ARTICLE

The effect of restructuring of health care services on caesarean section rates

Medical Research Council/ University of KwaZulu-Natal, Pregnancy Hypertension Research Unit and Department of Obstetrics and Gynaecology, Nelson R Mandela School of Health Sciences, University of KwaZulu-Natal, Durban

Fathima Paruk, MB ChB, FCOG

Jaymala Devjee, MB ChB

Jack Moodley, MB ChB, FCOG, MD

Objective. To review the anticipated changes in caesarean section (CS) rates following the restructuring of maternity health care services from regional to district level.

Hypothesis. A change in provision of maternity services from regional to district level results in a decline in the CS rates.

Method. A retrospective audit was undertaken of CS rates 3 months before and 3 months after the 'down-scaling' of obstetric services from regional to district level at Addington Hospital, Durban. In addition the booking status of patients, indication for the CS, appropriateness of the CS decision and perinatal outcome were evaluated.

Results. Despite a 32% reduction in the total number of deliveries, the CS rate was essentially unchanged following the restructuring of the obstetric service (24.6% and 22.9% for the two periods respectively). The proportion of CSs for complicated high-risk cases declined from 9.62% to 4%. The perinatal mortality rate decreased from 84.5/1 000 to 59.4/1 000 deliveries. An inappropriate decision for a CS was made in one-third of the cases.

Conclusion. The restructuring of the health service and decline in the number of high-risk patients seen should have resulted in a decline in the CS rate. Lack of change in the latter may suggest possible influence of the skill of the health care providers.

A caesarean section (CS) is often regarded as a simple, routine and common procedure in obstetric practice. However it is a major surgical procedure. The performance of CS has the potential to impact adversely not only on an individual level (serious morbidity and mortality)[1] but also more widely on social, cultural and economic levels. The rise in incidence of CS is therefore a cause for concern for both affluent societies and under-resourced countries.[2,3] There is a strong body of opinion that CS should only be performed when there are stringent obstetric indications, in order to prevent the spiralling rise in CS rates, without a concurrent reduction in perinatal mortality figures.

However it is important to recognise that CS rates are influenced by a multitude of factors. These include patient profile, available resources, experience/skill of the health care provider and the levels of health care provided by an institution. One would expect lower levels of health care to have lower CS rates than higher levels of health care. To the best of our knowledge such data are not available for the Durban functional region (DFR). Indeed, such data may be of use to health care planners and health care providers. The recent reorganisation of maternity services in the DFR afforded us a window of opportunity to investigate CS rates at 2 levels of care, viz. district and regional. The purpose of this study, therefore, was to view the anticipated changes in CS rates following restructuring of maternity health care services from regional to district level.

Method

This study was conducted at Addington Hospital, Durban. Before 1 July 2002, Addington Hospital provided a regional health level of maternity service to central Durban. In addition it functioned as a referral centre for the north and north-western suburbs and townships of Durban. The hospital also provided neonatal and maternal intensive care

facilities, and was staffed by advanced midwives, medical officers and specialist obstetricians.

From 1 July 2001, the facility was restructured to provide care at a district level. District hospitals usually provide obstetric services for patients with uncomplicated pregnancies and/or minor obstetric disorders. The maternity service is provided by advanced midwives and medical officers. Specialist opinion or assistance is available in emergency situations and in addition a specialist may visit the hospital on a regular basis. Complicated cases are referred to a newly appointed regional hospital. Regional hospitals provide obstetric services for normal healthy uncomplicated pregnancies and complicated obstetric cases. The maternity service is provided by advanced midwives, medical officers and specialist obstetricians.

The prospective study was performed over 2 time intervals. The first interval spanned the period 1 April 2001 - 30 June 2001. During this period the health care services were reflective of a regional level of care. The second time interval, reflecting a district level of health care, included the period 1 August 2001 - 31 October 2001. The transition from regional to district hospital was effected on 1 July 2001. The month of July 2001 was omitted from the study as it represented a transition period. The time periods representing regional and district levels of health care are referred to as interval 1 and interval 2 respectively.

Data collected included total number of deliveries, booking status of the patient, mode of delivery, indication for CS and perinatal outcome. As the maternity service is midwife and medical officer 'driven', additional data related to CS decision-making (level of experience of health care worker and appropriateness of the decision) were recorded for the month of October 2001. The indication for each CS was reviewed by one of the authors (FP). Each CS was subsequently classified as being appropriately or inappropriately indicated. For the purposes of this study poor progress was defined as the failure of appropriate cervical dilatation and/or fetal head descent in the presence of adequate uterine activity. Fetal distress was diagnosed in the presence of repeated or continuous cardiotocographic abnormalities.

Data analysis included the calculation of CS and perinatal mortality rates. Data are expressed in numbers and percentages.

Results

Table I shows that the total number of deliveries during intervals I and 2 were 2 070 and 1 409 respectively. This represents a 32% reduction in the number of deliveries following the restructuring of services. For the 2 intervals the vaginal delivery rate (74.5% and 76.3%) and the assisted vaginal delivery rate (0.9% and 0.8%) remained essentially unchanged. The overall CS rates for intervals 1 and 2 were 24.6% and 22.9% respectively. The proportion of elective and emergency CSs was similar for both intervals.

Table I. Total deliveries and mode of delivery (*N*)

Parameter	Interval 1	Interval 2
Total deliveries	2 070	1 409
Vaginal delivery rate (%)	1 543 (74.5)	1 075 (76.3)
Assisted vaginal delivery rate (%)	18 (0.9)	11 (0.8)
Caesarean section rate (%)	509 (24.6)	323 (22.9)
Emergency CS	131 (25.7)	76 (24)
Elective CS	378 (74.3)	247 (76)

Table II. Birth weight

	Interval 1	Interval 2
Birth weight	***N* = 2 070 (%)**	***N* = 1 409 (%)**
500 - 999	21 (0.1)	9 (0.6)
1 000 - 1 499	36 (1.6)	12 (0.9)
1 500 - 1 999	84 (4.1)	37 (2.6)
2 000 - 2 499	191 (9.2)	107 (7.6
> 2 500	1 738 (84)	1 244 (88.3)

Table III. Booking status of patients (%)

Booking status	Interval 1	Interval 2
Addington Hospital	24.3	25.5
Referral facility	67.4	65.2
Unbooked	8.4	9.3

Table II shows that the proportion of very-low-birth-weight babies (1 500 - 1 999 g) declined from 4.1% to 2.6% and that the proportion of extremely low-birth-weight babies (1 000-1 499 g) decreased from 1.6% to 0.9%. It is evident from Table III that the booking status of the patients was similar for both intervals. In essence, over 70% of the patients had received some form of antenatal care on at least 3 occasions.

The indications for CSs are compared for the 2 intervals in Table IV. The proportion of CSs performed for cord prolapse, failed vaginal birth after CS, multiple pregnancy and fetal distress remained similar for both intervals. The proportion of CSs for complicated high-risk cases (such as abruptio placentae, diabetes mellitus and hypertensive disorders of pregnancy) declined from 9.2% to 4%. The proportion of CSs performed for poor progress in labour rose from 16% to 24.5%. The proportion of CSs performed for the presence of 2 or more previous CSs increased from 10% to 15%. The proportion of major malpresentations decreased from 6.7% to 3.7%.

The perinatal mortality rate (Table V) decreased from 84.5/1 000 to 59.4/1 000 deliveries, while the low birth weight rate declined from 46.8% to 35.3%.

Table IV. Indication for emergency and elective caesarean section (%)

Indication	Interval 1 (*N* = 509)	Interval 2 (*N* = 323)
Poor progress	16	24.5
Fetal distress	44	40.3
Cord prolapse	0.7	0.6
Failed VBAC	12	11
Two or more previous caesarean sections	10	15
Complicated high risk*	9.62	4
Multiple pregnancy	1	0.92
Major malpresentation	6.7	3.7

*Uncontrollable hypertension, abruptio placentae, diabetes mellitus, eclampsia.
VBAC = vaginal birth after caesarean section

Table V. Perinatal mortality rate (PNMR) and low birth weight rate (LBWR)

Parameter	Interval 1	Interval 2
PNMR/1 000 deliveries	84.5	59.4
LBWR (%)	46.8	35.3

Table VI. Level of skill of health care workers and appropriateness of caesarean section decisions

Level of skill	Decisions (N)	Appropriate decision (%)	Inappropriate decision (%)
Nursing sister	10	50	50
Intern	15	53.3	46.7
MO < 2 years	18	61.1	38.9
MO > 2 years	31	83.9	16.1
Total	74	66.7	33.3

MO = medical officer.

Table VI reflects data on the appropriateness of CS indications. The table illustrates that appropriate decisions were made in 66.7% of cases. Medical officers with more than 2 years' experience made an appropriate decision in 83.9% of situations. The overall data for the period show that irrespective of the level of skill, an inappropriate decision for CS was made in one-third of cases.

Table VII reflects data on the subset of patients who had a CS performed for poor progress in labour. An inappropriate decision for CS was made in 45.5% of cases. Medical officers with 2 or more years of obstetric practice experience made an appropriate decision in 85.7% of situations.

CS decisions made by nursing staff and interns were re-evaluated in theatre by the surgeon (medical officer). During the study period (1 month) no patient taken to theatre was returned to the delivery suite in the labour ward for an attempt at vaginal delivery. CS decisions were made by nurses or interns in scenarios where the medical officer was unavailable, i.e. s/he was either operating in theatre or attending to another emergency.

Table VII. Subanalysis of caesarean sections performed for poor progress with or without CPD or fetal distress (*N* = 22)

Level of skill	Number of decisions	Appropriate decision (%)	Inappropriate decision (%)
Nursing sister	4	50	50
Intern	2		100
MO < 2 years	9	44.4	55.6
MO > 2 years	7	85.7	14.3
Total	22	54.5	45.5

CPD = cephalopelvic disproportion.

Discussion

The 32% decline in total deliveries was not unexpected, as high-risk patients are now referred to appropriate levels of care. Similarly, the decline in the proportion of low-birth-weight babies and the concomitant improvement in the perinatal mortality rate were anticipated, and were confirmed by data from this study. The anticipated decline in the CS rate, however, was not demonstrated by the data. The CS rates have essentially remained static. This is also true for the subsets of emergency and elective CS. The current CS rate of 22.9% is similar to the 20% CS rate at Northdale Hospital (T R Moodley – personal communication), a district hospital in Petermaritzburg. Nonetheless, it is lower than the 45% CS rate at the tertiary and academic King Edward VIII Hospital obstetric unit departmental statistics, 2004. The high CS rate at King Edward VIII Hospital is probably a reflection of the unit's status as a referral centre for complicated cases.

The decline in CS performed for high-risk cases is considerable (from 9.62% to 4%). However the ultimate aim should be that no high-risk CS be performed at district level. Although an increase in the proportion of CS performed for indications other than high-risk cases is necessary (to compensate for the decline in CS for high-risk cases), there appears to be a disproportionate increase in the incidence of CS performed for poor progress (from 16% to 24.5%).

CSs are influenced by a multitude of factors including level of health care (administrative factor), patient population and the skill of the health care provider. It is also important to ensure that CS rates do not decline at the expense of a rise in the perinatal mortality rate. In this study the profile of the patient population changed with regard to a single factor, i.e. the proportion of high-risk patients declined. The

restructuring of the health service and the decline in the number of high-risk patients seen should therefore result in a decline in the CS rate. Lack of change in the latter therefore suggests possible influence of the skill of the health care providers at the institution.

The analysis of data for a 3-month period following the introduction of a restructured health service appears to provide some explanation for the unexpected results.

It is evident from the data that approximately one-third of CSs were not indicated at the time they were performed. Furthermore it is also evident that CS decision-making was influenced by level of experience in obstetric practice. The fewest inappropriate decisions were made by medical officers with at least 2 years of obstetric service. This pattern was reinforced in the subset of patients undergoing CS for poor progress. In this group of patients inappropriate decisions for CS were made in 45.5% of cases. This information is not surprising. Decisions for CS often require a risk-benefit assessment. In addition the diagnoses of 'poor progress' and 'fetal distress' are observer-dependent. As such skill and level of experience in obstetric care have the potential to influence CS decision-making.

Although the results of the study do not show the anticipated decline in the CS rate, they nevertheless provide important information – which may be utilised to effect further improvements in the quality of the obstetric services being provided.

It is vital that decisions related to the need for CS be delegated to appropriately trained medical officers. There is a need to valuate staff norms to correct these if necessary, and to institute continuing medical education programmes related to appropriate decision-making on CS. A subsequent audit of the CS and perinatal mortality rate would be of value.

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