Singapore Journal Of Obstetrics & Gynaecology
2018; 49(2): 9-19

Elective Caesarean Delivery between 37 and 38 weeks: An Audit of Indications in a Tertiary Referral Centre

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ABSTRACT

Introduction: *The guidelines of the National Institute for Health and Care Excellence (NICE) and American Congress of Obstetricians and Gynecologists (ACOG) recommend against routine elective caesarean deliveries before 39 weeks of gestation due to increased risk of neonatal respiratory morbidity. However, maternal requests for delivery prior to 39 weeks have been documented in some centres. In Asian populations, these requests are associated with beliefs about auspiciousness of time of birth. The objective of this study is to examine indications of early term elective caesarean deliveries performed in KK Women's and Children's Hospital (KKH).*

Methods: *This is a retrospective audit of elective caesarean deliveries performed between 37+0 and 38+0 weeks of gestation, from 1 January 2015 to 31 July 2015 in KKH. Data was extracted from the Trusted Care dashboard, a care pathway for caesarean delivery in KKH. Ninety women were listed for an elective caesarean section during the study period.*

Results: *Of our study population, majority of women (88%, n=79) underwent elective caesarean delivery as planned. The most common indication for elective caesarean section as the mode of delivery was a history of prior caesarean section (38%, n=30). The most common reason for scheduling delivery prior to 39 weeks was poorly controlled medical conditions (19%, n=15). Maternal request to bring forward the time of delivery was noted in 15% of pregnancies (n=12).*

Conclusion: *In this audit, majority of early caesarean deliveries were justified. By raising awareness, we hope to further diminish early term caesarean delivery driven by maternal request.*

Keywords: early term caesarean delivery, indications for caesarean delivery, timing of delivery, antenatal corticosteroids.

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INTRODUCTION

The recognition that rate of caesarean delivery has escalated tremendously, in Singapore (1) and around the world (2), has generated extensive study of factors contributing to the trend and, more importantly, of how outcomes of a procedure that has made its way in to common practice can be optimised. One element in the enhancement of outcomes is the timing of elective delivery. This is an area of growing interest in light of recent evidence suggesting that the gestational period between 37+0 and 41+6 weeks, previously known as 'term', is in fact a window wide enough to encompass

distinct phases of gestation that confer significantly different neonatal morbidity risks from delivery (3, 4).

Taking into account the emerging evidence, the American Congress of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine (5) recommend that expression 'term' be substituted, as proposed by a working group (6), to 'early term' (37+0 to 38+6), 'full term' (39+0 to 40+6), 'late term' (41+0 to 41+6). Furthermore, the National Institute for Health and Care Excellence (NICE) and the ACOG recommend, in guidelines, that routine elective caesarean deliveries, short of maternal or fetal indications, not be performed before 39 weeks of gestation, in view of the increased of neonatal morbidity with decreasing gestational age (7, 8).

It is concerning then that in spite of existing recommendations, elective caesarean deliveries performed before 39 weeks of gestation have been associated with requests arising from beliefs about auspiciousness of time of birth (9).

As non-maleficence is a core tenet of medical ethics and healthcare is a negative right, institutions have a duty to examine indications for early elective caesarean deliveries and implement the necessary to ensure that all early term elective caesarean deliveries are clinically justified. Therefore, the objective of this study is to perform an audit of indications and outcomes of early term elective caesarean deliveries performed in KK Women's and Children's Hospital (KKH) and propose recommendations for practice improvement.

METHODS

KK Women's and Children's Hospital (KKH) is a tertiary referral hospital in Singapore that sees approximately 12 000 deliveries annually. A retrospective audit of elective caesarean deliveries performed between 37+0 and 38+0 weeks of gestation, from 1 January 2015 to 31 July 2015 was conducted. The authors focused on this narrower and earlier gestational period of 37 to 38 weeks as opposed to the wider early term window of 37 to 39 weeks because this earlier period is of greater concern in view of the association of earlier delivery with progressively higher risk of neonatal complications (3, 4). Furthermore, the data from another institution's experience of reducing non-indicated early elective caesarean deliveries showed greater improvement in neonatal outcomes in delaying delivery from 37 to 39 weeks, compared to delaying delivery from 38 to 39 weeks (10).

Data was extracted from the TrustedCare® dashboard, a care pathway model for initially introduced for elective caesarean delivery KKH in 2014 and subsequently expanded to encompass all caesarean sections. Developing Trusted Care involved redesigning the entire process of elective caesarean section, from listing of the surgery to discharge, with the aim of optimizing clinical outcomes as well as enhancing patient safety, operational efficiency and financial sustainability through the standardized practice of evidence -based principles.

A datasheet of study variables was designed for data collection. This included information on demographic characteristics; past obstetric, gynaecological as well as any other medical or surgical history; and details of index pregnancy including antenatal history, indication for listing, administration of antenatal corticosteroids, eventual mode of delivery and neonatal outcomes in the immediate post-operative period. Statistical analysis was performed using Microsoft Excel 2013 (Microsoft Inc, Redmond, WA, USA).

RESULTS

Demographics

A total of ninety women were listed for an elective caesarean section during the study period. Of these, majority (88%, n=79) underwent elective caesarean delivery as planned while the remaining required an emergency caesarean delivery (10%, n=9) or an urgent caesarean delivery (2.2%, n=2) (Fig. 1).

Among the women who underwent elective caesarean delivery, median age of women at the time of delivery was 34 years. With regard to obstetric history, 35% of them were nulliparous (n=28), 29% were para one (n=23) and the remaining 35% were para two or more (n=28). Regarding the racial distribution, 51% of women were of Chinese origin (n=40), 18% of Malay origin (n=14), 15% of

Indian origin (n=12) and the remaining 16% of women were of other origins (n=13). Dating had been performed during the first trimester for most pregnancies (91%, n=72) while the remaining pregnancies had been dated during the second trimester (9%, n=7).

Indications of urgent and emergency caesarean delivery

In this audit, 12.2% (n=11) of women who were listed for early term elective caesarean delivery had required an urgent or emergency caesarean delivery instead. The documented reasons for the shift to urgent/emergency caesarean delivery in this subgroup were: labour (55%, n=6), pre-eclampsia (18%, n=2), labour with non-reassuring fetal status (9%, n=1), premature rupture of membranes (9%, n=1), placental insufficiency (9%, n=1).

Elective caesarean delivery: Indications for caesarean section as the mode of delivery

Fig. 2 shows an overview of the primary indications of opting for caesarean section as the mode of delivery among the 79 women who had an elective caesarean delivery in this audit.

Of the 79 women who had an elective caesarean section in this audit, 57% of women (n=45) had a previous caesarean section; in two-thirds of these women (n=30), the previous caesarean section was the primary reason for a repeat caesarean section as the mode of delivery while in the other one-third (n = 15), there were multiple indications and therefore other considerations (e.g. poorly controlled medical conditions) took priority as the primary indication for caesarean section as the mode of delivery.

Among the women (n=30) who had a repeat caesarean section primarily because of the prior section, more than half (n=17) had only one prior caesarean section and had opted for an elective repeat caesarean section (ERCS) while the rest had more than one prior caesarean section (n=7) or had a history of a complicated caesarean section (n=5) or had a history of Fenton's repair and opted for an ERCS (n=1). In 2.5% of women (n=2), the indications for caesarean section as the mode of delivery were 'soft' – these were instances of maternal request for caesarean section as the mode of delivery. These deliveries were performed at 37+2 weeks of gestation and 37+5 weeks of gestation. Table I provides further information of the indications for caesarean section as the mode of delivery in the 79 pregnancies.

Elective caesarean delivery: Indications for scheduling delivery between 37 and 38 weeks of gestation

Fig. 3 shows an overview of the indications for scheduling the time of delivery between 37 and 38 weeks of gestation among the 79 women who had an elective caesarean delivery in this audit. Majority of deliveries (76%, n= 60) could be justified for being scheduled between 37 to 38 weeks. The most common indication was poorly controlled medical disorders (19%, n=15).

The remaining 24% of deliveries (n=19) could not be clinically justified for being scheduled between 37 to 38 weeks: maternal request influenced the timing of delivery in 15% of pregnancies (n=12) while no obvious reason for timing of delivery could be found in 9% of pregnancies (n=7) on retrospective case-note review, related likely to paucity of documentation by the medical professional. In this audit, we focus our attention to the cohort of women in whom maternal request (n=12, 15%) influenced the timing of delivery.

Table II provides further information of the indications for scheduling caesarean between 37 and 39 weeks in the 79 pregnancies.

Maternal request for scheduling the time of clinically indicated elective caesarean delivery

Maternal request influenced the timing of delivery in 15% of pregnancies (n=12). The median age of these women at the time of delivery was 34 years; 59 % of women were of Chinese origin (n=7), 8% of Malay origin (n=1), 8% of Indian origin (n=1) and the remaining 25% of women were of other origins (n=3). Lack of documentation precluded deeper analysis of perceptions, beliefs or motivations that gave rise to these requests. Postulated reasons for these requests – beliefs about auspiciousness of time of birth and misconceptions about the term period as well as safety of marginally early deliveries - are expounded in the discussion below.

Administration of antenatal corticosteroids in early term elective caesarean delivery

Of the 79 women who underwent a planned elective caesarean section, 23% (n=18) of women received a single course of antenatal corticosteroids. Of the 15% of women (n=12) whose timing of elective caesarean section was brought forward by maternal request, a quarter (n=3) received a single course of antenatal corticosteroids – one woman received it within the week preceding the delivery while the other two women received it at the time they were admitted for threatened preterm labour and hence these were administered at much earlier gestations (23+5 and 27+5 weeks).

Outcomes of early term elective caesarean delivery

Of the 88 neonates in this audit, the majority (83%, n=73) received care at the ward nursery while the rest received care at the Special Care Unit (SCN) (12.5%, n=11) or the Neonatal Intensive Care Unit (NICU) (4.5%, n=4) in the immediate perinatal period.

Among the 14 neonates born to the women in whom time of delivery was brought forward by maternal request, the majority (93%, n=11) received care at the ward nursery while one neonate (7%) received care at the SCN in the immediate perinatal period. There were no admissions to the NICU.

DISCUSSION

In this audit population, 76% of elective caesarean deliveries were brought forward from the guideline-directed 39 weeks to 37-38 weeks for clinical indications. The most common clinical indication was poorly controlled diabetes mellitus and hypertensive disorders. This finding reflects the ongoing metabolic crisis in developed countries like Singapore. Based on the International Association of the Diabetes and Pregnancy Study Groups (IADPSG) criteria, the incidence of gestational diabetes in Singapore is 25.1%, a figure higher than the average 17.8% among the 15 centres that participated in the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) Study (11).

This audit also found that 15% of caesarean sections (n=12) were brought forward from guideline-directed 39 weeks to 37-38 weeks to fulfil maternal request. While this is fewer than the group in which scheduling was clinically indicated, it is remains imperative to curb deviance from evidence-based practice. This is because larger studies have consistently revealed adverse outcomes of early elective caesarean delivery. This includes neonatal respiratory morbidity, neonatal intensive care unit (NICU) admissions and other composite neonatal outcomes (12), as well as healthcare costs (13). The reverse (i.e. reduction in adverse outcomes by delaying elective caesarean section to 39 weeks) has also been demonstrated in the literature. A centre in the United States found a significant reduction in admissions to the NICU after implementation of guidelines to minimise non-indicated caesarean deliveries prior to 39 weeks (14).

The retrospective nature of this audit resulted in a reliance on case-note documentation of factors influencing timing of delivery. This meant that the authors were unable to explore the perceptions, beliefs and motivations that gave rise to requests for earlier delivery, for which a prospective study could elucidate. The retrospective nature of the audit also limited the analysis of 9% of caesarean deliveries (n=7) where no obvious reason for bringing forward time of delivery could be found. Scheduling these 9% of deliveries prior to 39 weeks could have been the result of undocumented maternal request or undocumented obstetrician preference. This finding brings to light the scope for improvement in documentation in our centre. One conceivable method to encourage documentation would be for caesarean delivery listing forms to include indications of timing of delivery (where it is performed prior to 39 weeks) as a separate field from indications of caesarean section as the mode of delivery.

In the literature, maternal request for caesarean section as the mode of delivery is a topic that has been the subject of a plethora of studies and the subject of heated debate for decades. Studies have found that the reasons for request for caesarean section as the mode of delivery range from fear of a loss of control and pain during labour to misconceptions about safety of caesarean delivery, from cultural and social reasons to obstetrician preference (15-17). A less studied area is reasons for maternal request for bringing forward time of

elective caesarean delivery. Two reasons discussed in the literature that the authors believe are relevant to our population are cultural beliefs and misconceptions about the safety of early deliveries.

A study in Taiwan found that Chinese cultural beliefs about auspiciousness increase the likelihood of scheduling an elective delivery before 39 weeks (9). A Californian cohort study also echoes this finding among Chinese Americans (18), suggesting that cultural influences persist despite resettlement to other countries. This is a pertinent finding given that a considerable population of women in our audit were of Chinese origin and that Singapore is home to a considerable immigrant population.

The second factor influencing maternal request that may apply to our population is misconceptions about the safety of what is perceived by patients to be marginally early delivery. Surveys among women in the antepartum and postpartum period have revealed misconceptions about the earliest time for safe birth should there be no other complications requiring early delivery (19, 20). A study among 650 American mothers found that 50% and 40% respondents believed 34-36 weeks and 37-38 weeks (respectively) was the earliest time for safe birth should be no complications requiring early delivery (19). Similarly, a study among 784 Australian mothers found that 57% of respondents believed 37-38 weeks was the earliest time for safe birth (20). These misconceptions are important to correct, as the increasing discomforts of pregnancy in later gestations combined with these misconceptions may encourage maternal request to bring forward time of delivery.

To reduce maternal request for earlier delivery in our context, the authors believe that efforts to improve patient education is necessary. Ideally, discussions on mode of delivery could start from early pregnancy and continue through the pregnancy journey. It may also be supported by patient education tools such as leaflets and other decision aids. In approaching requests, the use of the term 'maternal request', although representative of the fact that the expectant mother is the patient who expresses the request, neglects the paternal, familial and societal influences culminating in the request. Approaching requests in a non-biased and objective manner should instead be encouraged as this may allow the obstetrician to discover the motivation and external influences culminating in the request and therefore facilitate patient-centred education.

A discussion on the term period and explaining the basis of recommendations of international guidelines to schedule elective caesarean delivery at 39 weeks may also be undertaken.

Pertinent concepts for patient education could include the continuing nature of fetal lung development in the term period (21), that elective caesarean delivery, relative to the process of labour and normal vaginal delivery, is less supportive of the physiological changes that facilitate the fetal lung transition from intrauterine to extrauterine environment (22), and how both of these concepts culminate in the trend of increasing risk ratio of neonatal respiratory morbidity (elective caesarean deliveries versus normal vaginal deliveries) with decreasing gestation, even in the 'term' period (23).

To complete the discussion on scheduling delivery at 39 weeks, obstetricians may also briefly outline plans for urgent delivery should labour commence prior to 39 weeks. This is because up to a tenth of women scheduled for elective repeat caesarean sections enter labour prior to 39+0 weeks (24).

In the literature, more categorical initiatives to reduce elective caesarean delivery prior to 39 weeks of gestation have been found to be successful. A comparative study of three approaches across 27 centres in the United States found that formal categorical hospital policies were more successful compared with softer measures of physician education, or review and evaluation by a local committee (25). However, such hard-stop measures come with practical challenges. In our context, where the clinical indications for scheduling delivery prior to 39 weeks are wide-ranging and complex (Table II), it is imperative that institutional policies do not inadvertently deter the listing of women for early term delivery where it is indicated. The authors of the aforementioned comparative study in the United States also later conceded that one of their challenges in crafting hard-stop measures was including provision for justifiable maternal or fetal indications for early term delivery. Questions like how poorly controlled diabetes or

hypertension must be to justify earlier delivery highlight the difficulties in comprehensively defining justifiable clinical indications for scheduling elective caesarean delivery prior to 39 weeks (26). Furthermore, categorical policy may not be suited to addressing the heterogenous reasons for requests for early delivery that we have postulated in our population.

Lastly, in this audit we also examined the frequency of antenatal corticosteroid administration. Antenatal corticosteroids expedite the development of fetal lung maturity and therefore reduce the rate of neonatal respiratory morbidity resulting from early delivery. While corticosteroids is well-established to decrease the rates of neonatal morbidity in the context of pre-term delivery (27), the data on benefits of administering antenatal steroids in the term period is only emerging. A Cochrane review on the topic included only 1 major randomised controlled trial, the antenatal steroids for term caesarean section (ASTECS) trial, that bears evidence of neonatal morbidity reduction from antenatal steroid administration for delivery at 37, 38 and 39 weeks (28). However, the trial also concedes that delaying elective delivery to 39 weeks of gestation is more effective in reducing morbidity outcomes than antenatal steroid administration (29). The RCOG guideline also acknowledges the paucity of data on safety of antenatal corticosteroids in the context of delivery after 36+0 weeks of gestation; the administration of antenatal corticosteroids caesarean delivery in this context remains grade C recommendation in the guideline (24). In KKH, the use of antenatal corticosteroids for early term caesarean delivery is individualised – this explains why one quarter of women who underwent early term elective caesarean in this audit delivery received antenatal corticosteroids.

In conclusion, three-quarters of the early term elective caesarean deliveries in this audit were justified. Maternal request was found to influence timing of delivery in a smaller proportion of early term caesarean deliveries. We believe that greater clinician efforts towards patient-centred engagement and education will be able to narrow the chasm between request and evidence, placing women and their obstetricians on the same page.

Conflicts of Interest

The authors declare no conflict of interest.

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Fig. 1. Mode of delivery

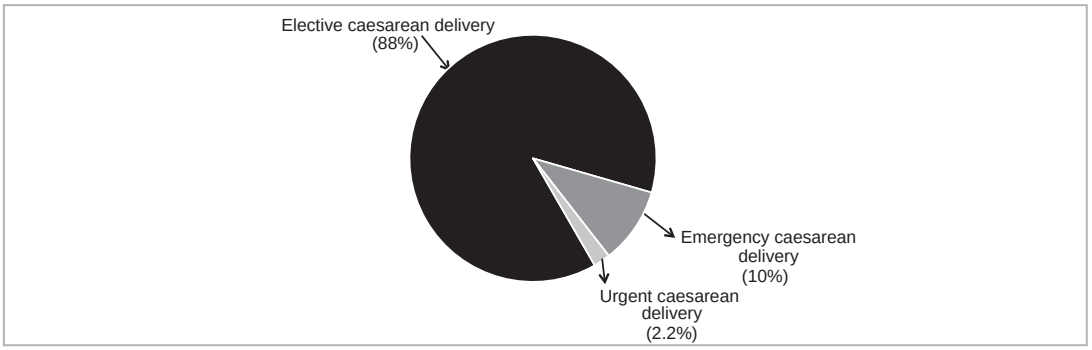

Fig. 2. Primary indication for caesarean section as the mode of delivery

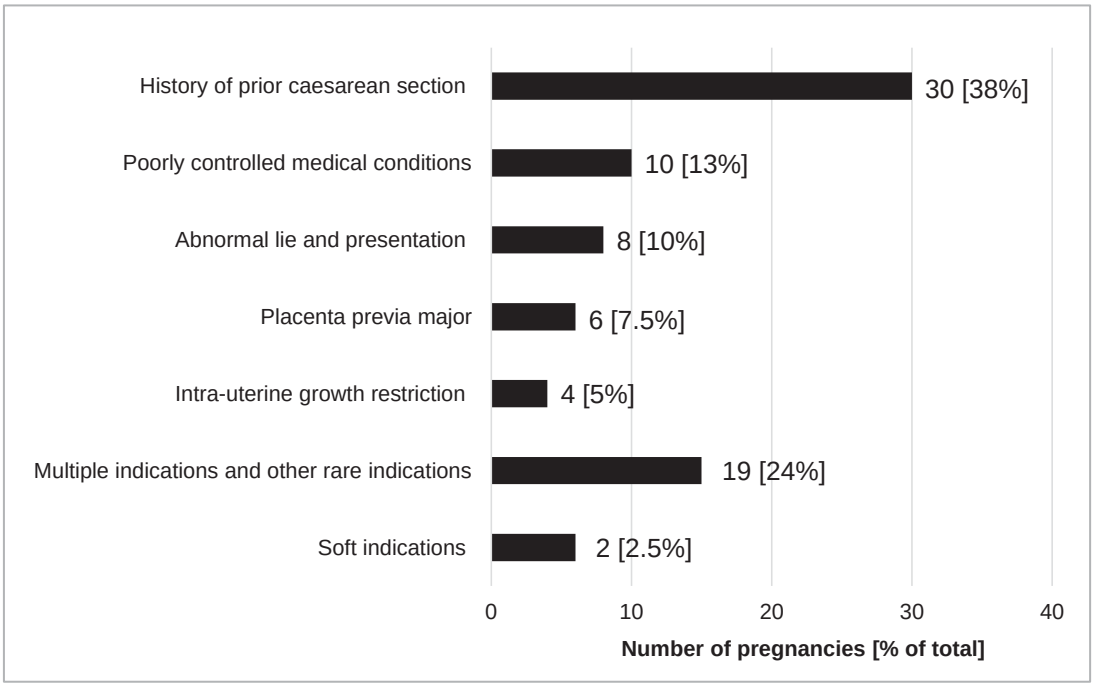

Fig. 3. Indications for scheduling elective delivery between 37 to 38 weeks of gestation

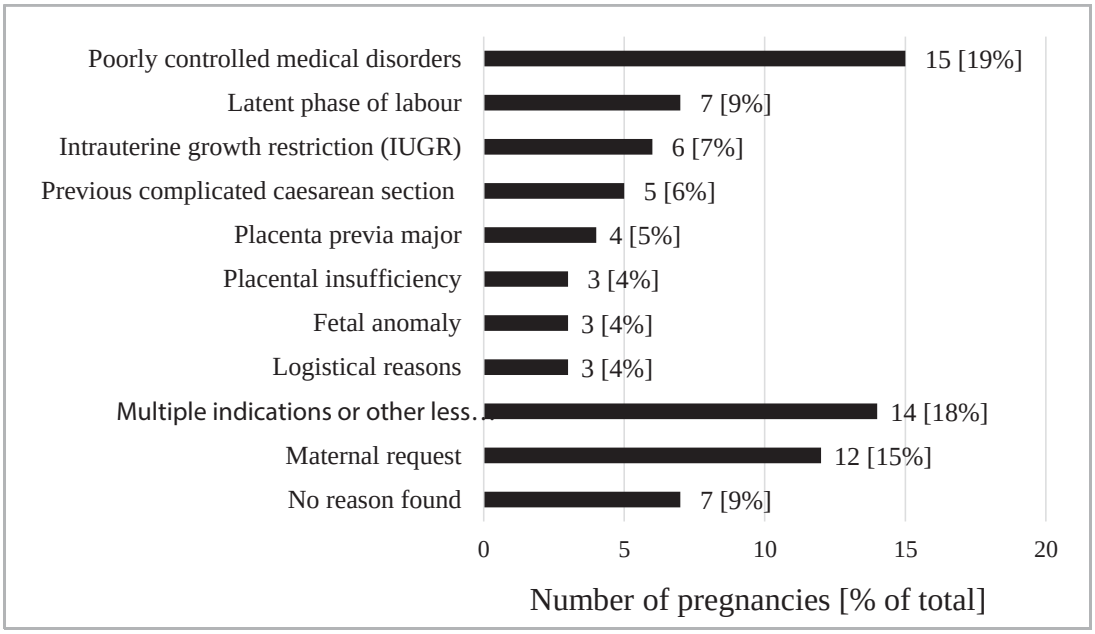

Table I. Details of indications for caesarean section as the mode of delivery

Indication	Number of pregnancies (% of total)
History of prior caesarean section:	**30 (38%)**
Woman with one prior caesarean section opting for elective repeat caesarean section (ERCS)	17
More than one prior caesarean section	7
History of complicated caesarean section (uterine tear, extended caesarean, inverted T incision, classical caesarean section)	5
ERCS in woman with prior history of Fenton's repair	1
Poorly controlled medical conditions:	**10 (13%)**
Type 1 diabetes mellitus on insulin	1
ERCS in women with type 2 diabetes mellitus on insulin	3
Gestational diabetes (GDM) on insulin	1
ERCS in women with GDM on insulin	2
Pre-eclampsia	1
ERCS in woman with pre-existing hypertension	1
Pregnancy-induced hypertension	1
Abnormal presentation or lie opting for caesarean section:	**8 (10%)**
Singleton breech pregnancy	3
ERCS in women with singleton breech pregnancy	2
Dichorionic diamniotic (DCDA) twin pregnancy (both twins breech)	1
Transverse lie	2
Placenta previa major	**6 (7.5%)**
Intra-uterine growth restriction	**4 (5%)**
Singleton	2
DCDA twins	2
Multiple indications & other less common indications	**19 (24%)**
Soft indications: Maternal request for caesarean section	**2 (2.5%)**

Table II. Details of indications for scheduling caesarean delivery between 37 and 38 weeks

Indication	Number of pregnancies (% of total)
Poorly controlled medical disorders:	**15 (19%)**
Type 1 diabetes mellitus on insulin	1
Type 2 diabetes mellitus on insulin	3
Gestational diabetes (GDM) on insulin	3
GDM on insulin with fetal anomaly	1
GDM on insulin with history of term stillbirth	1
Pre-eclampsia	1
Pre-existing hypertension with history of abruption complicated by stillbirth	1
Pregnancy-induced hypertension (PIH)	2
PIH with placental insufficiency	1
Type 2 diabetes mellitus on insulin, pre-existing hypertension	1
Latent phase of labour	**7 (9%)**
Breech presentation	1
Multiple prior caesarean sections	3
Singleton cephalic pregnancy in a woman with one or no prior caesarean section	3
Intrauterine growth restriction (IUGR)	**6 (7%)**
Previous complicated caesarean section (uterine tear, extended section, inverted T incision, classical caesarean section)	**5 (6%)**
Placenta previa major with caesarean delivery scheduled close to 38 weeks of gestation	**4 (5%)**
Placental insufficiency	**3 (4%)**
Fetal anomaly	**3 (4%)**
Logistical reasons	**3 (4%)**
Multiple indications or other less common indications:	**14 (18%)**
History of myomectomy	2
History of myomectomy with PIH in index pregnancy	1
Multiple previous caesarean sections	2
Difficult previous caesarean section	2
Placental previa major scheduled close to 38 weeks with placental insufficiency	1
IUGR in IVF pregnancy	1
Cholestatic jaundice in pregnancy	1
Marked anxiety of expectant mother, in view of high nuchal translucency measurement and history of Fenton's repair	1
Large fibroid, advanced maternal age, IVF pregnancy	1
Rhesus negative mother with rising anti-D titres	1
History of prior pregnancy with early term labour	1
Maternal request	**12 (15%)**
No reason found	**7 (9%)**