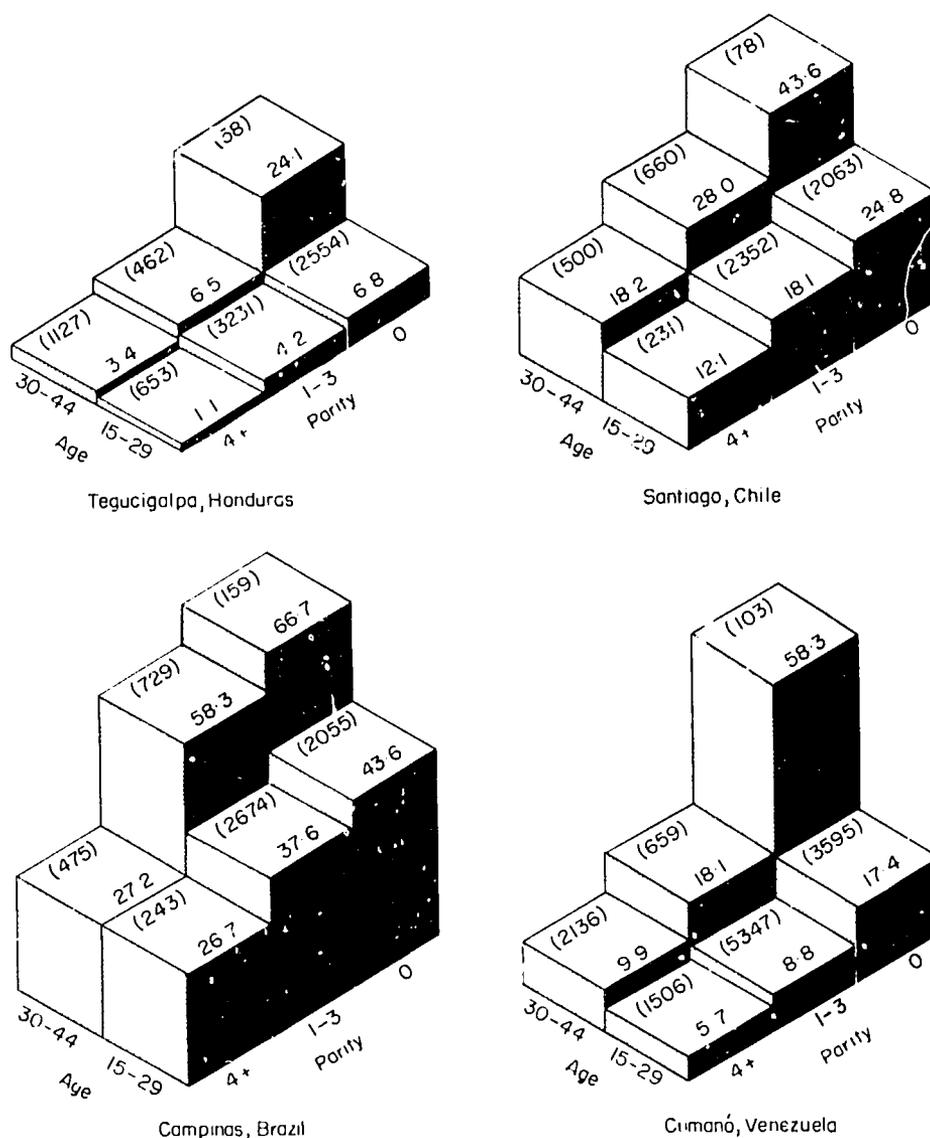


Figure 1. Caesarean delivery by parity and age at four Latin American hospitals (sample size shown in parentheses).

Figure 1 also shows that the percentage of caesarean deliveries decreases with increasing parity in each group of each hospital. Controlling for the two age levels in the four hospitals, the Mantel-Haenszel statistic is highly significant ($P < 0.01$). Additionally, statistically significant inverse associations between percentage of caesareans and parity level were found in each of the eight subpopulations defined by hospital location and age level ($P < 0.05$).

In all four hospitals, the women with the highest rate of caesareans are primiparas over 30 and the lowest rate is for grand multiparas 15-29 years old. Thus, while caesarean rates vary widely between hospitals, within each hospital the same pattern with respect to age and parity holds.

TABLE 3. Percentage of women with indication for caesarean delivery by type of indication, for women with no previous deliveries

Indication	Tegucigalpa, Honduras (%)	Cumana, Venezuela (%)	Santiago, Chile (%)	Campinas, Brazil (%)
Foetal	14.3	32.1	52.2	59.5
CPD	0.0	0.6	8.7	11.4
Obstructed labour	6.4	12.2	7.2	20.3
Prolonged labour	1.0	5.5	4.7	1.2
Foetal distress	4.3	3.5	8.9	11.0
Other*	2.6	10.2	22.7	15.6
Maternal†	2.7	13.7	7.2	13.4
No recorded indication	83.0	54.2	40.6	27.1
N =	2559	3645	2083	2181

* Includes breech, other malpresentations, cord prolapse and failed induction.

† Includes placenta previa, placenta abruptio, toxemia, diabetes, hypertensive disorders, renal disorders, hyper- and hypo-uterine contractions and primipara \geq 35 years of age.

Note: Total is 100%. Women designated as having a more severe indication are coded as having that indication and not for lesser indications.

Table 4. Percentage of women delivering by caesarean, by type of indication, for women with no previous deliveries

Indication	Tegucigalpa, Honduras		Cumana, Venezuela		Santiago, Chile		Campinas, Brazil	
	%	No.	%	No.	%	No.	%	No.
Foetal	45.4	366	37.0	1169	47.2	1088	64.6	1293
CPD	0	0	95.7	23	90.6	181	99.2	248
Obstructed labour	89.0	164	36.2	445	44.4	151	81.2	442
Prolonged labour	11.5	26	26.9	201	35.7	98	53.8	26
Foetal distress	1.8	109	38.5	129	51.1	186	61.0	241
Other*	22.4	67	39.6	371	32.4	472	21.4	341
Maternal†	10.0	70	21.6	501	9.3	150	20.5	292
No recorded indication	0.1	2123	6.4	1975	0.5	845	14.9	591

* Includes breech, other malpresentations, cord prolapse and failed induction.

† Includes placenta previa, placenta abruptio, toxemia, diabetes, hypertensive disorders, renal disorders, hyper- and hypo-uterine contractions and primipara \geq 35 years of age.

Indications for caesarean delivery

In this section, differential rates of caesarean birth are investigated with respect to different indications for caesareans and by the likelihood of performing a caesarean, given any indication. The implications of these two factors for variations in hospital caesarean rates are explored in Tables 3 and 4. This analysis is confined to women who are having their first delivery. The usual practice of examining indications for surgical delivery among

women with no history of caesareans is not followed here. This is because parous women with a proven ability to deliver vaginally are less likely to have indications for caesareans in subsequent deliveries than are women without previous deliveries. Confining the discussion to the latter category eliminates the confounding influence of parity in affecting indications for a caesarean.

Deliveries are categorized by whether there is a recorded indication for a caesarean. If there is an indication recorded, it is further classified as either foetal or maternal. The foetal indications are subclassified as cephalopelvic disproportion, obstructed labour, prolonged labour, foetal distress or other. The category "other" includes breech and other malpresentations, cord prolapse and failed induction of labour. Maternal indications are placenta previa, placenta abruptio, toxemia, diabetes, hypertensive disorders, renal disorders, hyper- and hypo-uterine contractions and primipara ≥ 35 years of age.

The most striking difference among these hospitals is in the proportion of women with no recorded indication for caesareans (among all women regardless of type of delivery), from a high of 83% in Tegucigalpa to a low of 27% in Campinas. The same pattern occurs with respect to foetal and maternal indications, except that in Santiago the percentage with maternal indications is lower than in Cumaná. Specifically, in Honduras cephalopelvic disproportion (CPD) is never reported, is less than 1% in Cumaná, but is 9% in Santiago and 11% in Campinas. The proportion of women with obstructed labour also follows a similar pattern, except that it is higher in Cumaná than in Santiago. When these two categories are combined, as they often are, the pattern is again one of a rising rate, moving from the Honduran to the Brazilian hospital. The proportion with foetal distress also follows this pattern, though with irregularities.

Table 4 shows the percentages of caesareans performed by indication for abdominal delivery. Not only is this proportion (45%) significantly higher in Campinas than elsewhere ($P < 0.01$), but so, too, is the proportion (15%) of women who have caesareans with no reported indication ($P < 0.01$). The rate for maternal indications is significantly lower than that for the foetus in each of the hospitals ($P < 0.01$).

As shown in Figure 2, the proportion of women with reported indications for caesareans increases significantly ($P < 0.01$) with the rate of surgery. It is unlikely that the real range of indications could be as wide as is reported; rather, it may be the likelihood of reporting an indication that varies with caesarean rates. We will return to this hypothesis later.

Emergency versus elective caesarean delivery

Data on indication for the caesarean are limited, so the investigator must resort to other indicators to determine the circumstances influencing the decisions. Variations in the frequency of blood transfusions, the choice of anaesthetic and differences in nights hospitalized by type of delivery are considered.

A blood transfusion suggests an emergency operation. Among the mothers undergoing surgery in Tegucigalpa, 23% received a blood transfusion compared with 4.4% in Cumaná, 10% in Santiago and 3.5% in Campinas. The higher percentage requiring transfusions in the Honduran hospital suggests that emergency patients may make up a much higher percentage of caesareans there than in the other three hospitals.

Figure 3 shows that the percentage of patients with caesarean deliveries who receive a general anaesthetic decreases as the caesarean rate increases. Further, in the Honduran hospital, the proportion given a general anaesthetic is significantly higher ($P < 0.05$) among primary than repeat caesarean patients (25% versus 9%). The greater use of general anaesthetics in Honduras is a reflection of the emergency character of the caesareans. In

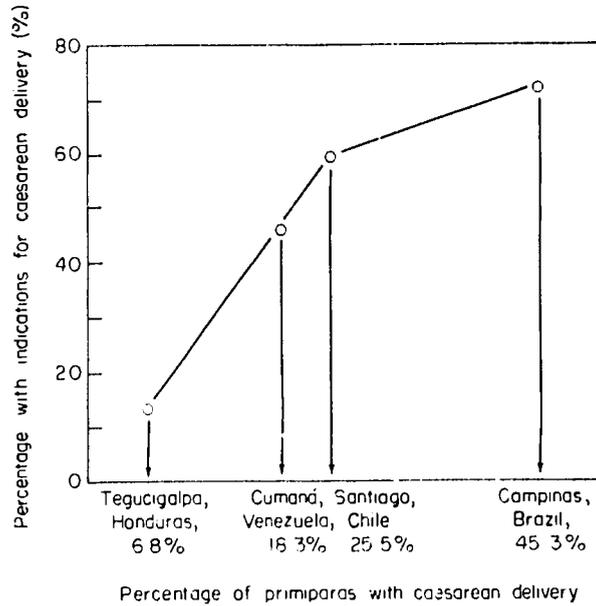


Figure 2. Indication for caesarean delivery for primiparas at four Latin American hospitals.

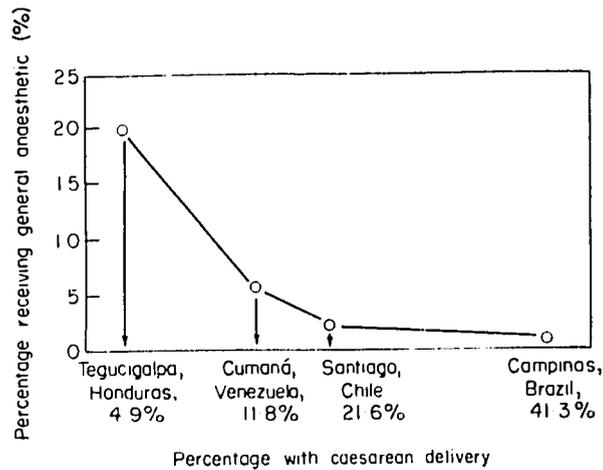


Figure 3. General anaesthesia and caesarean delivery at four Latin American hospitals.

general, anaesthesiologists prefer spinal anaesthetics, but use general anaesthetics in emergencies, especially those involving haemorrhages with some type of shock. Thus, their use would be expected to be greater the higher the proportion of emergencies among all caesarean births, and indeed a greater proportion of primary, as compared to repeat, caesareans are expected to be emergencies.

In the three hospitals with higher rates of abdominal delivery, the similarity in use of anaesthetics among primary and repeat cases indicates similar treatment of the two groups

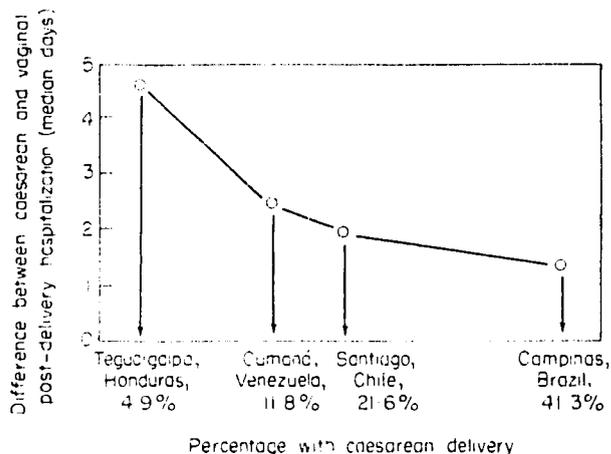


Figure 4. Differential maternal post-partum hospitalization and caesarean delivery at four Latin American hospitals.

of patients, suggesting that emergency cases do not constitute the preponderance of caesarean deliveries. The percentages of women receiving general anaesthetics for primary and repeat caesarean deliveries at the three hospitals are, respectively, as follows: Cumaná (6.4% vs. 6.8%), Santiago (3.8% vs. 2.8%), Campinas (0.2% vs. 0.0%).

Perhaps the best overall indication of the relative contribution of emergency caesareans to the total of caesareans is found in the differences in median nights hospitalized between women delivered by caesarean and those delivered vaginally. The difference estimates the additional contribution that caesarean delivery makes to length of hospital stay. As shown in Figure 4, the difference in the median values of caesarean and vaginal post-delivery hospitalization decreases as the rate of caesareans increases. This, too, provides indirect evidence that caesarean patients in hospitals with low caesarean delivery rates required emergency care whereas those in hospitals with higher rates generally did not. In Honduras, where women are rarely hospitalized for more than one night for regular delivery, the long stay of caesarean patients (median stay is 5.3 nights) is a strong indication of the medical problems that necessitated it. In contrast, it may be inferred from the small difference in Campinas that many caesareans are elective.

Although the proportion of women having medical indications for a caesarean increases with its rate, the proportion of caesareans that are emergency cases (using the indicator difference in median nights hospitalized between women delivered vaginally and abdominally) decreases significantly with the rate of caesareans ($P < 0.05$). Reported medical indications for this surgery by hospital may therefore be of limited use in explaining the wide variation in the rates. Although every caesarean is indicated in the eyes of the physician performing it, variations in practices of reporting those indications may be so great as to make these data of little use in arriving at an understanding of the cause of such a great diversity in caesarean rates.

Costs of caesarean versus vaginal deliveries

The extra cost of performing a caesarean compared with a vaginal delivery may be assessed by calculating the extra resources entailed in the surgery. The total savings would, of course,

be greater the higher the caesarean rate. Therefore, the reductions could be greater in Campinas than in the other hospitals.

These calculations are based on the assumption that the average patient having a caesarean delivery is the same at all four hospitals. In practice, as we have argued in the preceding section, women delivered abdominally in Tegucigalpa are more likely to be emergency patients than in Campinas. Consequently, if the caesarean rate in Tegucigalpa were to be reduced, costs might even increase. For example, if among those cases in which a caesarean is performed to stop haemorrhaging and save the lives of the mother and the foetus, a vaginal delivery were to be performed, not only would the survival chances of the mother and child be compromised, but also, additional blood loss might lead to an increase in blood administered. With this caveat in mind, we assess the following resource savings: (1) anaesthetics, (2) blood transfusions, (3) nights hospitalized, (4) attendants at delivery.

For the four hospitals, the difference in the percentage of women receiving anaesthetics by type of delivery decreases as the percentage of women having a caesarean increases. It appears that hospitals that intervene by performing caesareans also intervene by administering anaesthetics to women delivering vaginally. In Campinas, only 18% of these non-surgical patients receive no anaesthetic, as compared with 33% in Santiago and over 50% of the same groups in Cumana and Tegucigalpa. As a consequence of its greater use during vaginal deliveries in hospitals with high caesarean rates, the cost savings of decreasing the number of caesareans is diminished.

The cost savings with respect to reducing blood transfusions and nights hospitalized are also less in hospitals with higher caesarean rates, because their average caesarean patient neither spends much more time in hospital nor is very much more likely to receive a blood transfusion than is the woman with a vaginal delivery. But, as discussed earlier, it is probably only in the hospitals with the higher caesarean rates that the cost savings can be realized without endangering the life of the mother and or child.

In almost every case, an obstetrician or gynaecologist is the primary attendant at a caesarean birth. In contrast, many vaginal deliveries in Tegucigalpa and Campinas are attended by medical students, so that cost savings will vary, depending on who is in attendance.

Paradoxically, we then find, in considering the average patient, both vaginal and caesarean, that eliminating "excess" caesarean deliveries has little impact on cost savings per patient in hospitals that do fewer caesareans because hospitals with a high rate tend to intervene in many ways (e.g. use of anaesthetic and the attendance of an obstetrician-gynaecologist at vaginal delivery). In hospitals with low rates, the calculated potential cost savings are not borne out in practice. Women with caesareans have more medical problems than the other mothers. Consequently, reductions in caesareans may be costly in terms of lives, and perhaps, also, of resources. If we could compare similar women, we would have a better picture of cost savings. But the data on indications are not reliable enough to "select" women with similar medical indications for surgical delivery.

Summary and Conclusions

Data collected by the HRP through the use of a Maternity Record show a wide variation in rates of caesarean delivery in 20 Latin American hospitals from a low of 2.8% in a Honduran hospital to a high of 49.1% in a Brazilian one.

The role of sociodemographic and medical factors in affecting variations in caesarean rates has been explored for four of these hospitals. With respect to age and parity, these rates were highest among older women with first deliveries in each of the four hospitals.

Although the percentage of women with medical indications for caesarean increases with the caesarean rate, other data suggest that documented medical indications are of limited value in explaining variations in these rates. The proportion that may be classified as emergency decreases with the caesarean rate. Hospitals that do not customarily perform this surgery may be reluctant or simply unaccustomed to classifying women as having indications for caesarean unless there are grounds for believing that the mother and/or child would be jeopardized by a vaginal birth. In hospitals with higher rates, the operation is more routinely practised and physicians may classify more women as having medical indications for surgical deliveries.

Even though the data suggest that costs could be reduced if the caesarean rate fell, these findings are somewhat illusory. Where caesareans are not a matter of routine, these patients are expensive emergencies, but hospitals in which caesareans are common practice are geared to special care of their patients. Consequently, the vaginally delivered patient is also carefully attended.

The feasibility of reducing caesarean deliveries at hospitals with low rates is open to question. In fact, it may be argued that additional resources should be devoted to increasing the number of caesareans at the Honduran hospital. In Campinas, however, some cost savings might be realized without endangering the health of mother or child.

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Ischaemic Heart Disease – The Long Term Outlook

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Case records and death certificates of 136 patients admitted to hospital following acute coronary artery disease were retrospectively studied after intervals of 14–21 years. The treatment policy had included anticoagulants for at least 12 months where clinically appropriate, and a programme of rest, rehabilitation and out-patient review. There were three times as many men as women, the latter being older and with a worse prognosis.

Over the first 10 years of follow-up survival rates of patients diagnosed as having myocardial infarction were substantially less than those for ischaemia patients, due in part to an excess of deaths among the former group of patients aged 65–74 years on admission; after 15 years the proportions of surviving patients were virtually the same (approximately one-third).

Patients initially treated with anticoagulants had substantially higher survival rates from 7 years onwards than patients not so treated; standardization for age confirmed this finding for male patients but not for female patients. There was no indication of a higher mortality from deaths from other causes (including neoplastic disease) amongst those patients treated with anticoagulants compared with others.

Deaths from cardiovascular disease predominated throughout the period and for each sex there was a highly significant excess of such deaths over those expected for the general population with the same age composition. However, after the first 10 years there was no significant excess for men; and considering all causes of death the observed and expected numbers were equal for men for this period of follow-up.

Introduction

A patient who survives an attack of acute myocardial ischaemia or infarction, whether symptoms persist or not, is regarded as having ischaemic heart disease, and consequently to be at increased risk of recurrence or deterioration, and of reduced life expectancy. It may be difficult to evaluate the magnitude of this risk, how frequently it occurs, and for how long it persists. The hope that prospects for recovery might be improved by treatment and life expectancy increased by long term management has been only partially realized, though the overall prognosis has improved since the advent of coronary care and resuscitative facilities.

In an attempt to assess the long-term outcome a retrospective review was undertaken of