Secular trends in caesarean section rates over 20 years in a regional obstetric unit in Hong Kong

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ABSTRACT

Introduction: Although caesarean section rates have been increasing over the years in both public and private sectors in Hong Kong, there has been a paucity of formal surveys on local trends in such rates. This study aimed to examine the trends in caesarean section rates over a 20-year period at a public regional obstetric unit in Hong Kong using the Robson's Ten-group Classification System.

Methods: All deliveries in a single obstetric unit during a 20-year period (1995-2014) were classified into 10 subgroups according to the Robson's classification. The annual caesarean section rate for each subgroup was calculated and then stratified into 5-year intervals to analyse any significant trends.

Results: The caesarean section rates in a total of 86 262 births with complete data were analysed. The overall caesarean section rate increased modestly from 15.4% to 24.6% during the study period. There was an obvious increasing trend for caesarean section in those with previous caesarean section (Robson's category 5), breech presentation at delivery (category 6 and 7), multiple pregnancy (category 8), and preterm labour (category 10). A gradual fall in caesarean section rate from 14.4% to 10.8% was seen in primiparous women with term spontaneous labour (category 1). Statistically significant differences (P<0.001) in these trends were confirmed when the data were stratified into 5-year intervals for comparison.

Conclusion: The rising caesarean section rate may be associated with clinical management policies that allow women with relative risk factors (such as breech, previous caesarean section, or multiple pregnancy) to opt for caesarean section. This rise was counterbalanced by a decrease in primary caesarean section rate in primiparous women with spontaneous labour. The trend for caesarean section was more in line with patient expectations rather than evidence-based practice.

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New knowledge added by this study

- Pregnancy with previous caesarean section (CS) was the principal contributing factor to rising CS trend.
- In addition, a significant increase in CS rate was observed in those with breech presentation, multiple pregnancy, and preterm labour.

Implications for clinical practice or policy

- To reverse this rise, policies should aim to reduce CS rate for first births by adopting external cephalic version and safe vaginal delivery technique for twins. Vaginal delivery after previous CS can be promoted to reduce repeat CS.
- The results of this study should encourage obstetric units to audit their own CS trends using the Robson's classification, analyse the extent of rise for each class, identify areas for improvement, and institute appropriate changes in clinical practice.

Introduction

The crude rate of caesarean section (CS) deliveries is considered an important global indicator when measuring access to obstetric care.[1] Previous ecological analysis in primitive lower-income countries revealed that with the introduction of safe CS deliveries, small increases in CS rates, if performed in women with a medical indication, could dramatically reduce maternal and newborn mortality.[1-3] On the other hand, CS rates in developed countries have risen steeply since the 1970s and 1980s[4] without any obvious evidence of significant improvements in pregnancy outcome.[1,5] High CS rates have since been an issue of international public health concern. In 1985, the World Health Organization (WHO) stated that there was no justification for any region to have a CS rate higher than 10% to 15%.[6] There is a lack of scientific evidence of any substantial maternal or perinatal benefit from increasing CS rates and some studies contrarily have shown that higher rates may be associated with negative consequences to maternal and child

health.[7,8] Despite this, CS rates have continued to increase worldwide in middle- and high-income countries. The WHO-recommended upper limit of 15% has been grossly exceeded by most centres in developed countries over the last two decades.[9]

The lack of a standardised classification system to facilitate monitoring and comparison of CS rates in a consistent and action-oriented manner is one of the factors that makes changes to CS trends difficult to understand.[10] Previous discussions often focused on total CS rates and did not yield information about the underlying reasons. The Robson's Ten-group Classification System is one of the best methods that fulfils current international and institutional needs to monitor and analyse CS rates.[11] The classification system divides women into 10 groups based on basic epidemiological and obstetric characteristics, including parity, previous uterine scar, preterm (<37 weeks) or term delivery, fetal presentation, singleton or multiple pregnancy, or whether labour is spontaneous or induced. The actual indication for CS is not needed for such categorisation. As the groups are totally inclusive and mutually exclusive, the classification system can be applied prospectively. All women who present to the labour ward for delivery can be promptly classified based on these readily available parameters. Specifically, these categories are[11]:

(1) Primiparous women with a single cephalic pregnancy, ≥37 weeks' gestation, in spontaneous labour;
(2) Primiparous women with a single cephalic pregnancy, ≥37 weeks' gestation, who have induction of labour or CS prior to labour onset;
(3) Multiparous women without a previous uterine scar, with a single cephalic pregnancy of ≥37 weeks' gestation in spontaneous labour;
(4) Multiparous women without a previous uterine scar, with a single cephalic pregnancy of ≥37 weeks' gestation, with induction of labour or CS prior to labour onset;
(5) Multiparous women with one or more previous uterine scar(s) and a single cephalic pregnancy of ≥37 weeks' gestation;
(6) Primiparous women with a single breech pregnancy;
(7) Multiparous women with a single breech pregnancy, with/without previous uterine scar(s);
(8) Women with multiple pregnancies with/without previous uterine scar(s);
(9) Women with a single pregnancy with a transverse or oblique lie, with/without previous uterine scar(s); and
(10) Women with a single cephalic pregnancy at ≤36 weeks' gestation.

Despite this increase in CS rates over the years in both public as well as private sectors, there has been a paucity of formal surveys on trends in CS rates in Hong Kong. This study attempted to analyse the secular trends in CS rates over 20 years at a single public tertiary training obstetric unit serving a stable population of around 0.7 to 1 million in the Kowloon East area. Applying the Robson's classification to the data should allow identification of the subgroup(s) that are predominantly contributing to the steady increase in overall CS rate. The results of this study should determine whether the increase in CS rates is genuinely due to changes in patient epidemiology and risk factors or merely to changes in obstetric management.

香港一所分區醫院婦產科部門在20年期間剖腹產率的變化趨勢分析

鍾慧衡、江采華、杜榮基

引言：香港公立和私家醫院的剖腹產率多年來都不斷上升，可是相關的趨勢調查研究卻很有限。本研究採用Robson十組分類法探討香港一所分區醫院婦產科部門在20年期間剖腹產率的趨勢。

方法：根據Robson十組分類法分析由1995至2014年的20年期間一個婦產科部門所有的分娩紀錄。計算每組每年的剖腹產率，然後以5年為一個周期時段分析是否有明顯趨勢。

結果：分析完整數據共86 262例。研究期間，總剖腹產率由15.4%溫和上升至24.6%。剖腹產率在以下組別增長趨勢較為明顯：有剖腹產史（Robson分類第5組）、臀位分娩（第6、7組）、多胎妊娠（第8組）和早產（第10組）。單胎自然臨產（第1組）的剖腹產率則從14.4%逐漸下降到10.8%。把數據以5年為一周期的時段再進行比較時，以上各項趨勢仍達至顯著統計學差異。

結論：臨床管理政策容許有相對風險因素的產婦（如臀位分娩、有剖腹產史或多胎妊娠）選擇剖腹產可能與剖腹產率上升相關。這抵消單胎自然臨產婦女剖腹產率的下降。剖腹產的趨勢更符合產婦的期望，而非因循證醫學證據的支持。

Methods

The obstetric data from a single obstetric unit (United Christian Hospital, Kwun Tong) for the last 20 years (1995-2014) were retrieved from the Hospital Authority (HA) Obstetrics Clinical Information System. The annual data were supplied to the unit in an anonymous format with only secondary identifiers such as medical record number and hospital number. After compiling this 20-year database, basic patient characteristics that could constitute important epidemiological risk factors, such as the proportion with advanced maternal age of >35 years, percentage with previous CS or other uterine scars, induction of labour and multiple pregnancies, were calculated over the study period.

All cases that underwent CS in our unit during the study period were classified into one of the 10 groups according to the Robson's classification,[10,11]

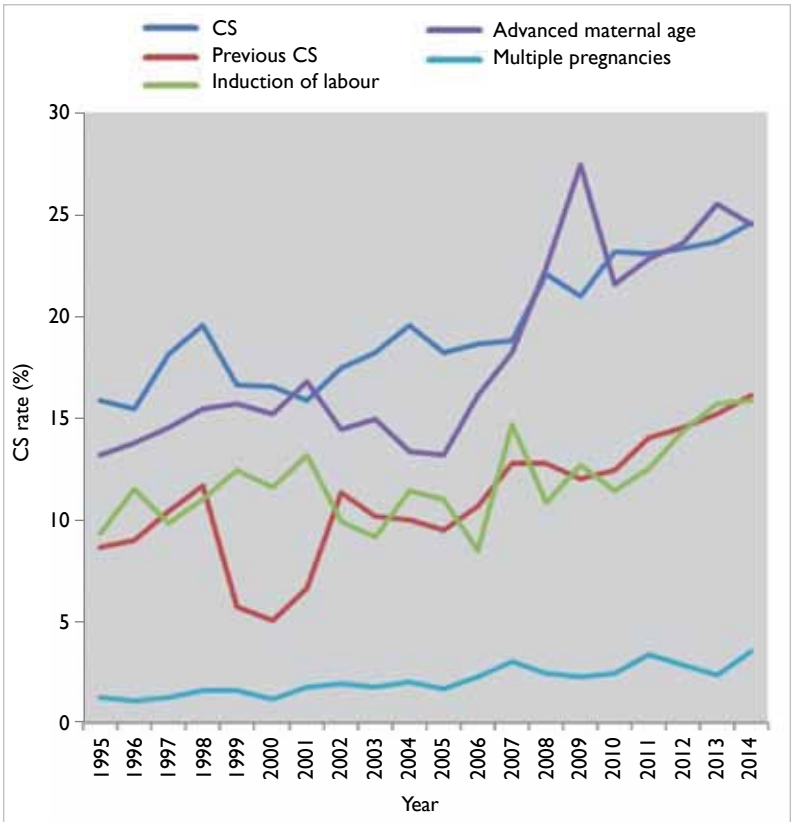

FIG 1. Trends in CS rates of major epidemiological risk factors from 1995 to 2014
Abbreviation: CS = caesarean section

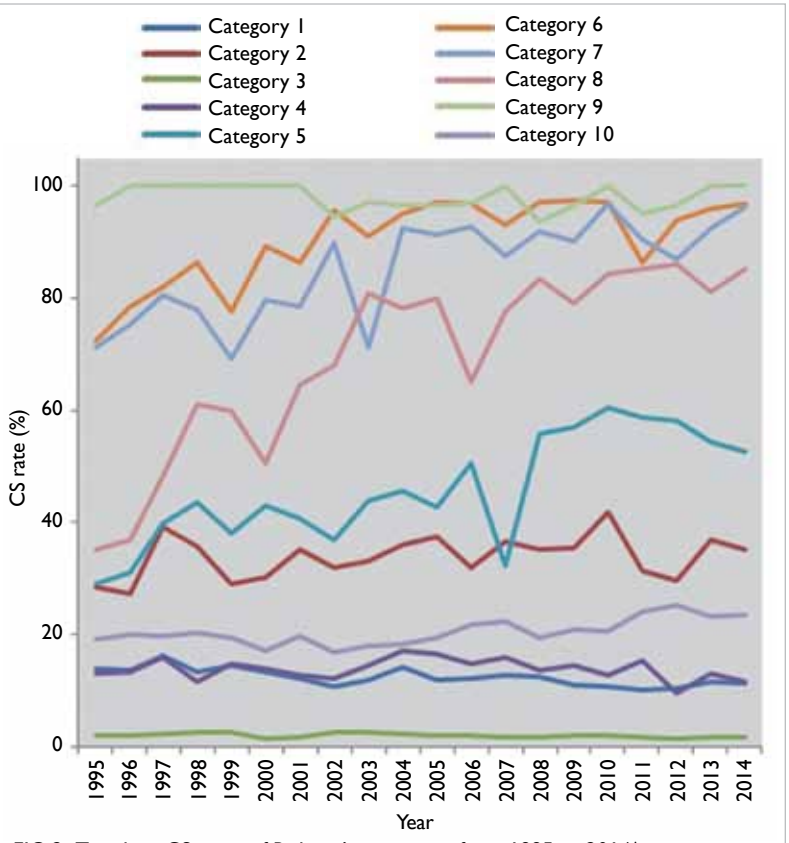

FIG 2. Trends in CS rates of Robson's categories from 1995 to 2014*
Abbreviation: CS = caesarean section
* Robson's categories are listed in the Table

using prior characteristics or risk factors before delivery, including primiparous versus multiparous, preterm versus term, induction of labour versus spontaneous labour, cephalic presentation versus breech or other non-cephalic presentation, singleton versus multiple pregnancy, and previous uterine scar versus no previous scars. The CS rate of each of the 10 subgroups was then calculated for each year, and the trends and changes in the rate over the 20 years were examined. The total number of patients in each category was then stratified into four 5-year intervals to compare the four periods using 4 x 2 contingency tables and Mantel-Haenszel Chi squared tests for linear trends for each category. A P value of <0.05 was considered statistically significant. Significant trends identified in each category were then compared with observable trends in patient epidemiological factors over the same period of time. This study was approved by the Kowloon Central/Kowloon East Ethics Committee Board.

Results

There were 86 262 births and 17 140 CSs from January 1995 to December 2014. The annual number of deliveries over the 20 years ranged from 3350 in 1995 to 5648 in 2011. The overall CS rate increased modestly from 15.4% in 1996 to 24.6% in 2014. Parallel with the gradual increase in overall CS rate, the proportion of elective CS compared with emergency CS also gradually increased from 25%-30% for 1995-2000 to 40%-45% for 2010-2014, indicating that an increasing number of CS were performed electively and the decision was made well ahead of labour, rather than as an emergency in the intrapartum period. There were significant increases in the proportion of women with previous CS (lowest 5% in 2000 to 16.2% in 2014), advanced maternal age of >35 years (lowest 13.2% in 1995 to 24.5% in 2014), induction of labour (lowest 8.5% in 2006 to 15.9% in 2014), and multiple pregnancies (1.1% in 1996 to 3.6% in 2014) during the study period (Fig 1). The crude perinatal mortality rate also fluctuated between 2.6 and 5.3 per 1000 deliveries; the adjusted perinatal mortality rate (excluding those major congenital malformations and birth weight of <750 g) also varied with an excursion of 1.9 and 3.5 per 1000 deliveries. Due to the small number variations with absolute crude perinatal mortality ranging between 10 and 27 per year, however, no obvious trends were identified during the study. The maternal mortality rate was lower than 5 per 100 000 pregnancies throughout the two decades with many years recorded as zero, so no trends could be observed due to the small variations.

Comparison of the trend in Robson's categories 1 to 4 for primiparous and multiparous women with term spontaneous labour (category 1 and 3) or induced labour or elective CS (category 2 and

4) revealed that the group of primiparous women with term spontaneous labour (category 1) had a consistent and gradual fall in CS rate from 14.4% to 10.8%, while the group of multiparous women with term spontaneous labour (category 3) also had a slight fall from 2.1% to 1.6%. The other categories remained quite stable (Fig 2). On the contrary, obvious trends showing a dramatic increase in CS rate were observed in those with previous CS (category 5, from 29% to 61%), breech presentation at delivery (category 6 and 7, primiparous from 72% to 97% and multiparous from 69% to 96%), and multiple pregnancy (category 8, from 35% to 86%). Although the CS rate for abnormal lie or malpresentation other than breech (category 9) approached 100% throughout the period and therefore displayed no significant trend, a subtle increase in CS rate was seen in those with preterm labour (category 10, from 17% to 25%) [Fig 2]. The data were then stratified into 5-year intervals and the CS rate for each category compared using a 2 x 4 contingency table. The above observed trends were confirmed to be statistically significantly different with P<0.05 for categories 1, 5, 6, 7, 8 and 10 (Table).

TABLE. Comparison of CS rates in the Robson's Ten-group Classification System for 5-year intervals between 1995 and 2014

	No. (%) of patients				
	1995-1999	**2000-2004**	**2005-2009**	**2010-2014**	**P value (Chi squared test for trend)**
No. of deliveries	17 600	19 603	24 506	24 553	-
No. of CSs	3008 (17.1)	3455 (17.6)	4898 (20.0)	5779 (23.5)	<0.001
Robson's categories*					
Category 1	6339	7511	9003	8225	
Category 1 with CS	911 (14.4)	941 (12.5)	1073 (11.9)	888 (10.8)	<0.001
Category 2	919	1158	1515	2092	
Category 2 with CS	299 (32.5)	384 (33.2)	588 (38.8)	732 (35.0)	0.12
Category 3	5941	6260	7541	6542	
Category 3 with CS	127 (2.1)	129 (2.1)	139 (1.8)	106 (1.6)	0.02
Category 4	857	865	834	1122	
Category 4 with CS	131 (15.3)	120 (13.9)	124 (14.9)	139 (12.4)	0.09
Category 5	1560	1701	2816	3521	
Category 5 with CS	573 (36.7)	716 (42.1)	1349 (47.9)	2006 (57.0)	<0.001
Category 6	360	379	507	518	
Category 6 with CS	285 (79.2)	348 (91.8)	480 (94.7)	486 (93.8)	<0.001
Category 7	295	278	348	397	
Category 7 with CS	221 (74.9)	230 (82.7)	296 (85.1)	367 (92.4)	<0.001
Category 8	273	358	569	711	
Category 8 with CS	133 (48.7)	245 (68.4)	441 (77.5)	603 (84.8)	<0.001
Category 9	151	178	164	160	
Category 9 with CS	150 (99.3)	174 (97.8)	158 (96.3)	157 (98.1)	0.28
Category 10	905	915	1209	1265	
Category 10 with CS	178 (19.7)	168 (18.4)	250 (20.7)	295 (23.3)	0.01

Abbreviation: CS = caesarean section

* Ten categories are:

(1) Primiparous women with a single cephalic pregnancy, ≥37 weeks' gestation, in spontaneous labour
(2) Primiparous women with a single cephalic pregnancy, ≥37 weeks' gestation, who have induction of labour or CS prior to labour onset
(3) Multiparous women without a previous uterine scar, with a single cephalic pregnancy of ≥37 weeks' gestation in spontaneous labour
(4) Multiparous women without a previous uterine scar, with a single cephalic pregnancy of ≥37 weeks' gestation, with induction of labour or CS prior to labour onset
(5) Multiparous women with one or more previous uterine scar(s) and a single cephalic pregnancy of ≥37 weeks' gestation
(6) Primiparous women with a single breech pregnancy
(7) Multiparous women with a single breech pregnancy, with/without previous uterine scar(s)
(8) Women with multiple pregnancies with/without previous uterine scar(s)
(9) Women with a single pregnancy with a transverse or oblique lie, with/without previous uterine scar(s)
(10) Women with a single cephalic pregnancy at ≤36 weeks' gestation

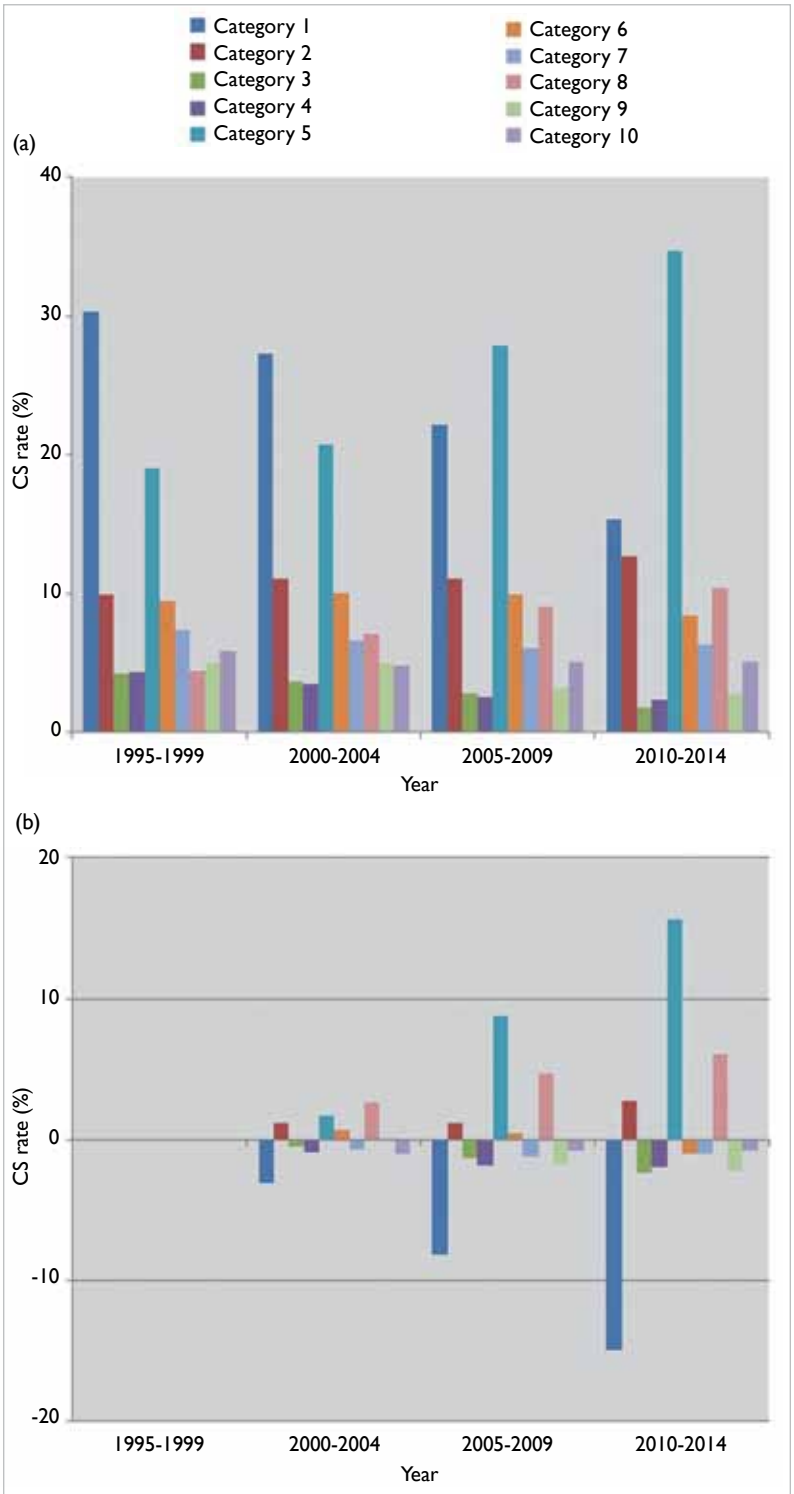

FIG 3. (a) Percentage contribution and (b) percentage change to contribution of each Robson's category to total caesarean section (CS) rates*

* Robson's categories are listed in the Table

The data were then reorganised to show the percentage contribution of each Robson's category to the total CS rate for each 5-year interval (Fig 3a). As there were wide differences in the absolute number of women in these categories, it could be seen that the contribution of categories 1, 2, 5, 6 and 8 tended to overwhelm the contribution of other categories. Thus, despite the modest fall in CS rates in category 1 over the four interims from approximately 14% to 11%, the impact on reducing the overall CS rates was predominant over other categories, amounting to almost 10% of all CS recorded. This effect, however, was counterbalanced by the contribution of categories 5 and 8 that increased the CS rates, and to the accumulated effects on increasing CS rates by other categories (Fig 3b), so that the net balance was an overall rise in CS rates from 15% to 24% within the study period.

Discussion

The data presented above revealed a gradual increase in overall CS rate of approximately 10% over the 20-year study period. While there was a significant reduction in the primary CS rate in low-risk primiparous women with spontaneous labour, this was counterbalanced by the ever-increasing CS rate in those with previous CS, breech presentation, multiple pregnancies, and to a lesser extent those with preterm labour. The data have demonstrated the advantages of using the Robson's classification to analyse factors that will influence the overall CS rate.

The use of the Robson's classification is increasing rapidly and spontaneously worldwide. Despite some limitations, the 10-group classification is easy to implement and interpret.[11,12] It allows standardised comparisons of data across countries and time points, and identifies the subpopulations that drive changes in CS rates. The 10-group classification was easily applied to different levels of analysis from single-centre to multi-country datasets without problems of inconsistencies or misclassification,[12-16] enabling specific groups of women to be clearly identified as the main contributors to the overall CS rate. Indeed, it has been demonstrated that this classification can help health care providers plan practical and effective care that targets specific groups of women to improve maternal and perinatal care.[13,14,16,17]

According to the WHO multi-country survey,[9] CS rate was as high as 46% in China, 42% in Paraguay, and 40% in Ecuador with an overall mean of 26.4% for the 21 countries in the survey. Incremental rates as high as 18% within 3 to 4 years and a total CS rate of up to 80% have been reported in some parts of China.[9,18] In Hong Kong, the annual CS rate rose steadily from 16.6% to 27.4% from 1987 to 1999, indicating a 65% increase over 12 years, with the CS rates in private institutions of approximately 27.4% higher than those in the public sector.[4] The Hong Kong College of Obstetricians and Gynaecologists territory-wide audit has documented an increase in overall CS rates in Hong Kong from 27.1% in 1999 to 30.4% in 2004 and 42.1% in 2009,[19] a drastic increase of 12% over a 5-year interval. The annual obstetric

report of the HA in 2014 also showed varying CS rates among the eight public hospitals with obstetric services, ranging from 22.7% to 32%.[20] The overall increase in CS rates of approximately 10% over the 20-year period to 24%-25% (approximately 0.5% per year on average) reported in the current study was modest in rate as well as lower in absolute value compared with the figures reported above, and those reported in other countries. The slight drop in CS rates for primiparous pregnancies with spontaneous term labour may be an important factor that mitigates the surge in CS rates in the study period.

Primary caesarean section (categories 1 to 4)

The current data have demonstrated a modest drop in CS rate for primiparous women with spontaneous labour (category 1) and a slight fall in multiparous women with spontaneous labour (category 3) although the rate for all women with induced labour or prelabour CS (category 2 and 4) has remained constant. Review of the labour ward management protocol in the unit during the study period revealed that the adoption of evidence-based active management of labour protocols since the late 90s (including regular formal audits in CS rates and indications), the implementation of 'best practices' such as vigilant use of partograms,[21] early amniotomy,[22] and prompt oxytocin augmentation for slow progress[23] could have contributed to the gradual but progressive fall in CS rates in these low-risk women. Similar measures in labour management have been shown in cluster-randomised trials to be associated with significant, albeit small declines in primary CS rates driven by the effects in low-risk pregnancies.[24] Indeed the magnitude of fall of 1% to 2% in CS rates in such studies was similar to that observed over the two decades in the current study. As this category of low-risk primiparous women with spontaneous labour usually constitutes approximately ≥30% of the entire obstetric population, the effects of a modest fall in CS rates in this group will have a major impact on the overall rate. Other national studies to evaluate the effect of labour attempts and labour success on primary CS rates have shown that the fall in CS rates might not be persistent. After a slight drop in the late 90s, the rate started to rise again between 2004 and 2010.[25] In addition, other meta-analyses have shown that the effects of such active management of labour, while consistently associated with shorter duration of labour and no discernible differences in neonatal and maternal outcome, might not be associated with significant reductions in CS rates.[26] It remains to be seen whether the modest fall in CS rate in primiparous low-risk women in the current study will persist in future years. The effects of still other more drastic attempts to curb primary CS rates in primiparous women, including redefining labour dystocia,[27] postponing the cut-off for active labour at 6-cm dilatation, allowing adequate time for second stage of labour, and encouraging operative vaginal delivery[28] require further evaluation.

Previous caesarean section (category 5)

The rising proportion of women with previous CS who undergo repeat CS has been shown by various studies to contribute significantly to the overall rise in CS rates. For instance, at a single tertiary hospital level, it was shown that the Robson's classification easily identified multiparous women with a previous CS scar as the leading patient group that contributed to an increase in CS rates from 38% in 1998 to 43.7% in 2011.[13] Similarly, on a national scale, a French population–based study using perinatal survey data showed that a continuous rise in the CS rate was observed in three patient groups, one of which was women with previous CS.[16] On an even larger scale, a WHO global survey of 97 095 women who delivered in one of 120 facilities in eight countries showed that although women with a previous CS (category 5) represented only 11.4% of the obstetric population, they were the largest contributor to the overall CS rate (26.7% of all the CSs). This highlights the great burden of repeat CS and the need to curb primary CS in order to control CS rates.[17] In our study, the repeat CS rate escalated sharply from approximately 30% to 50%-60% over the two decades. This could be explained by the abandonment of the use of X-ray and computed tomographic pelvimetry as a selection tool 15 years ago to decide which patients with previous CS can undergo a trial of labour.[29] As evidence accumulated that pelvimetry is imprecise and fails to predict successful trial of vaginal birth after CS,[30] a liberal policy of allowing women with previous CS to choose between elective repeat CS or trial of labour was adopted since 2001. Although this policy is not based on strong evidence, the progressive increase in CS rate in this category indicates the preference of a large proportion of patients to elect repeat CS based on the relative indication of previous CS.

Breech presentation (category 6 and 7)

The Term Breech Trial published in 2000 is a good example of an important landmark study that has affected clinical protocols adopted by the unit and thus the CS rates in the study period.[31] This was an authoritative randomised controlled trial which concluded that planned CS carries a reduced perinatal mortality and early neonatal morbidity for babies with breech presentation at term compared with planned vaginal birth. Although these findings have been challenged in subsequent studies,[32,33] the policy of sectioning all breech babies has been widely adopted in international guidelines.[34,35] Thus, while the CS rate for breech presentation was already

high at approximately 70%-75% at the beginning of the study period, it increased to well over 90% in the subsequent 10 to 15 years to comply with these recommendations. Within this study period, 10%-12% of women with breech presentation at term opted for external cephalic version (ECV) and approximately 65% had achieved a successful vaginal delivery. With better counselling to achieve a higher acceptance of a trial of ECV, a decline in CS in this category can be anticipated.

Multiple pregnancies (category 8) and preterm deliveries (category 10)

The policy of allowing women with a twin pregnancy to opt for CS delivery was even more controversial. Over 90% of these CS deliveries were elective, based on maternal choice rather than emergency intrapartum obstetric indications. Over the 20 years of the study, women with a twin pregnancy in which one fetus was breech opted for CS in order to avoid a vaginal breech delivery at all costs, despite the lack of good clinical supporting evidence if the first twin is in vertex presentation.[36] This further evolved into a patient expectation that all twin pregnancies should be sectioned, again despite contrary evidence from randomised controlled trials that elective CS in uncomplicated twins offers no perinatal advantage.[37] The data from the current study showed that the liberal clinical policy we have adopted gradually since 2003 to accommodate such expectations has resulted in an overwhelming rise in CS rates in multiple pregnancies from >40% to >80%, far in excess of that which could be explained by a breech presentation[38] or other risk factors in either twin.

Similarly, the literature has not shown any particular perinatal survival benefit for CS in preterm delivery of a cephalic-presenting fetus.[39] There is also good evidence that CS delivery at very early gestations is associated with increased morbidity in the mother.[40] Despite this, we observed that a large proportion of the increase in preterm CS was a result of planned iatrogenic preterm deliveries largely due to specific maternal or fetal conditions such as pre-eclampsia or early-onset fetal growth restriction with evidence of fetal compromise. The modest increase in the use of CS in these cases from approximately 19% to 23%-24% more likely reflects the obstetrician's increasing preference for CS in the management of these cases rather than women's choice. Nevertheless, the increase was modest and comparable with that reported in other centres.[41]

Transverse or oblique presentation (category 9)

The overall contribution of this class to the overall CS rate was low. Stabilising induction after ECV was performed in only a small number of highly selected cases largely because of the low success rate (<30%), so that the impact of such a practice on CS rates in this category was limited. Hence the CS rate in this class remained high throughout the study period (>96%).

Strengths and limitations

A strength of the current study was the large sample size collected over a long duration of two decades to allow significant trends to be observed. As a single-centre study, the impact of authoritative scientific guidelines or a change to liberal management policies that allowed patients with relative indications to undergo CS delivery could be readily identified. Although patient epidemiology, risk factors, and case-mix were believed to contribute to the rising CS rates observed within the study period, such effects were not observed in all categories. For example, advanced maternal age should have caused an increase in CS rates for low-risk primiparous women yet this was not observed. Changes in obstetric management protocols could also play an important role in these increasing trends. For instance, the rising repeat CS rate for women with previous CS from 36.7% to 57.0% during the study period grossly exaggerated the absolute increase in the number of CS performed in women with previous uterine scars. Liberal rules for multiple pregnancies as described above were not entirely evidence-based, but were often adopted to meet patient expectations. It remained a limitation that we could not test the temporal relationship of CS trend to changes in obstetric practice to establish a causal relationship.

In this study, it could be argued that the trends observed are specific to a public obstetric unit that did not entertain CS at the mother's request in the absence of any clinical indications. However, CS rates have been observed to rise similarly in all other HA hospitals as reflected in the HA annual obstetric reports since 1999. We believe that our practice is similar to that of other public institutions in Hong Kong and that our observations can serve to encourage other obstetric units to audit their own trends, analyse the extent of rise in each Robson's category, and identify the target groups that contribute most significantly to the rise in CS rates. Appropriate changes may then be made to clinical management protocols.

Conclusion

The most significant trends in an increase in CS rates were in line with the clinical practice towards CS for those with relative indications such as previous CS, breech presentation, and multiple pregnancies. The drop in CS rates for primiparous pregnancies with spontaneous term labour could be ascribed to more vigilant active labour management, and because the

large absolute number in this group had the effect of mitigating the overall surge in CS rates. The overall increase in CS rates of approximately 10% over the 20-year period was modest compared with figures reported previously in Hong Kong and in other developed countries.

Declaration

All authors have disclosed no conflicts of interest.

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