



Peer Review Audit of Caesarean Sections in a Tertiary Hospital

Zheng Yuan Ng*, Jarrod K Tan, Eng Loy Tan, Devendra Kanagalingam and Lay-Kok Tan

Department of Obstetrics and Gynaecology, Singapore General Hospital, Singapore

Abstract

We aimed to evaluate the use of a peer review audit on the indication and decision for Caesarean sections at our hospital to ensure appropriate patient selection and audit clinical quality. Weekly anonymized audits were held for all Caesarean sections performed in the preceding week. Each reviewer gave a score of 1, 2 or 3 for each case based on whether they believed the decision for Caesarean section was appropriate, appropriate with areas for improvement, or inappropriate respectively. Mean scores were used for classification to one of four categories: Category A (score 1.0) implying unanimous agreement with management, B (1.1-1.9) suggesting minor reservations about management, C (2.0-2.4) suggesting significant reservations and D (2.5-3.0) suggesting serious issues with management. All indications for CS in our institution had a low mean score of <1.6. Among singleton pregnancies, there were more category A cases (72.0% versus 54.9%, $p < 0.001$) but also more Category D cases (2.8% versus 0.9%, $p < 0.05$) in the elective CS group than the emergency CS group. We conclude that the majority of reviewed cases had appropriate indications and acceptable management. Peer review audit sessions provide a platform for discussion, education, and identification of specific conditions where management can be improved.

Introduction

Caesarean Section (CS) is the most common surgery in women. CS rates in the United States rose from 22.9% in 2000 to 32.9% in 200 [1,2]. In England, CS rates increased from 21.5% in 2000-2001 to 24.8% in 2009-10 [3,4]. CS rates in Singapore are rising as well, with rates in Singapore General Hospital more than doubling from 14.0% between 1986 and 2000, to 28.3% between 2001 and 2012. Caesarean section can be associated with increased risk to both mother and fetus compared to vaginal delivery. These include higher infection rates, anaesthetic complications, lower breastfeeding initiation rates, increased length of hospital stay, and fetal complications such as an increased risk of respiratory morbidity including transient tachypnoea of the new-born, respiratory distress syndrome and persistent pulmonary hypertension, particularly if CS is performed less than 39-40 weeks of gestation [5-7]. There are also important long term consequences such as an increased likelihood of repeat CS for future deliveries, and uterine scarring, which can affect future fertility and increase the incidence of placenta creta and uterine rupture [6-9]. Obstetric decision making is often complex. Apart from the clinical scenario, patient wishes also influence the decision for Caesarean section, and the fear of medical litigation may influence the Obstetrician's actions as well. Hospital or practice-based audits have been used as part of measures to address rising CS rates [10]. A small Scottish series on CS audit by peer review by Wareham et al found significant inter-auditor disagreement with regards to the indication and decision for CS [11]. They subsequently introduced structured diagnostic criteria for CS indications and have implemented on-going peer review by the on-call team of daily CS cases [11]. There is unfortunately a lack of contemporary literature analysing the role of peer review audit as a clinical quality and educational tool. With the variation and diversity in individual obstetricians' practice as well as the intricacies of individual cases, there is a need for the peer review process to appraise the decision for Caesarean section. Our hospital introduced a peer review-based system of auditing Caesarean sections using weekly audit meetings and instituted a scoring system to reflect each reviewer's opinion on every case performed. This was primarily intended to be a clinical quality control and education tool, rather than a direct attempt to reduce the Caesarean section rate, and the aim of this paper is to report our experience in using this system.

Materials and Methods

The study period was from Jan 2010 to June 2012. Weekly audits were held, each attended by

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*Correspondence:

Zheng Yuan Ng, Department of Obstetrics and Gynaecology, Singapore General Hospital, Outram Road 169608, Singapore, E-mail: zhengyuan.ng@mohh.com.sg

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Table 1: Audit scores - Overall (Singleton + Multiple pregnancies).

	Score	Category	Emergency			Elective	Combined
			Crash	Non-Crash	Total emergency	No. of cases	No. of cases
Acceptable management	1	A	31 (59.6%)	304 (55.5%)	335 (55.8%)	255 (71.6%)	590 (61.7%)
	1.1-2.0	B	19 (36.5%)	226 (41.2%)	245 (40.8%)	85 (23.9%)	330 (34.5%)
Unacceptable management	2.1-2.4	C	2 (3.8%)	12 (2.2%)	14 (2.3%)	6 (1.7%)	20 (2.1%)
	2.5 -3	D	0 (0.0%)	6 (1.1%)	6 (1.0%)	10 (2.8%)	16 (1.7%)
Total			52	548	600	356	956

Table 2: Audit scores - Singleton pregnancies.

	Score	Category	Emergency			Elective
			Crash	Non-Crash	TOTAL	
Acceptable management	1	A	28 (5.0%)	282 (49.9%)	310 (54.9%)	231 (72.0%)
	1.1-2.0	B	17 (3.0%)	220 (38.9%)	237 (41.9%)	76 (23.7%)
Unacceptable management	2.1-2.4	C	2 (0.4%)	11 (1.9%)	13 (2.3%)	5 (1.6%)
	2.5 -3	D	0 (0.0%)	5 (0.9%)	5 (0.9%)	9 (2.8%)
Total			47 (8.3%)	518 (91.7%)	565	321

Table 3: Audit scores - Multiple pregnancies.

	Score	Category	Emergency			Elective
			Crash (%)	Non-Crash (%)	TOTAL (%)	(%)
Acceptable management	1	A	3 (60.0)	22 (73.3)	25 (71.4)	24 (68.6)
	1.1-2.0	B	2 (40.0)	6 (20)	8 (22.9)	9 (25.7)
Unacceptable management	2.1-2.4	C	0 (0.0)	1 (3.3)	1 (2.9)	1 (2.9)
	2.5 -3	D	0 (0.0)	1 (3.3)	1 (2.9)	1 (2.9)
Total			5	30	35	35

at least 6 department Consultants and post-MRCOG (or equivalent) specialists. During each audit, all cases from the preceding week were anonymised and presented, using a fixed template (Appendix A). For every CS, each reviewer gave a score of 1 (CS entirely appropriate), 2 (some reservations over indication) or 3 (CS not indicated or management seriously flawed). The scores for each case were tallied and the mean score calculated at the end of each case, with a lower score suggestive of a more appropriate or less controversial decision for CS. An arithmetic mean of scores was used to determine the final mean score for each CS, to allow for analysis of appropriateness of each CS decision, and also for comparison of scores between indications. Four classification categories were assigned based on the mean score obtained: Category A for a mean score of 1.0 implying unanimous agreement with the decision for Caesarean section, Category B for a mean score of 1.1-1.9 suggesting management was considered mostly acceptable with minor reservations, category C for a mean score of 2.0-2.4 suggesting significant reservations over the indication and Category D for a mean score of 2.5-3.0 suggesting there were serious issues with the indication and management. Additionally, the composite of Categories A+B was designated "overall acceptable management" whereas the composite of Categories C+D was designated "unacceptable management" for outcome analysis. Score analysis was divided into singleton and multiple pregnancy subgroups, elective or emergency (including "Crash" CS, or immediate CS necessitating delivery within 30 minutes), and subdivided according to the main indications for the CS. The overall mean scores and the mean scores for the different indications for CS were also calculated. The main outcome measures of interest were the relative proportions of Category A and D between elective and emergency CS, as well as the

relative proportions of "overall acceptable management" (composite of Categories A + B) and "unacceptable management" (composite of categories C + D) in the CS subgroups.

Results

There were a total of 1254 CS deliveries in our hospital during the study period and 3667 deliveries, giving a CS rate of 34.2%. Among the CS cases, audit scores were available for 956 out of 1254 (77.8%), including 886 singleton CS and 70 multiple pregnancy CS cases. The remaining cases had missing or incomplete audit scores and therefore excluded from the study. Within the study group, there were 356 Elective CS (37.3%) and 600 Emergency CS (62.7%) 52 emergency CS cases were Crash, or immediate CS (5.4% of total CS cases) (Table 1). Among singleton CS deliveries, there were significantly more Category A elective cases (72.0%, 231/321) than emergency CS (54.9%, 310/565), $p < 0.001$ (Table 2). However, there were also significantly more Category D elective cases; 2.8% (9/321) of elective CS were Category D compared to 0.9% (5/565) of emergency CS ($p < 0.05$). Both elective and emergency CS had similar rates of CS having "overall acceptable management" at 95.7% (307/321) and 96.8% (547/565) respectively ($p = 0.367$). There were no Category D cases within the Crash CS subgroup. For multiple pregnancies, 70.0% were category A and only 2.9% Cat D (Table 3). Dividing the singleton cases by indication, all CS subgroups had a mean score of less than 1.6. In the emergency CS group, "failed induction" (1.45) and "failed instrumental delivery" (1.43) had the highest scores, whereas for elective CS cases the highest scores were for "pregnancy-induced hypertension (PIH) or pre-eclampsia" (1.58) and "other indications" (1.43) (Table 4). The commonest indications for Elective CS were

Table 4: Mean audit scores by indication (Singletons).

Delivery Mode	Indication	Number	Mean score	Standard deviation	Range
Elective CS	Failed induction	4	1.00	0.00	1
	Intrauterine growth restriction	7	1.07	0.15	1-1.4
	Placenta Previa	24	1.14	0.38	1-2.3
	Breech / Malpresentation / Abnormal lie	50	1.16	0.38	1-2.5
	Previous CS	115	1.25	0.44	1-3
	Previous CS - 2 or more	63	1.31	0.52	1-3
	Abnormal lie	5	1.34	0.65	1-2.5
	Diabetes	8	1.38	0.52	1-2
	Maternal request/Social reason	17	1.38	0.46	1-2.2
	Others	24	1.43	0.60	1-2.5
	PIH / Pre-eclampsia/Eclampsia	9	1.58	0.69	1-2.6
Elective CS Total		321	1.26	0.47	1-3
Emergency CS	Intrauterine growth restriction	4	1.05	0.06	1-1.1
	Previous CS - 2 or more	22	1.15	0.34	1-2.3
	Abruptio	13	1.19	0.48	1-2.7
	Previous CS	57	1.20	0.36	1-2.3
	Breech / Malpresentation /Abnormal lie	52	1.21	0.38	1-2.8
	Cephalopelvic disproportion	104	1.22	0.34	1-2.4
	Others	25	1.22	0.33	1-2
	Placenta Previa	27	1.22	0.37	1-2
	Maternal request/Social reason	11	1.26	0.29	1-2
	Fetal compromise	136	1.28	0.37	1-2.7
	Pregnancy-induced hypertension /Pre-eclampsia/Eclampsia	31	1.33	0.45	1-2.4
	Poor/failure to progress	47	1.38	0.43	1-2.4
	Failed instrumental delivery	3	1.43	0.49	1.1-2
	Failed induction	33	1.45	0.47	1-2.5
Crash CS Total		47	1.24	0.39	1-2.3
Emergency CS Total		565	1.26	0.38	1-2.8
Grand Total		886	1.26	0.42	1-3

for women with previous Caesarean section(s) who declined trial of vaginal birth after Caesarean (178/321, 55.5%), breech presentation (45/321, 14.0%), placenta praevia (24/321, 7.5%) and maternal request or social reasons (17/321, 5.3%). The commonest indications for Emergency CS were for Non-Reassuring Fetal Status (NRFS) or fetal distress (136/565, 24.1%), cephalopelvic disproportion (CPD) (104/565, 18.4%) women with previous caesarean section(s) in labour who declined trial of vaginal birth (78/565, 13.8%) and failure to progress in labour (47/565, 8.3%). Multiple pregnancies had a low mean score of 1.22 overall, with elective CS cases having a non-significantly higher mean score (1.29) compared to emergency CS cases (1.15).

Discussion

The majority of caesarean sections (61.7%, 590/956) audited were Category A, comparing favourably against the 52% of unanimous agreements in the Wareham study [11]. The majority of non-Category A cases were Category B (330/366). Most cases therefore had overall acceptable management, as defined by the sum of Category A + B (96.2%, 920/956). Within the study period, only 3.8% (36) of CS cases had overall unacceptable management, as defined by the sum

of Categories C + D. There were 10 elective CS cases and 6 emergency CS cases in Category D. Interestingly, there were significantly more elective cases within Category D than emergency cases, $p = 0.027$. There were no Category D cases within the Crash CS subgroup, with an overall mean score of 1.24 for the 47 cases (Table 4). This suggests that decisions to undergo crash CS were on the whole medically sound and well-justified. Several indications for CS had higher mean scores and warranted closer investigation. Among elective CS cases, "other indications" (1.43) and "PIH or pre-eclampsia" (1.58) had the highest scores. The high score for PIH and pre-eclampsia cases was somewhat surprising given well documented clinical pathways for management and close consultant-led decision making for monitoring and delivery of these cases. Dissent could be explained by the perceived delay when putting such cases on an elective operating list, or the lack of convincing diagnosis of pre-eclampsia when planning early elective CS delivery. The combined mean score for elective and emergency cases of PIH and pre-eclampsia was low (1.27), indicating overall management of this condition was acceptable. Cases classified under "other indications" typically consisted of complex cases with indications not easily classified into a single category. This was a heterogeneous group including women with pre-existing malignancy

or ischaemic heart disease who were often complex to manage, with relatively more controversies in their management. Amongst emergency CS cases, the highest mean scores were for “failed instrumental delivery” (1.43) and “failed induction of labour” (1.45) (Table 4). For failed induction of labour, there were several instances where induction was a result of maternal preference for a particular delivery date or other social reasons. If awaiting spontaneous onset of labour were to be more strongly advocated for these cases, a higher vaginal delivery rate could potentially be achieved and CS avoided altogether. For failed instrumental delivery cases, controversy arose mainly due to inappropriate case selection and the conduct of instrumental delivery, particularly in the absence of senior input. For indications with higher mean scores, Consultant-led decisions would be especially useful for more accurate management. These indications have also been highlighted in department-based teaching sessions to educate staff on optimal management practices. Category D cases were individually flagged for further review and discussion in wider department-based platforms such as Morbidity and Mortality meetings in order to reduce their recurrence. This demonstrates the utility of the audit as a tool for clinical governance. Our audit highlighted the indication of failed induction of labour as particularly controversial. In our practice as well as in current literature, there has been a worrying increasing trend of os-full caesarean sections in the light of the increasing reticence to attempt or inability to perform instrumental delivery [12] This can be attributed to the fear of adverse medico-legal consequences as well as progressive deskilling of delivery staff, accompanied by improvements in CS technique and outcome [12,13]. Attention must be made to the continued training and supervision of delivery staff to ensure optimal methods of delivery. Each subgroup divided according to indication had mean scores of <1.6, suggesting that the management of each subgroup was as a whole appropriate. However, a limitation to analysis based on a single indication was the inability to take into account multiple concurrent indications for CS. Furthermore, classification of indications could potentially be imprecise and could vary between institutions, limiting the usefulness of analysis and cross-institution comparisons. Our data collection rate of 77.8% of all CS cases could be improved in future with prospective data collection and documentation. Weekly audits are held up till present with immediate documentation of audit scores. With improved data collection, results would be more accurate and problem cases and indications more accurately identified. Our audit used a simple 3 point score to assess inappropriateness for simplicity of user participation and calculation on a weekly basis. One improvement could be to adopt a more tiered scoring system. The UCLA-RAND Appropriateness Method has been used in appropriateness studies [14]. This uses a standard scale of 9 points instead, with 1-3 for ‘appropriate’, 7-9 for ‘inappropriate’, and 4-6 for ‘uncertain’. Similarly, Likert 5 point scales have been used as well [14]. Using one of these methods with more tiered options would increase the complexity of logging and calculation, but would better capture the nuances of judgement calls in each case, and make interpreting the arithmetic mean of scores potentially more accurate. Our audit also did not specifically measure the level of inter-observer agreement or disagreement. The UCLA-RAND method proposes several ways to define agreement or disagreement among observers based on scores obtained [14]. Therefore, utilising this method could add meaningful information on inter-user agreement in our study, which would better reflect the degree of assent between hospital specialists in our department on management of cases and also better flag up controversial cases.

Conclusion

Caesarean section rates are rising, and identifying factors contributing to this increase and ensuring decisions for Caesarean are appropriate are important to limit the risk of morbidity to mother and fetus. There is however a paucity of literature describing the use of peer review audit as a means of quality control. With our data collected, we conclude that CS deliveries in our hospital have been for the most part indicated and appropriately managed. A small minority of cases attracted controversy and warranted further discussion for optimisation of management. Specifically, issues with the management of pre-eclampsia, PIH, failed induction of labour and failed instrumental delivery were highlighted by this audit, flagged up and discussed to improve patient outcomes at our hospital. Further prospective audits will be undertaken to confirm and maintain good patient outcomes at our hospital, with the option of utilising a more comprehensive appropriateness scale being explored and implemented. Peer review audit for CS is a simple, cheap but useful tool in facilitating discussion, education and improving clinical governance. Obstetric management could also be improved and the rates of Caesarean section potentially be addressed by the audit.

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