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Trends in Caesarean Section Deliveries among nulliparous women

- an analysis using the Ten Group Classification System

Version 1

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Abstract

Background: Caesarean section (CS) rates have increased during the last decades, especially in the developed world. The reason is multifactorial. However, excessive use of CS shows few maternal or fetal benefits and instead increases morbidity. CS on first-time mothers is a driver of the total rate and measures to prevent the primary CS is of importance.

Objective: Primary aim was to analyse indications for CS among nulliparous women with single, cephalic, full term pregnancies at Örebro University Hospital. Secondary aims were to analyse differences in maternal age and gestational age depending on delivery mode.

Materials and methods: Descriptive, observational design. Data was obtained from medical records at Örebro University Hospital, Sweden. All women delivered by CS during 2010-2014 , with obstetric characteristics concordant with group 1 and 2 according to Ten Group Classification System (TGCS) were included.

Results: TGCS group 1 (N=4254) had a CS rate of 6% during the study period. The CS rate of group 2 (N=1238) was 29%. Major indications for CS were dystocia/poor progress (Group1: 47% / Group 2: 36.2%) and fetal distress (Group 1: 41.5% / Group 2: 26.5 %). Non-medical/maternal request accounted for 24.3 % of CS in group 2. Nulliparous women delivered by CS were significantly older than their vaginally delivered counterparts (Group 1: 29.5y vs. 27.8y, p <0,000 / Group 2: 30.1y vs 28.5y, p<0,000). Gestational age was significantly longer for CS pregnancies in group 1(283.6y vs.280y, p < 0,000).

Conclusions: CS rates among nulliparous women at Örebro University Hospital is low, both in a national and international perspective. Dystocia and/or fetal distress are the major primary indications for CS. Both indications are considered relative and in some cases possible to influence. Non-medical indication/maternal request was a relatively rare indication for CS in first-time mothers at Örebro University Hospital.

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Glossary and abbreviations

Ablatio placenta	Premature separation of the placenta
BMI	Body mass index
Breech lie	Presentation of the fetus during birth with the buttocks or less commonly the knees or feet first.
Cephalic	Vertex presentation
Cephalopelvic disproportion	Abnormally large size of the fetal skull in relation to the maternal pelvis
CS	Caesarean Section
Dystocia	Slow or difficult labour or delivery
Fetal distress	An abnormal condition of a fetus characterized by an abnormal heart rhythm
Full-term pregnancy	≥ 37 weeks gestation
Group 1	Ten Group Classification System group 1
Group 2	Ten Group Classification System group 2
Malpresentation	Faulty fetal presentation
Multipara	A woman who has given birth two or more times
Nullipara	A woman who has never given birth
Placenta previa	Abnormally placed placenta, which partially or totally covers the cervix.
Poor progress	A stall during labour
Preterm pregnancy	<37 weeks' gestational age at delivery
Single/singleton pregnancy	A pregnancy with only one fetus
TGCS	Ten Group Classification System

1. Introduction

Caesarean sections are at present the most commonly performed operations in the developed world [1]. With the right indication and technique, they can be lifesaving for both mother and child. However, during the last decades CS´s have dramatically increased in both the developed and developing world, without clear understanding of the drivers for this evolvement [2]. Many explanations have been proposed, including trends in the field, maternal request, medico-legal concerns, increasing maternal age and obesity [3].

This increase of CS´s worldwide has been an issue of global debate for decades among midwives, obstetricians, and the society as a whole [4]. Maternal and professional satisfaction, women´s rights and wishes, costs and safety have been elements of this debate [1].

CS´s seem to be considered relatively safe out in the community and some women even prefer a CS to a vaginal delivery even when medical indications for the procedure are lacking [5]. However, studies have shown that excessive use of this operation only has a few benefits and show a significant increase in both short and long term morbidity and in rare cases, even mortality compared to vaginal delivery [6].

In the year 1985 WHO came out with the claim that the appropriate amount of CS deliveries in any given country should not exceed 10-15 % [7]. This is a dramatically smaller percentage than the current global rate in developed countries, which is 18-20% [8]. In the USA, the current CS rate is above 30% [8] and in Brazil even higher, with rates over 40% overall and 80% in the private sector [5]. In Sweden, the average rate is still much lower, but differences between hospitals are considerable. The highest Swedish CS rate in the year 2014 was found at Danderyd Hospital in Stockholm, at 24,8%, and the lowest at Linköping University Hospital at 10,6%. The CS rate at Örebro University Hospital the same year was 14,4% [9].

No absolute agreement on the appropriate overall CS rate has however been reached in the field [10]. Striving for a particular rate has also been questioned, and it has been suggested that an appropriate rate may vary in different contexts and over time [10]. In his paper from 2012, Robson criticized the ongoing debate on caesarean sections, which focuses on a rate instead of the appropriateness, a decision based on the relevant information [10]. Robson also claimed that the CS rate should not be isolated from other changes in the society [4].

One step in the process of collecting the relevant information is to analyse the CS patients. Who are the women undergoing this procedure? Many different classification systems have developed for this purpose, and the Ten Group Classification System, TGCS, proposed by Robson in 2001 is perhaps the best on so far [2]. This classification system divides all deliveries into ten groups, depending on their obstetric characteristics [4]. The variables in this system are parity, single or multiple pregnancy, fetal presentation, full term or preterm pregnancy and spontaneous or induced labour/prelabour CS [4]. The TGCS, which is totally inclusive and mutually exclusive is now incorporated in many facilities and countries routines to monitor and evaluate the CS rates in their population [2]. This is also the case in the Swedish setting.

Studies using the TGCS have shown that the key to lowering the total rate of CS´s is prohibiting the first one, which is the driver of the total rate [11,12]. Prohibiting the first cesarean has also been shown to be important in preventing morbidity and mortality in subsequent pregnancies [6]. Thus, in order to change the trend of a rising CS rate as well as preventing complications in subsequent pregnancies, the focus should be on the delivery of nulliparous women.

TGCS categories, 1, 2 and 6 exclusively include nulliparous women with single pregnancies. Groups 1 and 2 are the largest, comprised of women expecting their first child, with full term pregnancies with vertex presentation. Robson group 2 patients differ from group 1 by induction of labour or being electively delivered by CS before spontaneous labour start. Group 6 is the group for breech pregnancies and, therefore, a group where the CS rate is less modifiable. In many previous studies as well as the annual reports from Swedish Society of Obstetrics and Gynecology (SFOG) groups 1 and 2 are considered as the groups of nulliparous women possible to influence with regard to the mode of delivery [9].

The indications for caesarean sections, obstetric, maternal or fetal are numerous, but only a few of them are considered absolute [11]. Spong et al. list complete Placenta Previa, Vasa Previa, and Cord prolapse as absolute indications and the rest, which represents the majority of indications as more or less relative and, therefore, modifiable [11]. In these more or less subjective cases patients and physicians attitudes concerning risks and benefits may play a key role [11].

In this study, we aim to analyse the rate and the physician-documented indications, primary and secondary, for caesarean sections performed on patients in TGCS groups 1 and 2, thus nulliparous with single, cephalic, full term pregnancies at Örebro University Hospital between the years 2010-2014. We also aim to study correlations between mode of delivery and factors such as maternal age, BMI, gestational age and fetal birth weight.

2. Material and method

2.1 Design and population

This descriptive, observational study was conducted at the Department of Gynecology and Obstetrics at Örebro University Hospital, a tertiary referral hospital in the central part of Sweden. The patient group consists of residents of the Örebro City area as well as referrals from nearby hospitals, due to high-risk pregnancies.

All nulliparous women giving birth at Örebro University Hospital during the years 2010-2014 with obstetric characteristics concordant with TGCS groups 1 and 2 were included (5492 women). Excluded were nulliparous women with an abnormal or breech lie as well as women with preterm or multiple pregnancies.

2.2 Data collection

In order to classify the patients, the Ten Group Classification System (TGCS) was applied. Data for TGCS groups 1, 2 and 6 was collected from the electronic obstetric medical record, Obstetrix, from January 1st, 2010, through December 2014. Characteristics for each TGCS group are descriebed in Figure 1.

Three parts of the records were scrutinized, the MHV1 form added by midwives at enlistment, the physician added operation report and medical record notes. This data includes date and time of birth, ultrasound verified expected date of birth, mothers date of birth, maternal height and weight, fetal presentation and indication(s) for the CS. The data in Obstetrix is prospectively added and in the case of this study retrospectively retrieved.

The 38 physician recorded indications in the form of ICD-diagnoses were grouped into 8 main groups in the final analysis. These groups, constructed for analysis, with associated diagnoses and ICD-codes are found in the attachments.

2.3 Statistical analysis

The collected data was analysed in SPSS (Statistical Package for Social Sciences, Microsoft Inc.) software, version 22. Categorical data were described as frequencies and continuous data was expressed as means. Interferential statistics with nominal variables were analysed by Chi-square test and means were compared with the independent t-test. A p-value of < 0.05 was considered significant.

2.4 Ethical considerations

This study is based on retrospectively retrieved medical record data and did therefore not influence the treatment of the patients. No specific consent for the collection of data was retrieved from included patients. Due to the large size of participants however, the results are depersonalized and individual patients can not be identified. The ambition is to apply the results of this study into the clinical practise

and thereby improve the care of future patients. Due to the quality assurance aim of the study, no ethics committee application was applied.

3. Results

3.1 Caesarean section rates

14 037 mothers gave birth at Örebro University Hospital during 2010-2014. The overall rate of CS was 13.6 %. The largest total number of deliveries was found among women with obstetric characteristics concordant with TGCS group 3, followed by group 1. However, the largest total number of CS was found in TGCS groups 5 (single, cephalic, full term with previous CS), followed by 2 and 1, the two latter constituting the groups of interest to this study.

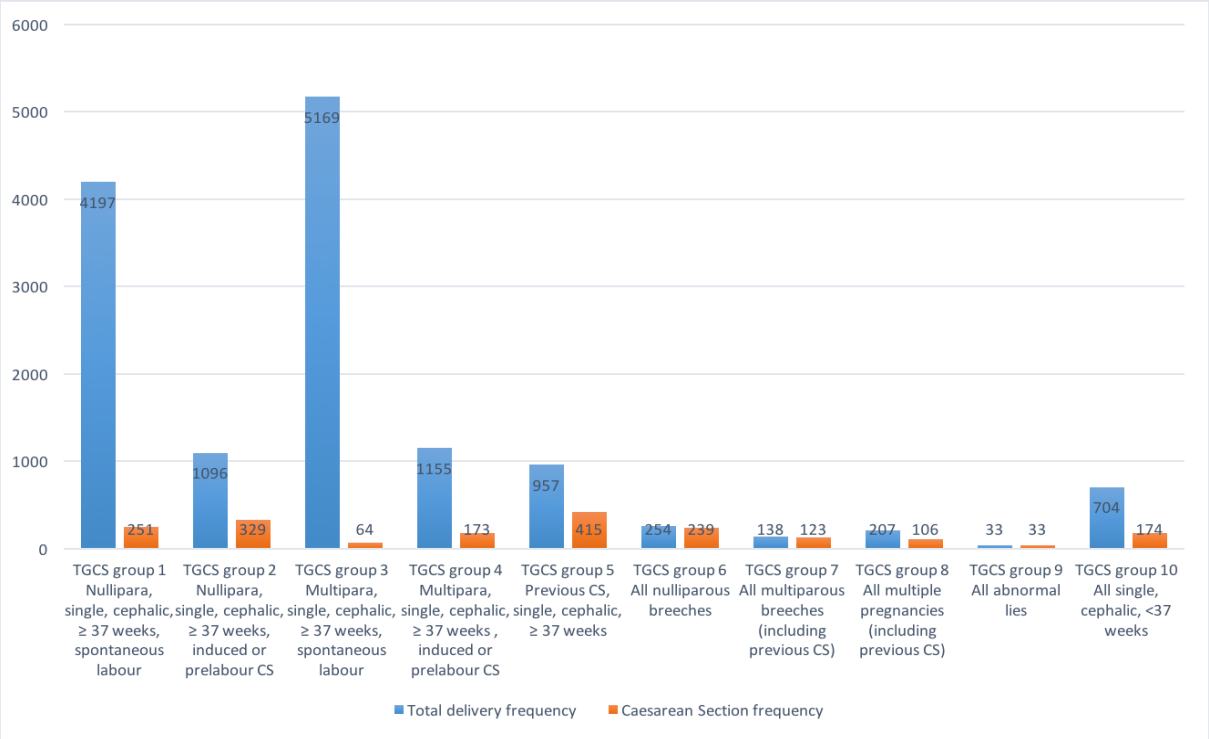

Figure 1. Delivery and Caesarean section incidence according to the Robson report, for each Ten Group Classification System (TGCS) group separately, at Örebro University Hospital 2010-2014. Obstetric characteristics for each group are found under the group name.

A total of 4254 women had obstetric characteristics coinciding with TGCS group 1. Of these women, 79.9% underwent a vaginal delivery, 14.1% a vaginal delivery, with instrumental assistance, by vacuum extraction or forceps, and 6% were delivered by CS. Among women with obstetric characteristics coinciding with TGCS group 2, a total of 1238 women, 54.5% underwent a vaginal delivery, 16.2 % an instrumental delivery and 29.3% were delivered by CS.

During the same years, 354 women had the obstetric characteristics concordant with TGCS group 6, thus, breech position. In this group the rate of CS was 94,1%.

3.2 Primary indications

In group 1 we found 20 different ICD-codes used to record the primary indication for CS. 38 different primary indications were found for CS in group 2. The indications for CS in nulliparous breech (group 6) were not analysed further due to a breech position in itself being an indication for the procedure. The distribution of primary indications is displayed in Figure 2.

No significant difference in mean maternal age was seen depending on if dystocia or fetal distress was the primary indications for CS (30.0y vs. 28.9y, p = 0.098) in group 1.

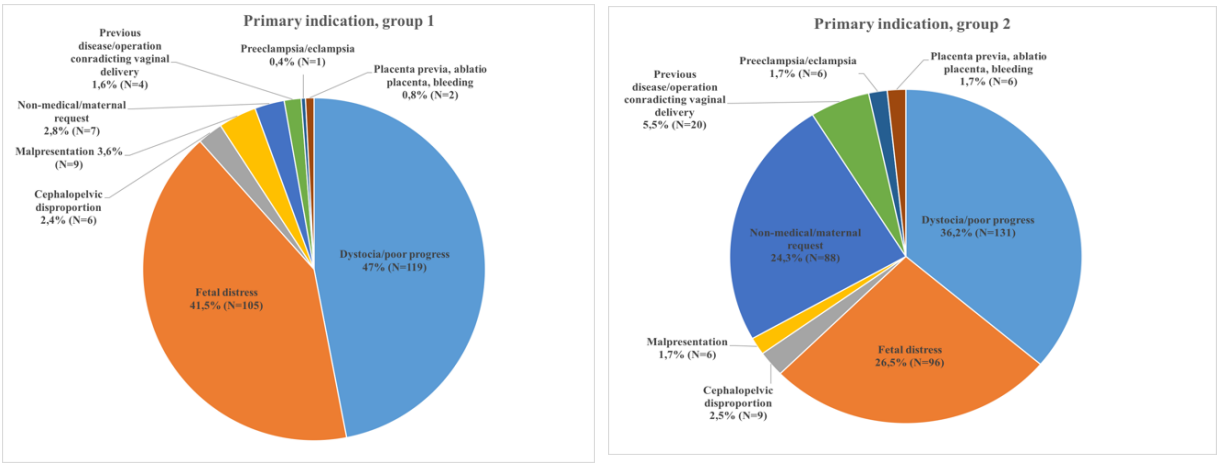

Figure 2. Primary Indications for Caesarean sections 2010-2014, Örebro University Hospital, in group 1 and 2 respectively.

3.3 Secondary indications

In 14.2 % (N=36) of the group 1 CS and in 7.2% (N=26) of the CS in group 2, a secondary ICD-code for indication was given. Only 1 patient, belonging to group 1, was found to have a third indication, a diagnosis classified under cephalopelvic disproportion. The most common combination of primary and secondary indication was Dystocia/poor progress with Fetal distress. In group 1 this combination constituted 47% of all cases and for group 2 the amount was 37%.

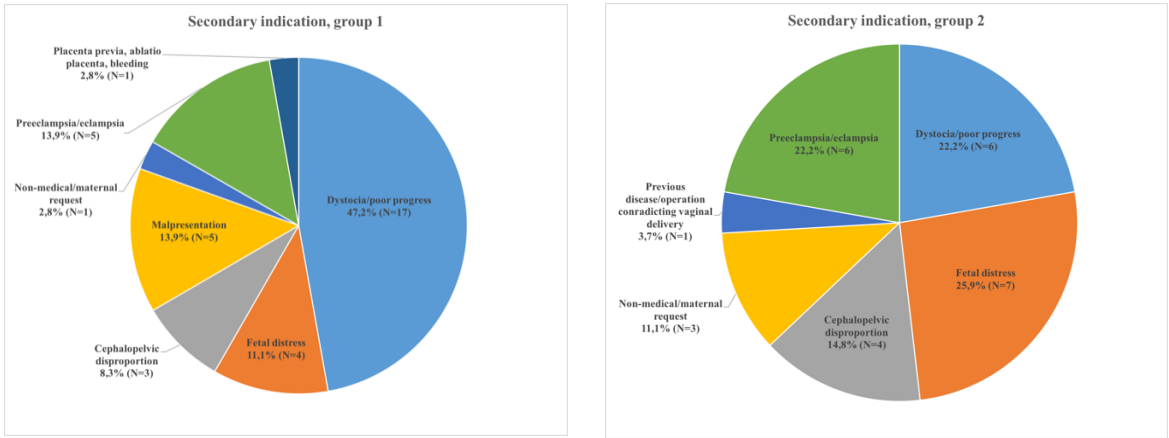

Figure 3. Secondary Indications for Caesarean sections, 2010-2014, Örebro University Hospital, in group 1 and 2 respectively.

3.4 Changes in indication for Caesarean Section during the study period

In Figure 4 the different indications are compared over the five-year period for groups 1 and 2 separately. For each group the ratio between indication stay relatively similar, no significant variation is to be found. In addition to the two main indications, in group 2, also, Non-medical/maternal request contributes considerably, with similar ratios for all five consecutive years.

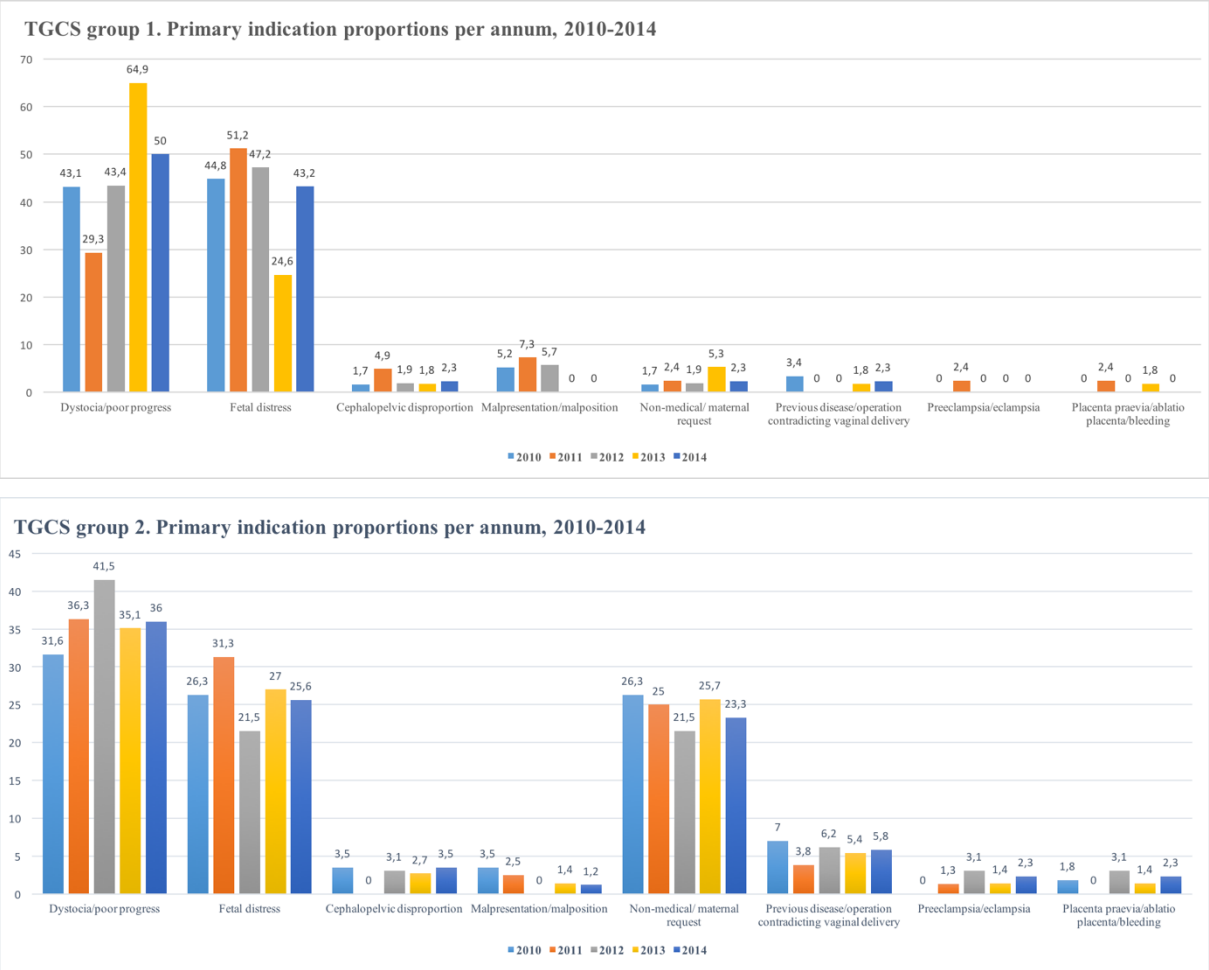

Figure 4. Primary indication in percentage of total, per annum, 2010-2014, Örebro University Hospital, for group 1 and 2 separately.

3.5 Maternal and fetal characteristics depending on mode of delivery

Mean maternal age differed between the CS and vaginally delivering populations. In both group 1 and 2 CS mothers were significantly older. Also, a significant difference in gestational age was found for CS as compared to vaginal delivery in TGCS group 1. In TGCS group 2 the difference in mean age and mean gestational length was small, and not statistically significant.

Mean maternal BMI and mean fetal birth weight was calculated for women delivered by CS but statistical comparison between other modes of delivery was not performed in this study. Results are shown in Table 1.

Table 1. Characteristics of women and pregnancies by mode of delivery, for patients with TGCS groups 1 and 2 characteristics, 2010-2014, Örebro University Hospital.

	Caesarean delivery	Instrumental vaginal delivery	Vaginal delivery	p-value
TGCS 1				
Mean age of mother (years)	29.5		27.8	p <0.000
	29.5	29,13		p =0.289
Mean Gestational age (days)	283.6		280	p <0.000
	283.6	282		p <0.013
Mean BMI at enlistment (mother) (N=241) (std 95%)	25.6 (0.34)			
Mean height, mother (m) (N= 247) (std 95%)	1.63 (0.07)			
Mean weight, mother (Kg) (std 95%)	68.2 (15)			
Childs birthweight (gram) (std 95%)	3630 (568)			
TGCS 2				
Mean age of mother (years)	30.1		28.5	p <0.000
	30.1	29.22		p =0.063
Mean Gestational age (days)	281.8		281.6	p =0.849
	281.8	283.8		p =0.043
BMI at enlistment (mother) (N=255)(std 95%)	26.6 (5.5)			
Mean height, mother (m) (N= 356) (std 95%)	1.64 (0.07)			
Mean weight, mother (Kg) (std 95%)	72.1 (15.9)			
Childs birthweight (gram) (std 95%)	3575 (600)			

4. Discussion

4.1 Main results

The total CS rate at Örebro University Hospital has varied through the years. In the 90`s the total rate was 8-9% [13]. A substantial increase was observed during the first decade of the 21st century with rates up to 15-16% during 2004-2008 [13]. Since then, the rate has slightly decreased to 13-14%. During 2010-2014, the rates have been unchanged with small variations. However, in a global comparison, these total rates are still low, far from American [14] or central European CS rates of over 30% [15].

The CS rate of 6 % in the Örebro group 1 is also in the lower range of the global scale. A nine hospital comparative study on group 1, showed a CS rate ranging from 5.7 % in Norway to 20.6 in New Zeeland [3,16].

In group 1, almost 90% and in group 2, over 60% of the primary indications were either Dystocia/poor progress or fetal distress. These findings are consistent with other studies that also show these two indications to be the most prevalent in the nulliparous population [16-19]. However, a study from New Haven, USA show a smaller proportion (60%) and, therefore, a greater variety of indications in the nulliparous patient population [12]. An Egyptian study found an alarming increase of dystocia/failure to progress in group 1 from 30% (2008) to 70% (2011), thus, a considerably smaller rate of fetal distress [18]. I.e, the indications show a considerable variation in different contexts.

Both of the most prevalent indications are considered relative and in some cases possible to influence. How well the criteria for these indications are met has not been evaluated in this study. Interesting, however, is the fact that the total sum of these two indications is fairly constant for each year, yet the interrelation between them varies between different years.

The overall rate of CS due to non-medical/maternal request among nulliparous women (TGCS 1 and 2) was 1.7% and constituted 15.4% of the primary indications udes for CS in these groupes. This indication has been seen to increase substantially in Sweden during the last decades [20,21]. Florica et al. showed that maternal request at Södersjukhuset, Stockholm had significantly increased between the years 1994-1999, from 1.2% to 2.7% of all deliveries [20]. In a study carried out in Canada and Switzerland the CS carried out at the request of the mother ranged from 0.4 – 5% [22]. In the USA the estimated current rate for CS with this indication was around 3% [23].

The contribution of this indication to CS rate in Örebro is comparatively low, especially baring in mind that other psychiatric conditions are also included and no increase of this indication is seen during the five-year study period.

Previous studies have shown that higher BMI and higher maternal age increase the incidence of a CS and this study collaborate these results [24,25]. However the association of maternal age as a risk factor particularly for dystocia, as seen in previous studies was not shown [24]. Mean maternal BMI was higher among nulliparous women in our population delivered by CS compared to mean maternal BMI among nulliparous women in Swedish national register (25.6 (group 1)/ 26.6 (group 2) vs 24.3) [26]. The same observation can be made for mean fetal birth weight (3630g (group 1)/3575g (group 2) vs 3510g) [26].

4.2 Strengths and limitations

The data used for analysis in this study is the same as reported to the Swedish Medical Birth Registry for their annual national reports. The national register is well studied and quality assessed [27]. Inconsistencies in the reported indications were verified in medical records for full accuracy. The population included all nulliparous women delivered during the study period making selection bias unlikely.

A longer study period than five years would however have been preferable for analysing trends over time. Also, for a full comparison of the three main delivery mode groups; vaginal, vacuum extraction and CS a complete medical record review, with the collection of data also for the two former groups, would have given the opportunity to analyse differences in mean maternal BMI and fetal birth weight further.

Another limitation was inconsistencies regarding indications between operation records and the epicrisis in the same record and a lack of a hierarchical and standardized system for primary and secondary indications.

The medical record selection of patients based on their obstetric characteristics constituted another limitation due to some of the given patients not, in reality, being nulliparous, but new patients to the hospital. However, these patients were excluded during the record screening for the CS women but the inconsistency may slightly affect the controls in the vaginal and instrumental vaginal delivery groups were this record scrutiny was not possible. This discrepancy in data can be observed as differences in patient quantity collected from the medical record obtained Robson reports (Figure 1) and the analysed data.

4.3 Is there an appropriate Caesarean Section rate?

Robson argues that the CS rate will ultimately be determined by fetal and maternal well-being and this will vary depending on time and place [10]. The rate in itself is unimportant, the key is, to have the right information to make a justified decision [10]. This is where the indications come in and the question of which indications are to be considered appropriate? Simple and replicable, well-defined indications and a given primary indication are requirements Robson has stated for enabling the analysis of good quality of care [10].

The CS rate is a medical question but also a question for the society as a whole, especially regarding maternal request [16]. It has been suggested that part of the trend with rising CS rates is a result of a changing attitude and a lower thresholds regarding maternal request as well as other indications [16,28]. The reason for this is scarcely medical, but perhaps sociocultural and medico legal. Patient autonomy is strongly emphasised in modern health care and some argue that the mode of delivery should be entirely a maternal choice. The maternal request for CS can also be seen as a lack of trust in the health care surrounding vaginal delivery. Actions to reclaim the trust and satisfaction of vaginally delivering women are a first approach in lowering requested CS.

5. Conclusions

Overall rates of CS among nulliparous women at Örebro University Hospital is low both in a national and international perspective. Dystocia and/or suspicion of fetal distress were the major primary indications for nulliparous women delivering by CS. Both indications are considered relative and in some cases possible to influence. Further studies in the area should focus on major indications for CS in nulliparous women identified in this study, for example the compliance to protocols on labour progress and interpretation of fetal heart rate surveillance.

Non-medical indication/maternal request was a relatively rare indication for CS in first-time mothers at Örebro University Hospital. A nuanced medical, ethical and cultural discussion among obstetricians and in the community as a whole is however required regarding the indication maternal request.

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iiii. Attachments

Att 1. Grouped indications for Caesarean Sections.

Analysis Groupes	Recorded diagnoses with associated ICD-code
1 Failure of progress	1. Hypertonic uterine dysfunction, primary O62.2 2. Hypertonic uterine dysfunction, secondary O62.1 3. Dystocia O62.9 4. Hypertonic uterine dysfunction O62.4 5. Prolonged labor un-spec. O63.9
2. Fetal distress	1. Threatening or manifest fetal asphyxia O68.9 2. Signs of fetal hypoxia O36.3 3. Intrauterine poor fetal growth O36.5 4. Care of mother due to other abnormality or injury on fetus O35.8 5. Umbilical cord prolapse O69.0 6. Umbilical cord complication O69.9
3. Cephalopelvic disproportion	1. Excessive fetal growth O36.6 2. Labor obstruction due to narrow pelvis O65.3 3. Care due to suspected disproportion between fetus and pelvis O33.9 4. Labor arrest due to disproportion pelvis-fetus, un-spec. O65.4
4. Malposition/ Malpresentation	1. Deep transverse arrest O64.0 2. Asynclitism or malrotation O64.8 3. Face presentation O64.2 4. Forehead presentation O64.3 5. Fetal obstruction transverse/oblique lie O64.4
5 Non-medical/ Maternal request	1. Cesarean section on maternal request O82.8 2. Acute stress reaction R45.7 3. Psychiatric disorder O99.3 4. Intrauterine fetal demise O36.4 5. Exhausted mother O75.0
6. Previous disease/operation contradicting vaginal delivery	1. Uterine scar O34.2 2. Anemia O99.0 3. Herpes simplex infection, unspec. B00.9 4. Myoma O34.1 5. Essential hypertension O10.0 6. Diabetes in pregnancy O24.4b 7. Other infection during labour O75.3 8. Diabetes type 2 prior to pregnancy O24.1 9. HIV O98.7 10. Diabetes, prior to pregnancy, insulintreated O24.0 11. Disease of skin and subcutaneous tissue O99.7 12. Other specific urine incontinence N39.4 13. Hereditary motor and sensory neuropathyG60.0 14. Behçets disease M35.2 15. Care of mother due to abnormality in pelvic organs after prior pelvic surgery O34.8C 16. Fistula between vagina and colon O82.3 17. Cancer in situ, cervix – adenocarcinoma cervix D06.9 18. Heartinsufficiency, unspec. I50.9 19. Ulcerative colitis K51.9 20. Ehler Danlos syndrome Q79.6
7. Preeclampsia/eclampsia	1. Severe preeclampsia O14.1 2. Mild to moderate preeclampsia O14.0 3. Preeclampsia unspec. O14.9 4. Eclampsia during pregnancy O15.0
8. Placenta praevia, ablatio placentae, bleeding	1. Other premature separation of placenta O45.8 2. Other specific bleeding prior to labour O46.8 3. Placenta praevia O44.0/O44.1 4. Vaginal bleeding prior to labour, unspec. O46.9

Letter of intent

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Dear Editor-in-chief,

Attached you will find our manuscript titled *Trends in Caesarean Section Deliveries among nulliparous women. An analysis using the Ten Group Classification System* for consideration for publication in *Gynecology and Obstetrics.*

This is an observational study of the total single, cephalic, fullterm, nulliparous population giving birth at Örebro University Hospital, Sweden during the years 2010-2014. The medical records for patients undergoing Cesarean Section were scrutinized regarding indication for the procedure as well as maternal age and BMI, gestational age and fetal birth weight.

The two main indications, accounting for more than 90% in the group with spontaneous labour start and 60% in the induced /prelabour cesarean section group, were either Dystocia or Fetal distress. Of the total poulation of nulliparous women, caesarean section on maternal request accounted for 1,7%. The Cesarean section mothers were found to be significantly older than their vaginally delivering counterpart in an independent t-test analysis.

This is the first study on CS indications in nulliparous women at Örebro University Hospital and the study has never been published elsewere. The author hereby convey all copyright to *Gynecology and Obstetrics* in the event of publication by the paper.

We look forward to hearing from you soon.

Yours sincerely,

Jessica Tikkala

ÖREBRO UNIVERSITY
SCHOOL OF MEDICAL SCIENCES

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Förlossningsrädsla är en relativt ovanlig orsak till kejsarsnitt bland förstföderskor i Örebro

En studie gjord bland förstföderskor på Universitetssjukhuset i Örebro visar att de allra flesta kejsarsnitt utförs p.g.a. värksvaghet eller risk för syrebrist hos barnet. S.k. humanitär orsak, dvs att kejsarsnittet utförs på grundval av moderns önskan, oftast p.g.a. förlossningsrädsla sker endast i 1,7% av alla förstföderskors förlossningar. I internationell jämförelse är detta en relativt låg siffra.

Den totala kejsarsnittsfrekvensen i Örebro ligger på cirka 14%, vilket är lågt internationellt sett. Även i svenska mått mätt är detta lågt, om än inte lägst i landet. I dagsläget har Linköping de lägsta siffrorna med cirka 11% och Danderyds sjukhus i Stockholm de högsta med cirka 24% (2014). Tidigare studier har visat att kejsarsnitt på förstföderskor styr den totala frekvensen och är därför den grupp man bör fokusera på att påverka den totala kejsarsnittsfrekvensen.

Denna studie undersökte orsakerna till de utförda kejsarsnitten på förstföderskor i Örebro mellan åren 2010-2014. Orsakerna var nästan uteslutande värksvaghet hos modern eller en risk för syrebrist hos barnet. I cirka 15 % av kejsarsnittsfallen i denna grupp var orsaken en önskan från den blivande modern, i avsaknad av medicinska skäl. Detta är internationellt sett en relativt låg siffra. Tidigare studier har observerat andelar på mellan 0,4-5% i utvecklade länder. Övriga orsaker till kejsarsnitten, såsom havandeskapsförgiftning, trångt bäcken hos moder eller livshotande blödningar var ovanliga enligt i denna studie.

De vanligaste orsakerna till kejsarsnitt bland förstföderskor i Örebro, värksvaghet hos modern och risk för syrebrist hos barnet, är inte alltid absoluta, utan en bedömningsfråga i varje enskilt fall. Detta innebär därmed också att de är möjliga att påverka och skillnader i bedömning kan ligga som grund till olika frekvenser i olika delar av landet.

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Studiens namn: *Trends in Caesarean Section Deliveries among nulliparous women. An analysis using the Ten Group Classification System*

Author: Jessica Tikkala, School of Medical Sciences, Örebro University
Supervisor: Ann Kristin Rönnberg, Dept. Of Gynecology and Obstetrics, Örebro University Hospital

Titel: ***Trends in Caesarean Section Deliveries among nulliparous women. An analysis using the Ten Group Classification System***

Ethical considerations

The department of Gynecology and Obstetrics had the ambition to do this quality assurance study in order to revise routines regarding assessment of caesarean sections in the nulliparous population. The department has statistics on the rates of caesarean sections but not the indications for them. This study will serve as foundation for an internal discussion on the appropriateness of the caesarean sections performed at the clinic as well as the possibilities to influence them. Ultimately the aim is to improve the care for delivering women and infants at Örebro University Hospital.

Non- maleficence

The study does not constitute a direct physical intervention on the patients. The material used is retrospectively retrieved from the obstetric medical records and does not intervene with the patient care or compromise the patients´ treatment. However, the ambition is that the statistics retrieved shall lead to less morbidity in upcoming deliveries and the improvement of care for future patients.

Autonomy and beneficence

The study includes over 5000 patients, of which approximately 600 patients´ medical records were reviewed. The large population depersonalizes the results. Also the manner in which they are presented makes it unlikely to derive them to individual patients. However, the patients in this study have not given their direct approval to contribute. They have not given their approval to this particular study, thus the patients´ autonomy is challenged. To minimize the autonomy violation, only the obstetric records were reviewed and only information on the pregnancy and delivery of interest was retrieved. The advantage, beneficence to the society, and future mothers stand against the individual´s integrity, autonomy and right to privacy. The privacy is guarded by the depersonalization of the data as well as the professional secrecy, confidentiality of the author and the computer security.

Ethics approval of research

Due to the quality assurance aim of this study no ethics committee application was applied. The operations manager at the Department of Gynecology and Obstetrics at Örebro University has given his written approval for the conduction of the study. The work is also carried out within the medical programme at the School of Medical Sciences at Örebro University.