"CAROL DAVILA" UNIVERSITY OF MEDICINE AND PHARMACY
BUCHAREST
DOCTORAL SCHOOL
DOMAIN MEDICINE

Peculiarities of pregnancy and birth in pregnant adolescents

SUMMARY OF THE DOCTORAL THESIS

PhD Coordinator:
PROF. UNIV. DR. IONESCU CRÎNGU ANTONIU

PhD Student:
MATEI ALEXANDRA

YEAR
2022

Table of contents

List of abbreviations and symbols

AAFP: American Academy of Family Physicians

AAP: American Academy of Pediatrics

ACOG: American College of Obstetricians and Gynecologists

CI: confidence interval

Covid-19: Coronavirus 19

CS: Caesarean section

CTG: cardiotocography

dl: deciliter

DSM-5: The Diagnostic and Statistical Manual of Mental Disorders 5th edition

EBCOG: European Board&College of Obstetrics and Gynecology

EPDS: Edinburgh Postnatal Depression Scale

E/R: episiotomy/episiorrhaphy

FIGO: International Federation of Gynecology and Obstetrics

g: gram

kg: kilogram

ICD-10: International Classification of Diseases-10

m: meter

m^2: square meter

Max: maximum

Min: minimum

OR: odds ratio

PDS: Perinatal Depression Syndrome

RTGCS: Robson Ten Group Classification System

Std Dev: standard deviation

VBAC: vaginal birth after Caesarean section

WHO: World Health Organization

Introduction

The period of adolescence, known both as a period of risks and opportunities, often marks the debut of sexual life as a form of manifestation of sexuality and expressiveness; however, lack of knowledge and experience often facilitate the process of acquiring sexually transmitted diseases and/or unplanned pregnancies. World Health Organization (WHO) defines adolescence using as a chronological landmark the period between 10 and 19 years of age, characterizing this decade during one's lifetime as a combination of accelerated growth and development mechanisms, affecting both physical and intellectual levels, irrespective of the involved period of adolescence: early adolescence (between 10-14 years of age), middle adolescence (between 15-17 years of age) or late adolescence (between 18-19 years of age) [1]. Maternity at a young age is a frequently encountered obstetrical concept in Romanian medical practice, without having a corresponding specific speciality-related management, pregnancy, birth and the puerperium are considered a unitary entity, independent of the associated maternal age. Analysing the national data related to the European context reveals a shocking conclusion: Romania contributes almost one quarter (23%) to the overall European Union number of births in mothers under 18 years of age [2].

This thesis is aiming to point out the decisive role of the obstetricians in reassuring the optimal maternal health status in young pregnant women, related to an unjust medical system concerning the universal accessibility of patients. There were 3 themes analysed in this thesis, based on data regarding the social and demographic variables of teenage mothers and their outcomes during the perinatal period and hospitalization:

- The screening of perinatal depressive pathology using the Edinburgh Postnatal Depression Scale (EPDS) questionnaire and the analysis of the corresponding social background of the patients
- Implications of the episiotomy practice during vaginal delivery in adolescent mothers and the analysis of intrapartum soft tissue lacerations
- The analysis of the mode of delivery in pregnant adolescents and the retrospective identification of young women at risk of Caesarean Section (CS) delivery.

Besides these aspects, it is relevant to mention that the perceptions of young pregnant women towards intrapartum soft tissue trauma differ significantly: while some of them acknowledge this as a potential event correlated with the natural birth process and are ready to

face it, others see it as a psychologically traumatic event [3]. The evaluation of the relation between the intrapartum perineal trauma and the development of postnatal depression led to conflicting results; however, maternal resilience was found to be a protective factor concerning the development of depressive symptoms at 6 weeks postpartum, in the context of severe perineal lacerations during spontaneous birth [3]. Although in Romania there is scarce data regarding the mode of delivery in the adolescent pregnant population, CS is the preferred method of delivery in some medical units, to the detriment of a vaginal birth; this is an alarming fact with respect to the obstetrical future of these mothers and the possible comorbidities correlated to the following pregnancies, knowing that in Romania, the national rate of CS reaches 44.1% [4, 5].

The Robson Ten Group Classification System (RTGCS) has previously been validated by WHO, the International Federation of Gynaecology and Obstetrics (FIGO) and the European Board and College of Obstetrics and Gynaecology (EBCOG) as a globally standard tool to assess the process of evaluation, monitoring and comparing the rates of CS reported by a medical institution or between institutions in the same or different regions, states or periods [6, 7].

GENERAL PART

Chapter 1

Adolescence pregnancy and perinatal depression: two affiliated entities

WHO considers that mental health is "a state of wellbeing where every person is aware of its potential, can manage stressful life situations, can work in a productive and useful manner and is capable of manifesting its contribution to the development of the community he's taking part of" [8].

The research conducted on teenage mental health revealed that the key point to understanding its mechanism is to analyse their associated risk behaviour [9]. In 2020, 11% of the Romanian population was represented by adolescents [10]. The most recent data regarding the health status of mother and child published in "The state of the world's children 2021", states that in our country the rate of young mothers aged 15-19 years was 36/1000 mothers during the 2015-2020 period [10]. The problem with young-age maternity is that it involves high rates of school dropout, infant abandonment, and social exclusion [11], all of these adverse events have the potential to further jeopardize the maternal health status, by perpetuating risk behaviour or the development of the depressive syndrome.

Teenagers that become mothers come from a heterogeneous group of young women: their education level is an essential factor influencing risk behaviour acquirement and their integration into vulnerable populational groups. The unfavourable prognosis of pregnancies acquired during adolescence involves both the foetal and the maternal outcome. Intrauterine growth restriction is an obstetrical complication which can be frequently identified in this particular context; gestational anaemia and pregnancy-induced hypertension are other entities which amplify maternal morbidity and can also increase the risk of antepartum foetal demise [12]. Moreover, it has been proven that mothers aged 16-17 years old have an associated 1.32 times higher risk of antepartum foetal demise [13]. The psychological distress perceived by young mothers during pregnancy can manifest as anxiety, depression or exacerbated levels of stress; at the same time, it has been linked to increased perinatal medical assistance costs and increased risk of foetal abuse and neglect [14]. In other words, the experience of maternity during adolescence and maternal mental health integrity are both predictors of the infant's psychological status in early childhood [10].

Perinatal depression syndrome has been defined as a depressive episode which meets all DSM-5 criteria of a major depressive episode:

A.   Five or more of the following symptoms present identified for two weeks and involve a disruption of the previous functioning lifestyle; at least one of the symptoms is (1) depressed mood or (2) loss of interest or pleasure

1. Depressed mood most of the day, almost daily, as indicated by either subjective account (the patient feels sad or hopeless) or observation made by others (the patient appears tearful). Note: in children and adolescents, irritable mood can be detected

2. Marked diminished interest or pleasure in all or almost all activities, most of the day, almost daily (as indicated by either subjective report or observation made by others)

3. Significant weight loss without dieting or weight gain (for example, a >5% change in weight for one month period) or reduced or increase in appetite almost daily. Note: in children, it is important to identify the failure to follow the growth curves

4. Insomnia or hypersomnia almost daily

5. Psychomotor agitation or retardation almost daily (as an observation made by others, not only subjective feelings of restlessness or being slowed down)

6. Fatigue or loss of energy almost daily

7. Feelings of worthlessness or excessive or inappropriate guilt (which can be delusional) almost daily (not only self-reproach or self-guilt about being sick)

8. Diminished ability to think or concentrate or indecisiveness almost every day (as indicated by either subjective report or observation made by others)

9. Recurrent thoughts of death (not only fear of death), recurrent suicidal ideation in the absence of a specific plan or suicide attempt or a specific plan for committing suicide

B.   the symptoms determine distress or significant impairment of social, occupational, or other important areas of functioning

C.   the episode is not attributable to the psychological effects of substances or other medical conditions,

in the absence of psychotic criteria and associating a debut during pregnancy or in the first 4 weeks postpartum [15].

The American College of Obstetricians and Gynaecologists (ACOG), the American Academy of Family Physicians (AAFP) and the American Academy of Paediatrics (AAP)

recommend routine screening of psychological disturbances during the perinatal period, because only 18%-25% of depressive or psychotic episodes are currently being diagnosed during the postpartum period, in the absence of specific screening [14]. The recommendation involves at least one screening evaluation during the perinatal period, using a validated screening tool for obstetrical practice such as EPDS, Patient Health Questionnaire-9 (PHQ-9), Beck Depression Inventory or the Postpartum Depression Screening Scale [14, 16].

EPDS has been validated for use in the Romanian pregnant population since 2012 and the cut-off value for further speciality evaluation of perinatal depression syndrome (PDS) was set at 12 points [17].

Previous research based on major traumatic events occurring during the perinatal period like disasters in nature or terrorist attacks, suggests that these events had been associated with the impairment of maternal psychological status, and consequently, linked to a debilitating effect on foetal development; cross-sectional studies show that Covid-19 pandemic is influencing maternal PDS in a similar manner [18].

Chapter 2

Intrapartum soft tissue trauma: the threshold between spontaneous and iatrogenic tearing

Soft tissue lacerations are part of the adverse obstetrical events group and can be identified in up to 85% of vaginal deliveries [19], their degree of severity being directly proportionate with their corresponding depth and type of affected anatomical structures. All the anatomical components of the feminine external genital tract can be affected by spontaneous tearing during vaginal birth: mons pubis, major and minor labia, vaginal vestibule, clitoris, and the perineal body; the last element is involved most often [20].

Although grade 3 and 4 lacerations can be diagnosed in only 0.6%-11% of spontaneous deliveries [19], their occurrence involves significant morbidity due to the patient being exposed to a high risk of quality-of-life impairment and future pelvic floor dysfunctions [21].

The WHO ICD-10 classification of perineal lacerations involved the following groups:

a.   1st degree involves tearing of the vaginal mucosa and/or perineal skin

b.   2nd degree: in addition to superficial tissue trauma, there is tearing of the perineal muscle body

c.   3rd degree: characterized by injury of the perineum and involving the anal sphincter complex:

- 3A: <50% of the external anal sphincter is torn

- 3B: >50% of the external anal sphincter is torn

- 3C: both the external and the internal anal sphincter are torn

d.   4th degree: injury to the perineum involving both the external and the internal anal sphincter complex and anorectal mucosa [19, 22].

For research purposes, the risk factors involved in predisposing pregnant women towards developing intrapartum soft tissue injury can be classified as follows:

- Maternal factors: nulliparity, Asian race, age ≤20 years, perineal body length <25 mm, vaginal birth after CS (VBAC)

- Foetal factors: macrosomia, shoulder dystocia, posterior foetal presentation

- Intrapartum factors: use of oxytocin or epidural catheters, prolonged stage II of labour, instrumental delivery, midline episiotomy, lithotomy birth [19, 23, 24].

The impact of both vaginal delivery itself and the possible correlated spontaneous soft tissue trauma has been proven to the involved in long-term pelvic floor dysfunction and thus, in the significant alteration of the women's quality of life, impairing further aspects such as the mother-child relationship, breastfeeding process, sexual life, postnatal recovery [23] and further social inclusion. Short-term complications related to the intrapartum perineal injury are not to be disregarded: bleeding, infections, and wound dehiscence can hinder postpartum recovery both physically and mentally and usually are predictors of long-term potential comorbidities: faecal and/or anal incontinence, pelvic floor muscle hypotonia, dyspareunia, or chronic pelvic pain syndrome [23, 25] – all these entities mark the effects of a fearful intrapartum adverse event which is the spontaneous perineal tearing. The underlying medical, social, and financial implications are to be considered rigorously as well.

Until the present time, the research regarding intrapartum soft tissue trauma of adolescent pregnant women has been incompletely explored. Some authors suggest that there is a 3 times increased risk of developing 2nd to 4th-degree perineal tearing during vaginal birth in young mothers compared to their adult counterparts but at the same time other cohort studies identified either a similar risk of OASIS development in these 2 groups or a protective role of young maternal age towards developing intrapartum tearing [26, 27].

Irrespective of the type and nature of these lacerations, early diagnosis and adapted management take part in the standard of good practice in obstetrical care; the assessment of both short- and long-term consequences of these spontaneous lesions is an essential part of patient follow-up, especially after vaginal birth occurring during adolescence since this event usually predicts a prolonged obstetrical future.

Chapter 3

CS in adolescent mothers: the Robson classification and the associated indications

Currently, the rate of CS represents a global quality care indicator, used often to quantify access to specific obstetric care [28]. The CS represents a surgical intervention which is recommended only with the purpose of maternal and/or foetal wellbeing reassurance; in the absence of a specific indication, all potential benefits become questionable [29, 30].

In 1985, WHO advocated that CS rates should be maintained below 15% [30, 31], foreseeing that there would be a rise in popularity concerning this procedure, especially in those medical systems where vaginal birth was being promoted and reduced morbidity and mortality were being registered. It was in 2001 that the Robson classification has been proposed as a useful tool in the evaluation of CS rates and the analysis of the reasons behind the constant growth of these rates; the intelligibility and reliability regarding its routine use arising from the 6 basic obstetrical parameters addressing both the mother and the foetus: parity, obstetrical history, course of pregnancy, number of foetuses, foetal presentation, and the gestational age [30, 31-33]. CS national guideline which is promoted by the Romanian Society of Obstetrics and Gynecology brings into discussion the use of Robson classification along with the fact that in our country iterative CS and the first two groups of the classification are responsible for the most significant increase in the number of CS [34].

The analysis of CS performed in the adolescent population of Romania can lead to a deeper understanding of the corresponding indications as well as the identifications of those young mothers at risk of CS birth. This peculiar approach, focusing only on teenage mothers who delivered by CS and using the Robson classification as a filter of perspective, represents an original strategy of research which is aware at the same time of its potential limitations and corresponding biases, but continues to prioritize the interest of the maternal-foetal dyad, by reassuring adequate counselling and a just, informed, and assertive birth assistance.

PERSONAL CONTRIBUTIONS
Chapter 4
Working hypothesis and general objectives

This present paper aims to identify the medical particularities associated with pregnancy and birth experience during adolescence, to be able to optimize medical assistance in this specific context. Even though all guidelines and protocols destined to be of use to the specialists concerning pregnancy follow-up and delivery assistance manage to do so in a pragmatic form, this research does not intend to criticize or reset these recommendations; the purpose is to underline a complementary perspective regarding a specific group of young pregnant women who are at risk of developing adverse maternal events as age-related consequences.

The Romanian health care system fails to assure a satisfactory level of medical education involving teenage mothers, this being the main reason why adolescents address the emergency department very often without consulting their medical needs with their family physician or the obstetricians in ambulatory service; in these conditions, most of the time the obstetrician assisting at delivery needs to assume these additional roles as well.

The working hypothesis encompasses the susceptibility of pregnant adolescents to develop perinatal complications especially secondary to their age-related risk factors. Therefore, 3 emergent themes have been identified to enlarge the horizon with respect to age-adjusted management of pregnant young women:

1. The first study focuses on an extensive demographic, social, medical and obstetrical characterization of pregnant teenagers, followed by the assessment of their susceptibility to developing PDS through a valid screening instrument

2. The second study presents the intrapartum evolution of the same pregnant population of women, centring on the integrity of their perineal soft tissue versus iatrogenic and/or spontaneous lacerations during vaginal delivery

3. The third study discloses the practice of CS among pregnant adolescents by using the Robson classification and the addition of information about the associated indications

Perinatal depression syndrome, an emotional disturbance which is underdiagnosed worldwide, requires prompt clinical suspicion and early diagnosis to be able to prevent its subsequent complications.

The practice of selective use of episiotomy along with a diligent anamnesis for maternal and foetal predisposing factors towards intrapartum soft tissue lacerations represents a globally concerning subject, therefore it is essential to identify age-specific peculiarities which could influence the incidence of intrapartum tearing.

In the context of an early obstetrical debut, knowing the indications for practising CS in young mothers becomes indispensable. More, by applying the Robson classification in medical practice, it is possible to clearly identify the groups of pregnant teenagers who are prone to delivering through CS. This way, in the future, targeted implementation of prevention strategies can become a smooth process in this field of medical practice.

Chapter 5
General research methodology

This research represents a prospective analysis of pregnant adolescents who delivered in the Obstetrics and Gynecology Department of "Sfântul Pantelimon" Clinical Emergency Hospital in Bucharest, from 1ˢᵗ of March 2020 – 1ˢᵗ of March 2021.

The observational and prospective nature of the study allowed the assimilation of additional variables which were able to reflect the equivocal characteristics of the epidemiological context, uncoiling over the last 3 years in our society under the development of the Covid-19 pandemic.

This research activity has been approved by the Ethics Committee of "Sfântul Pantelimon" Clinical Emergency Hospital from Bucharest: no. 2134/21.01.2020.

The following were considered inclusion criteria of the study participants and at the same time these features served as the foundation for the database construction:

- age <20 years
- a pregnant woman with gestational age ≥24 weeks of amenorrhea, admitted to the Department of Obstetrics of "Sfântul Pantelimon" Clinical Emergency Hospital in Bucharest to deliver, from 1ˢᵗ of March 2020 – 1ˢᵗ of March 2021
- verbal and written informed consent of the patient to take part in the study, for patients aged ≥ 16 years, according to current legislation
- verbal and written informed consent of the patient and one parent/legal representative/custodian, for patients aged <16 years, according to current legislation

At the same time, the following indicators were considered exclusion criteria:

- age ≥ 20 years
- a pregnant woman with gestational age <24 weeks of amenorrhea
- a pregnant woman with gestational age ≥24 weeks of amenorrhea, admitted during the study period in the Department of Obstetrics of "Sfântul Pantelimon" Clinical Emergency Hospital from Bucharest, but who did not deliver during admission
- patient refusal to take part in the study and/or sign the informed consent
- parent/legal representative/custodian refusal for the pregnant woman to take part in the study and/or sign the informed consent

To be able to complete a suggestive and relevant database, the research plan was based on the completion of the following documents:

1. a questionnaire convening demographic, clinical and psychosocial attributes of pregnant adolescents admitted in the Obstetrics and Gynecology Department of "Sfântul Pantelimon" Clinical Emergency Hospital from Bucharest (Annex 1), comprising also the Edinburgh Postnatal Depression Scale

2. supplementary sheet gathering information regarding the patient's medical history (Annex 2)

The Edinburgh scale which was used in this project corresponds to the validated one from 2012, which can be applied in practice for Romanian pregnant women and mothers, ensuring that the implicit semantics and symbolism are preserved. Considering the limited number of teenage participants in the study, the cut-off value for the EPDS was set at 10 points.

Patients who were assessed to have an EPDS score between 11 to 13 points raised the suspicion for a preexistent risk of PDS and therefore, were considered "suspicious", with a corresponding intermediate risk of emotional depressed mood. Additionally, scoring >13 points has been considered suggestive of high risk for the development of PDS and consequently, the patients were considered "very suspicious". The patients in both groups: "suspicious" and "very suspicious" or in other words those who had corresponding EPDS scoring >10 points have been referred to Psychological and Psychiatric services for further evaluation and additional investigations to confirm the PDS diagnosis. The same management has been applied to patients who marked an affirmative response in question number 10, destined to evaluate suicidal ideation and risk.

The filling of the two documents mentioned above by the physician took place during a preestablished doctor-patient interview, set for day 2 or 3 postpartum, by maintaining professional secrecy along with the patient's intimacy and personal information confidentiality.

A complementary objective of this research has been to evaluate the psychological impact of social restrictions and the new regulations from the delivery room and additional medical units regarding the management of patients with Covid-19 infections and the access of the relatives inside the hospital. This aim has been reached by following the initial research

plan and by using the Edinburgh screening questionnaire on patients who delivered during the "lockdown" period and in the immediately following period, without severe restrictions, considered the "open" period. The EPDS scorings from both periods were assessed and compared in order to identify any potential differences. Furthermore, special attention was paid to patients who nurtured a positive response regarding the existence of a stress factor in their lives and further documentation of the distress aetiology has been performed.

All the above-mentioned data have been used in the research project, depending on the consistency with one or more of the following topics below:

1. Perinatal depression syndrome in the context of adolescence pregnancy
2. The study of spontaneous and iatrogenic intrapartum soft tissue trauma
3. Delivery through CS in adolescence: risk categories and associated indications

The implementation of operations regarding data systematization, grouping, processing and statistical analysis of the collected information, which are going to be described based on the corresponding research topic, was possible by using the following programs: IBM SPSS Statistics for Windows version 23.0 (IBM Corp. Released 2015. Armonk, NY: IBM Corp), NCSS 2020 Statistical software (2020, NCSS, LLC. Kaysville, Utah, USA) and Microsoft Excel Data Analysis (Microsoft 365 Personal).

Chapter 6

Perinatal depression syndrome in the context of adolescence pregnancy

6.1 Introduction (working hypothesis and specific objectives)

Pregnancy and delivery during the adolescence period have always been a taboo subject; currently, it is describing the medical reality of obstetrical practice in Romania. The approach of the juvenile patient in the attempt to offer counselling on the issue of sexuality and reproductive disturbances represents a significant medical challenge, on one hand, because most of the time these patients do not have the appropriate level of health education which could ease the acknowledgement of the explained medical context and on the other hand because most of the time the obstetrician has limited or no paediatrics experience.

The working hypothesis of this research project focuses on the vulnerability of the adolescence period towards surrounding stress factors which can contribute to the development of PDS in this targeted pregnant population.

In order to confirm the working hypothesis, the following specific objectives have been enunciated:

- to identify the social, demographic and cultural characteristics of pregnant adolescents who delivered during the study period
- to apply the EPDS screening questionnaire to this young population of mothers to identify their potential susceptibility to developing PDS
- to evaluate the influence of the Covid-19 pandemic on the risk of developing PDS by comparing the corresponding EPDS scoring of those young mothers who delivered during severe social restrictions ("lock-down" period) versus the immediately following period with fewer restrictions applied ("open" period)
- to analyse and objectify the predisposing factors involved in the aetiology of PDS, related to the corresponding EPDS risk scoring

6.2 Material and method

The fundamentals of the study on PDS in the adolescent population of mothers were reinforced by the doctor-patient interview previously described in Chapter 5: General research methodology, along with the completion of the correlated consent and questionnaire. The

variables contained in Section I: social and demographic aspects and in Section II: medical aspects – have been processed with the purpose to describe as detailed as possible the belonging background and microclimate of the young participants. Section III of the questionnaire comprised 10 affirmations/questions associated with the Edinburgh screening scale for PDS and one additional affirmation/question: question number 11.

Each of the 10 questions requires the patient to choose only one answer of the 4 available ones and that is the answer which best reflects her emotional status during the previous 7 days before the interview.

The EPDS questionnaire is based on the fact that each answer has a corresponding number of points from 0 to 3; by summing all the corresponding points from each question, the final EPDS scoring can be easily obtained.

The cut-off value of 10 points was preset to distinguish between those women who had <10 points and who were considered "normal" or in other words having no/low risk or suspicion of PDS and those scoring at least 10 points, who were further divided into 2 categories: patients who scored 11-13 points raised the suspicion for PDS development and were considered to associate the intermediate risk of PDS. In the same way, those who scored >13 points were considered suggestive of the high risk of PDS.

An additional objective of this study was to identify the emotional impact of social restrictions and regulations imposed in the labour and delivery room concerning the management of patients with Covid-19 infection and the restricted access of the relatives inside the hospital.

Build under the structure of a nested case-control study but in smaller sample size, the research plan aimed to identify 2 study groups:

- case group, built of patients who delivered from the 16th of March 2020 until the 15th of May 2020 which was the period considered under "lockdown" and formed the "lockdown" group of patients
- control group, built of study participants who delivered in the immediately following period, between 16th of May 2020 and 31st of December 2020, considered the "open" group of patients

6.3 Results

The study group reunites 251 pregnant teenagers who manifested simultaneously the inclusion criteria and they were aged 14 to 19 years.

The analysis of the patient's provenance based on rural versus urban areas and depending on their corresponding age group concluded that there were no statistically significant differences between the corresponding proportions of young women: Pearson chi-square test p=0.431.

Regarding their education attainment, most of the study participants (36.7%) have graduated partially or thoroughly from the secondary education level. More than half of the young participants come from disadvantaged families: 25.9% declare that their parents are separated, with or without the corresponding legal forms, 25.1% come from couples without a legally recognized union, while 10% reported the demise of one of their parents.

Approximately half of the young women (50.2%) reportedly live with their concubine and his family, while another 18.7% of them claim to live only with their concubine. A proportion of 41% of teenagers is smoking.

Regarding the screening with the Edinburgh scale, the highest rate in achieving the maximum of 3 points in a question was identified for items 4-7 inclusively. Specifically, most patients scored a maximum of 3 points especially in question number 4, in which 14.7% chose to answer "D". The determination of the final EPDS scoring considered the cut-off level of 10 points to divide the participants into different risk categories. Therefore, Table 6.12 highlights the classification of young mothers based on their EPDS scoring and their corresponding risk of PDS development.

*Note: the tables and figures have the original and corresponding numbering from the thesis

Table 6.12 Adolescent distribution based on their EPDS scoring

		Frequence (N)	Percent (%)
EPDS final scoring	0-10 points	205	81.7
	11-13 points	23	9.2
	> 13 points	23	9.2
	Total	251	100.0

Adolescents aged 15 to 17 years old contributed in a higher proportion to the overall EPDS scoring >13 points compared to the group scoring 11-13 points: 12.1% versus 8.4%. More young women aged 18-19 years old were associated with an intermediate risk for PDS development rather than a high risk: 9.6% versus 6.6% (Figure 6.25).
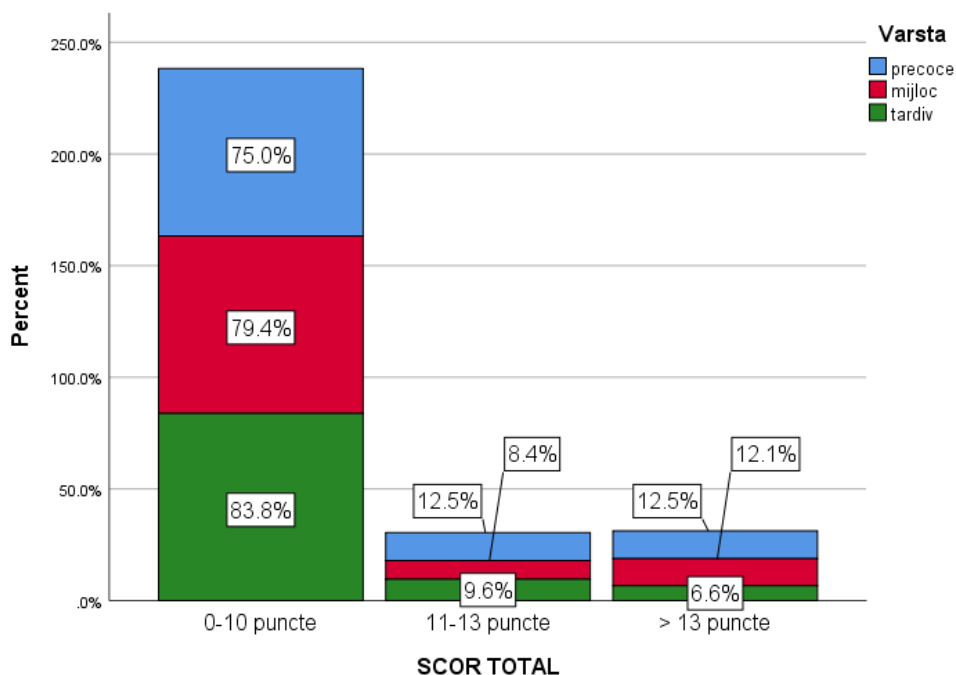

Figure 6. 25 The distribution of EPDS scoring based on participants' age groups

(X-axis: EPDS scoring; Y-axis: percept of patients)

Legend: age category

Blue: early adolescence, red: middle adolescence, green: late adolescence

Adolescents from the high-risk group corresponding to an EPDS scoring of >13points had a mean age of 17 years old (percentile 50), lower than that of the young participants from the low and intermediate risk groups, who had a corresponding mean age of 18 years old (percentile 50). This difference, however, was not statistically significant: Kruskall-Wallis test $p > 0.05$.

Regarding the class of study participants who reported the presence of an acute stress factor in their lives over the last year, these were more predisposed to obtaining an EPDS

scoring >13 points and therefore, to the development of PDS, compared to those who scored between 0-10 points on the same screening questionnaire: **likelihood ratio p=0.010**.

There were 201 young women included in the nested case-control study and they were distributed into 2 groups:

- case group or "lockdown" group, gathering 30 patients
- control group or "open" group, gathering 171 patients

During social restrictions, a higher percentage of young women were attributed to the intermediate risk of PDS development compared to the following period when restrictions were lifted and when a decrease of 8.76% in this risk group was noted (Figure 6.33). It is worth mentioning the fact that patients who were interviewed during the "open" period documented a 5.71% decrease in achieving EPDS scoring <10 points, accompanied by an increase in the proportion of EPDS scoring >13 points of 180.78%.
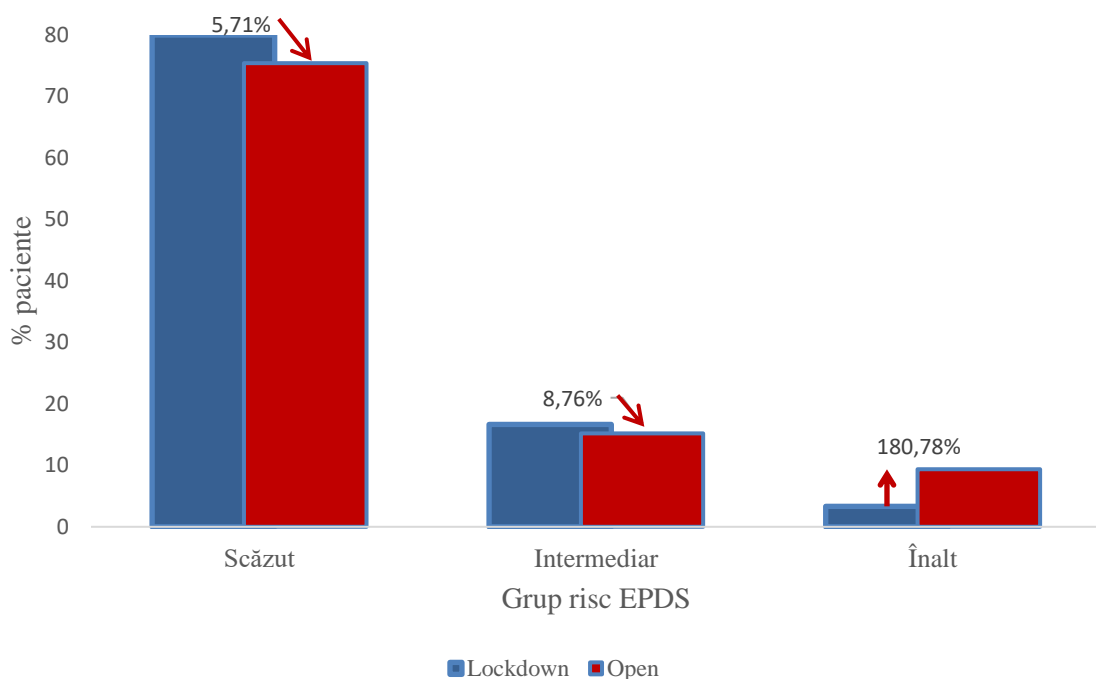

Figure 6.33 The dynamics of teenagers' proportions corresponding to each EPDS risk group (X-axis: EPSD risk groups, from left to right: low risk, intermediate risk, and high risk; Y-axis: percentage of patients)

The statistical analysis of the corresponding data in this study led to the highlighting of the following conclusions:

- the higher the number of cigarettes per day the patients used, the higher the possibility to associate an intermediate risk of PDS development: **OR 1.08, 95%CI: 1.00-1.16, p<0.05**

- the patients who did not report an acute stress factor in their current life during the interview had lower chances of obtaining a high-risk EPDS scoring: **OR 0.07, 95%CI: 0.02-0.30, p=0.000**

- having a planned pregnancy was proved to be a protective factor against obtaining an intermediate or high-risk EPDS scoring: **OR 0.25, 95%CI: 0.09-0.68, p=0.007**, respectively **OR 0.10, 95%CI: 0.02-0.45, p=0.002**.

6.4 Discussion

In Romania, the research in the field of obstetrical practice regarding adolescent mothers is barely reaching an inceptive stage. The population of young mothers included in this study came mostly from rural areas. A positive aspect of the above-mentioned results resides in the fact that the level of educational attainment of 7-10 years of schooling was mostly attributed to young women coming from rural areas. The obstetrical present and future of the analyzed teenagers where 12% of them associated a history of a previous CS and approximately another 16% of them had a current unplanned pregnancy, involves the urgent necessity to implement support and guidance strategies to reduce the risk of morbidity and at the same time to improve their quality of life. The specialized literature points out the existence of several options which can be achieved during the antepartum period: in Taiwan, for example, available educational strategies to be promoted by medical professionals like midwives conducted to the attainment of three-level advantages: reducing maternal clinical symptoms of anxiety, depression and the level of fear experienced concerning the moment of delivery and its implications [35]. Through the use of the Edinburgh questionnaire, there were documented 3.5% of young mothers aged 15-17 years old who manifested suicidal thoughts. At the same time, most study participants who had a high-risk for the development of PDS had the same corresponding age category. Additionally, 12.4% patients reported the existence of an acute stress factor during the last year, which was proven to be involved in the aetiology of a high-

risk EPDS scoring, after obtaining >13 points on the screening questionnaire. Mateus and collaborators showed higher levels of clinically evident PDS and signs of anxiety in pregnant women during the pandemic period compared to the pre-pandemic period, by using the Edinburgh screening questionnaire [36].

Chapter 7

The study of spontaneous and iatrogenic intrapartum soft tissue trauma

7.1 Introduction (working hypothesis and specific objectives)

Located at one of the two extreme poles of the fertile life, adolescents confront themselves more and more often with the complex phenomena of pregnancy and birth, long before reaching maturity and before finding stability in the bosom of their own family. The process of adjusting one's attitude from the perspective of the obstetrician and that of the young mothers towards these distinct and specific conditions implies the acknowledgement and understanding of certain peculiarities related to the young maternal age.

One suitable example is the occurrence of intrapartum soft tissue trauma, either spontaneously or iatrogenically, by performing episiotomy more or less judiciously.

The following are specific objectives of this study plan:

- to identify the proportion of adolescents who delivered vaginally and to expose their obstetrical characteristics
- to analyze the practice of episiotomy in the young pregnant population included in the study
- to describe the incidence of intrapartum spontaneous soft tissue lacerations and their background of occurrence
- to objectify the risk factors for spontaneous and iatrogenic soft tissue trauma, along with the characterization of the relationship between these factors and the obstetrical variables of interest

7.2 Material and method

The plan of this current study assimilates and is developed in accordance with the original research plan, the prospective and descriptive nature being unconditionally respected. All the patient information gathered during days 2 and 3 postpartum provided the database which was needed for the statistical analysis to be performed, to verify the validity of the above-mentioned working hypothesis.

The variables of interest for this specific study can be found in Section II of the questionnaire, named "Medical aspects" and also in the supplementary sheet generically named "Patient data". Additionally, the proportion in which episiotomy and episiorrhaphy were performed has also been described.

Concerning the investigation of intrapartum spontaneous lacerations, there was a special interest in the identification of specific anatomic regions involved in this process, and the following classification of lacerations has been used:

- category I lacerations: developed in the vulvar, labial and/or periurethral region

- category II lacerations: involving vaginal and/or perineal structures

- category III lacerations: localized strictly at the level of the cervix

7.3 Results

The results obtained show the existence of 133 vaginal deliveries (52.98% of the study population), compared to 118 (47.01%) deliveries through CS.

The sample of interest for this research activity was represented by the adolescents who underwent vaginal delivery.

Almost 29.9% of the young women interviewed in this study reported obstetrical comorbidities at the time of admission to the hospital. A much more extensive proportion of the participants was diagnosed with anaemia: 51.79% of the teenagers associated haemoglobin levels <11g/dl, with a mean value of 10.9g/dl (min 6.5g/dl, max 14.5 g/dl, std dev 1.34 g/dl).

Infections of the genito-urinary tract were also documented and involved the following entities:

- lower urinary tract infections

- colpitis secondary to pathogen colonization: Candida spp, Escherichia Coli, Enterococcus spp, Ureaplasma spp

were identified in 9.96% of the cases.

Spontaneous intrapartum lacerations complicated the delivery process in 46.66% of the cases reported to the overall number of 15 patients diagnosed with BMI $\geq$30kg/m^2 who delivered vaginally. Of them, 57.14% occurred at the vaginal and/or perineal level and 28.57% involved the cervix.

Episiotomy and episiorrhaphy (E/R) were practised for most of the study participants: 66.91% of the 133 teenagers who delivered vaginally. In a proportion of 24.06% of young women who delivered spontaneously and who did not have E/R, soft tissue lacerations could be documented.

Table 7.2 shows the frequency in the appearance of intrapartum soft tissue trauma, either spontaneously or iatrogenically, related to the age category of each participant.

Table 7.2 The analysis of soft tissue status during vaginal delivery

VARIABLE	ADOLESCENTS TOTAL (14-19 YEARS) (N=133)	EARLY ADOLESCENCE (14 YEARS) (N=6)	MIDDLE ADOLESCENCE (15-17 YEARS) (N=50)	LATE ADOLESCENCE (18-19 YEARS) (N=77)	LIKELIHOOD RATIO (P VALUE)
INTACT SOFT TISSUE	12 (9.02%)	0 (0.00%)	3 (6.00%)	9 (11.68%)	0.198
EPISIOTOMY	89 (66.91%)	5 (83.33%)	38 (76.00%)	46 (59.74%)	0.122
LACERATION CATEGORY I	6 (4.51%)	0 (0.00%)	1 (2.00%)	5 (6.49%)	0.171
LACERATION CATEGORY II	32 (24.06%)	1 (16.66%)	12 (24.00%)	19 (24.67%)	0.336
LACERATION CATEGORY III	14 (10.52%)	1 (16.66%)	7 (14%)	6 (7.79%)	0.208

Most category II lacerations, affecting the vaginal and/or perineal tissue, could be identified in the group of young women who did not have E/R, thus facilitating the identification of an increased incidence of this type of laceration of 257.14% compared to the patients who had E/R.
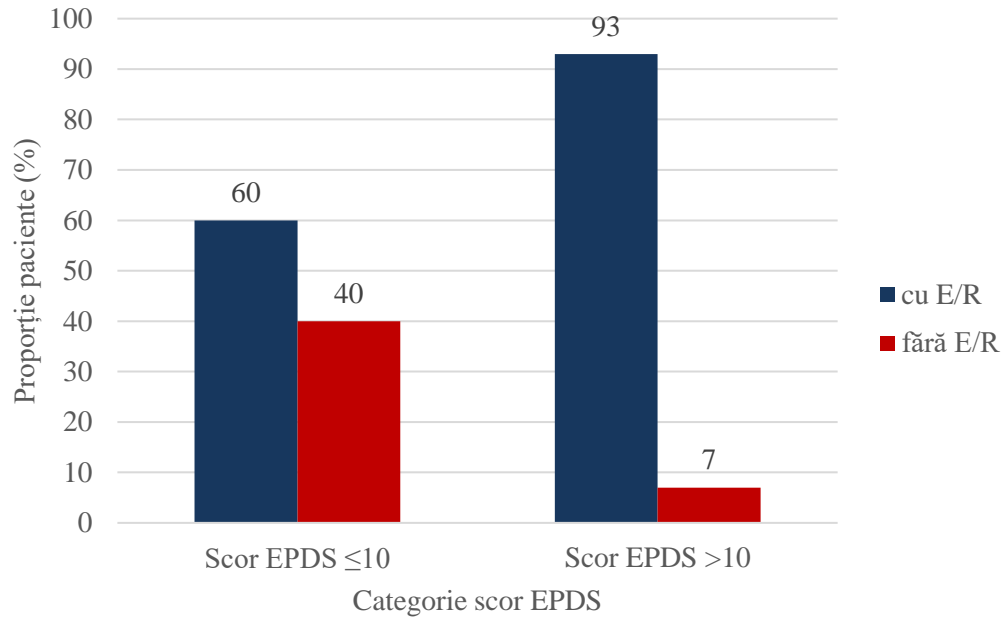
Figure 7.9 Distribution of EPDS scoring depending on the E/R practice

(X-axis: EPDS scoring categories; Y-axis: percentage of patients)

Legend: blue: with E/R; red: without E/R

According to the information presented in Figure 7.9, 93% of the young women who delivered vaginally and scored >10 points in EPDS screening, were also associated with E/R during birth. The same rationale was used to prove that most of the patients associating low-risk scoring in EPDS screening and who delivered vaginally, also had an E/R. This data is statistically relevant, proven by Pearson chi-square test **p=0.001**.

Following the same purpose of evaluating the EPDS scoring but this time in the population of teenagers who delivered vaginally and had intrapartum spontaneous lacerations, we were able to identify a higher number of adolescents who had low-risk scoring (≤10 points) in EPDS screening, compared to those who had EPDS scoring >10 points: Pearson chi-square test **p=0.038** (Figure 7.10).

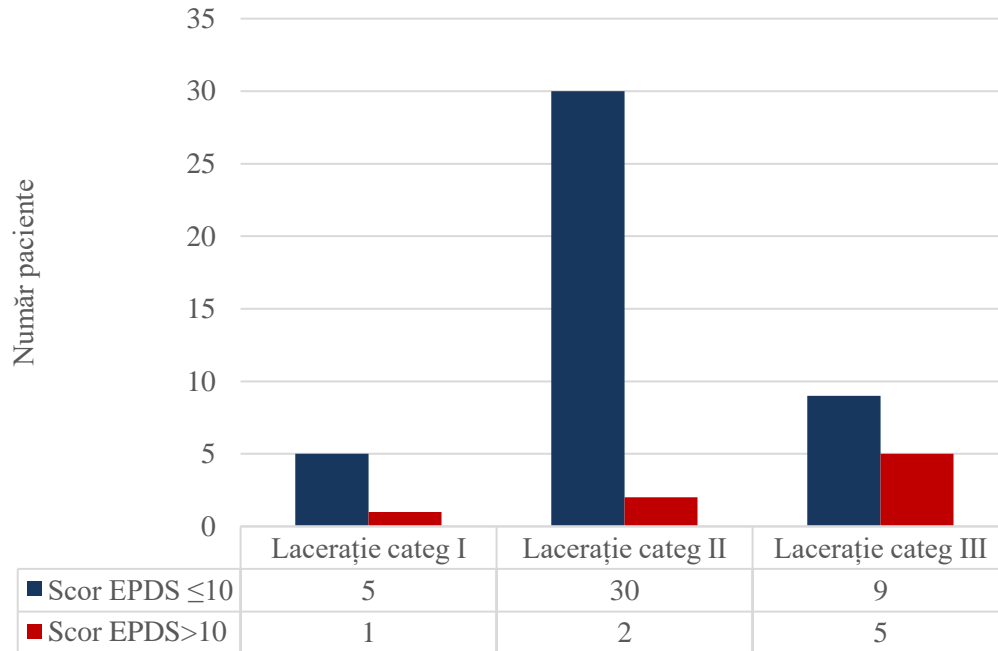|	Laceraţie categ I	Laceraţie categ II	Laceraţie categ III
■ Scor EPDS ≤10	5	30	9
■ Scor EPDS>10	1	2	5

Figure 7.10 The distribution of EPDS scoring in the group of teenagers who delivered vaginally and had intrapartum spontaneous lacerations

(X-axis: lacerations category; Y-axis: proportion of patients)

Legend: blue: EPDS scoring ≤10 points; red: EPDS scoring >10 points

Approximately 93% of the patients who had a vaginal birth and scored >10 points in EPDS screening also had E/R performed at the time of delivery.

By applying a multiple regression analysis, where "spontaneous lacerations" was considered the dependent variable and "primiparity", "infectious complications", "anaemia", "obesity", "gestational age <38 weeks" and "gestational age ≥40 weeks" were considered the independent variables, we were able to obtain an analytical model which can predict the incidence of spontaneous intrapartum lacerations in 99.95% of the cases: R^2: 0.9995, F: 3.9735E-08 (Figure 7.14).

Regression Statistics	
Multiple R	0,99978894
R Square	0,999577925
Adjusted R Square	0,99898702
Standard Error	0,477940331
Observations	13

ANOVA

	df	SS	MS	F	Significance F
Regression	7	2704,85787	386,408	1691,61	3,9735E-08
Residual	5	1,1421348	0,22843		
Total	12	2706			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	0,071748373	0,24703757	0,29044	0,78314	-0,56328191	0,706779	-0,5632819	0,70677866
Primiparitate	1,069854419	0,0522709	20,4675	5,2E-06	0,9354878	1,204221	0,9354878	1,204221043
Complicații infecțioase	-1,355500268	0,36655987	-3,6979	0,01403	-2,29777241	-0,413228	-2,2977724	-0,41322813
Obezitate	1,986447895	0,2928805	6,78245	0,00106	1,23357461	2,739321	1,2335746	2,739321183
Sindrom anemic	3,177019593	0,43887326	7,23904	0,00079	2,04885996	4,305179	2,04886	4,305179225
VG<38s	-2,000539322	0,33963346	-5,89029	0,002	-2,87359491	-1,127484	-2,8735949	-1,12748373
VG≥40s	-1,48441247	0,65960082	-2,25047	0,07423	-3,17997036	0,211145	-3,1799704	0,211145421
Epiziotomie	-0,907825655	0,05893887	-15,4028	2,1E-05	-1,05933283	-0,756318	-1,0593328	-0,75631848

Figure 7.14 Statistical elements of multiple regression in the prediction model of the intrapartum spontaneous soft tissue lacerations

7.4 Discussion

The vulnerability of pregnant adolescents towards developing intrapartum traumatic complications resides in the absence of protocols and recommendations regarding age-adapted management during pregnancy and delivery, and the significant variability regarding symmetry, dimensions and morphology of the vulvar structures [37].

The problems associated with the disadvantages involved by the restrictive versus routine use of episiotomy sheds light on the increased incidence of anterior perineal lacerations occurring in the context of restrictive use of E/R, while routine use of E/R promotes the development of severe perineal trauma, involving the posterior aspect of the perineum.

Previous analysis of the E/R practice in Romania showed a proportion of over 70% of the examined population who had mediolateral episiotomy [38]; although the results in this present project of research showed a lower incidence of E/R, all these data exceed greatly the WHO recommended standards of good practice and care, by maintaining a 10% rate of E/R, and the practice of other healthcare systems like the French one [39, 40]. In the context of selective use of E/R, the obstetricians may have to face an increased need for therapeutic

management of lacerations in categories 2 and 3. The comparative analysis of the young group of patients included in this study with a sample of pregnant adults who also delivered vaginally showed not only the increased predisposition of teenage mothers to associate E/R during delivery but also an almost double risk of developing additional category 2 lacerations [39].

Regarding the EPDS scoring during screening for PDS, a higher proportion of patients with E/R had an intermediate and high risk for PDS development, compared to those who had low or absent risk. Primiparity could not be proved to be an independent risk factor for the occurrence of spontaneous lacerations, but its placement in the prediction model associated a statistically significant role. At the same time, both premature delivery and the practice of episiotomy had validated intakes in the construction of the model. Also, the 3 types of complications: obesity, anaemia and infectious complications directed towards the genito-urinary tract subscribed in a significant mode to reaching an adequate result.

Chapter 8

Delivery through CS in adolescence: risk categories and associated indications

8.1 Introduction (working hypothesis and specific objectives)

The dynamics of the CS rate ascension manifest a true worldwide journey, accelerated by multiple social and cultural factors, and promoted especially by the globalization phenomenon.

Comorbidities which have long been researched by scientists like placenta praevia pathology, anomalies of placental insertion such as placenta accreta spectrum or the amplifying risk of uterine rupture in subsequent pregnancies – all these entities require deep analysis and debates in a particular manner, adapted to the maternal age. The application of the Robson classification in institutions which serve as places for obstetrical services allows for homogenization in the CS rate reporting process and the concurrent analysis of pregnant women who are susceptible to delivery through CS.

The working hypothesis considers that the exponential globally increases in the CS rates observed among the adult population of pregnant women, reflects in the same manner in the young population of pregnant girls who experience maternity during adolescence.

The subsequent dual purpose consists in the research of the CS rate and in the identification of the obstetrical categories of young pregnant girls who are at risk of giving birth through CS, by investigating them concerning the corresponding group in the Robson classification.

Additionally, the analysis and interpretation of the CS indications in this specific study group of teenagers have been performed.

8.2 Material and method

The complete characterization of the study group of patients who delivered through CS signified the reinterpretation of the corresponding social, demographic, and medical attributes, strictly in the analysis group. The collected data were the same obtained by the processing of the variables presented in the previous 2 studies, corresponding to Sections I, II and III from the basic questionnaire addressed to the patients during the doctor-patient interview.

The Robson classification which was used in the clinic (Annex 3) and this present study is the same form recommended by the national CS guideline [34].

This present research is contrasting with the previous ones since the basic elements correspond mostly to the descriptive analysis part, without eluding, however, the essential inferential statistical part.

8.3 Results

A number of 118 adolescents (47.01%) out of 251 participants in the original study were found to have given birth through CS during the recruiting period.

By comparing teenagers aged 15-17 years old with those corresponding to the 18-19 years old category, we have identified a greater proportion of patients in the second group concerning a corresponding history of a previous delivery through CS: 14.03% versus 30.50% and also 2 previous deliveries by the same method: 0.00% versus 5.08%: Pearson chi-square test **p=0.01.**

All the patients in corresponding groups 2, 5, 7, 8 and 10 in the Robson classification gave birth through CS. There were no deliveries identified in groups 4 and 9 of the same classification, irrespective of the mode of delivery.

The patients in group 1 of the classification remarkably contributed 55% to the overall proportion of the CS documented in the study. They were closely followed by those in Robson group 5.1.A, who contributed 19% to the overall quantum of CS. Conversely, at the opposite side we could find subunitary contributions of 0.8% from patients corresponding to Robson groups 2.A: nulliparous women, single cephalic, ≥37 weeks of gestation with induced labour and 5.2.A: multiparous women, two or more previous CS, single cephalic, ≥37 weeks of gestation in spontaneous labour.

The examination of the surgical registries contributed to the identification of CS practice most often in the context of CTG anomalies during labour.

A less heterogeneous category of CS indications is the iterative CS on the scarred uterus, which was identified in 24.58% of the cases, being the second most frequent CS indication in the adolescent population.

Therefore, using data from Figure 8.5, it is possible to confirm that most pregnant women from Robson group 1 delivered through CS secondary to CTG anomalies (in 38.23%

of the cases), arrest of descent (in 19.11% of the cases) and arrest of dilation (in 19.11% of the cases). A proportion of 75% of the young mothers included in Robson group 3: multiparous women, excluding previous CS, single cephalic, ≥37 weeks of gestation, in spontaneous labour, gave birth through CS secondary to the imminence of uterine rupture on the scarred uterus after previous CS.
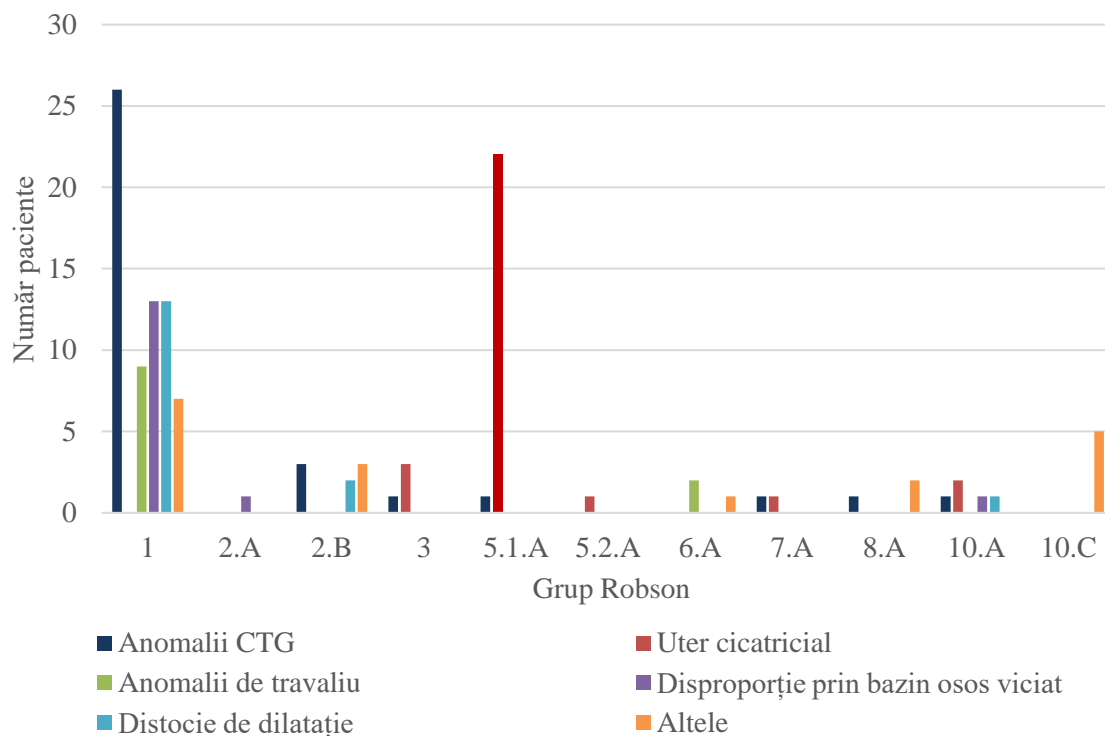

Figure 8.5 Description of CS indications corresponding to the Robson classification

(X-axis: Robson group from the classification; Y-axis: number of patients)

Legend: dark blue: CTG anomalies, green: labour anomalies; light blue: arrest of dilation; red: iterative CS; violet: arrest of descent; orange: others.

Reporting the final scores obtained after the analysis of the corresponding EPDS questionnaire in the context of CS deliveries, it was possible to highlight that more patients associating an intermediate and high risk for PDS development took part in the Robson group 1 and 5 of the classification, as shown in Figure 8.7.
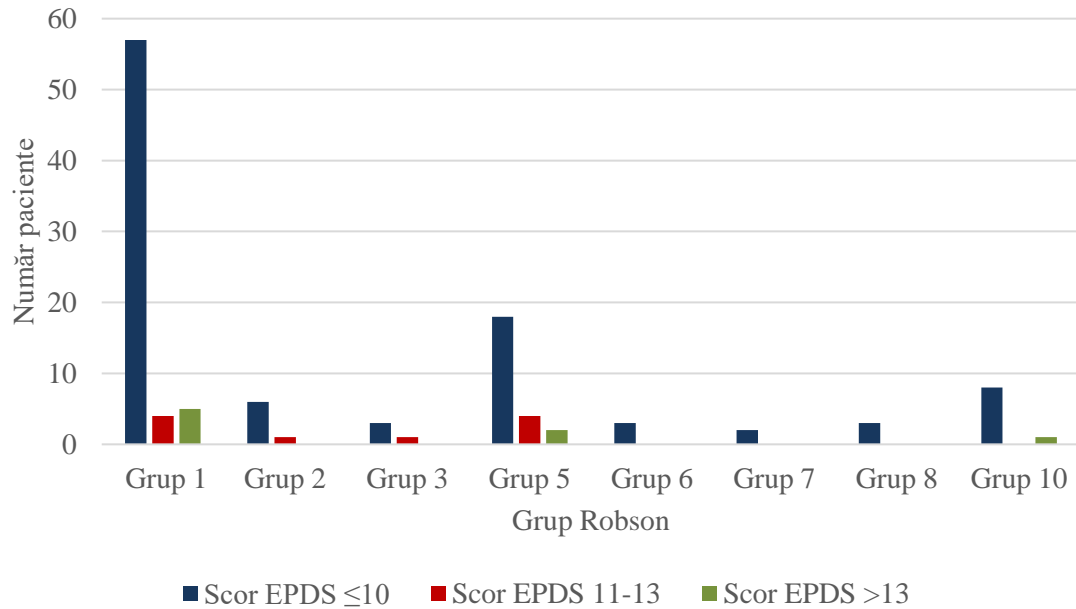
Figure 8.7 Distribution of EPDS scoring depending on the corresponding group of the Robson classification

(X-axis: Robson group; Y-axis: number of patients)

Legend: dark blue: EPDS scoring ≤10 points; red: EPDS scoring 11-13 points; green: EPDS scoring >13 points.

The examination of the patient's answers to the EPDS screening questionnaire led to the identification of a majority of young mothers (87.74%) with EPDS scoring ≤10 points, signifying low risk or the absence of risk related to the possibility of PDS development.

8.4 Discussion

A feasibility study involving the cost efficiency of the mode of delivery reported two significant conclusions: maternal and foetal advantages can be obtained through CS only when the clinical justification is firm evidence for the surgical act, otherwise, in the absence of a proper indication, OC determines progued hospitalization and increases maternal and foetal morbidity [41].

Romania has one of the highest rates of CS, with data from a Euro-stat study showing a 46.9% rate in CS births in 2015 [32]. This context becomes even more worrisome if we consider the long-term effects of CS delivery which affect both the mother and the foetus: to a

poor growing environment for the mother and the tendency towards school abandonment, adds to the neonatal adverse events regarding low birth weight, antepartum foetal demise, or premature birth [42]. While young mothers aged 14 years old delivered through CS secondary to arrest of dilation or foetal dystocic presentation, for teenagers aged 18-19 years old the birth through CS happened as a consequence of scarred uterus.

Even more, to the extent of the neonatal status as an indirect indicator of the quality of obstetrical care during pregnancy and birth, the most unfavourable outcomes were documented for patients in Robson groups 7 and 8, who associated either single pregnancy with breech presentation, or multiple pregnancies. This conclusion builds a solid argument for the required interventions to be enacted, to improve the efficiency of obstetrical services involving teenage mothers, without neglecting the fact that these patients can also associate a history of previous CS.

Chapter 9

Conclusions and personal contributions

9.1 Conclusions

Applying a retrospective analysis on all the activities which were empirically performed but at the same time respecting a methodologic path, and also on the data processing which inquired a perseverent attitude towards the acquisition of new statistical and analytical skills, the entire study design led to a step-by-step pursuit to the reaching of all the objectives which were set in the beginning.

Looking at the pandemic period from a constructive perspective, forsaking the difficult and overwhelming times both physically and mentally, this chapter in time has been an opportunity to analyse in real-time all the adapting mechanisms of pregnant women concerning their novel maternity status and a continuously converting surrounding world, under new regulations and restrictions.

An incompletely examined aspect resides in the adjacent evaluation of teenagers who are associated with intermediate and high risk for the development of PDS during the screening – from the psychological and psychiatric point of view.

Knowing the fact that certain psychiatric disorders become clinically evident a long time after exposure to a determinant factor, we consider that a reevaluation visit for the patients included in the study represents an essential continuity of this present research; both obstetrical evaluation and repeating the screening using the Edinburgh questionnaire are being considered.

Another research direction to be considered in the future is represented by the additional screening for anxiety disorders in the same pregnant adolescent population. This suggestion is motivated by the fact that participants in our study had the maximum scoring documented during EPDS screening, especially in the section destined to evaluate the anxiety factor.

Practising episiotomy on a large scale as proven in this current study marks a significant issue under multiple aspects, which requires immediate implementation of optimal solutions. In the short term, this study can be considered a significant determinant to beginning the registration process for episiotomy indications.

Additional research on adolescents who have obstetrical characteristics corresponding to Robson groups 1, 5.1.A, 7 and 8 is a proposal to be further explored in the future, knowing that the primary outcome involves the wellbeing of both the mother and the foetus, followed by the reduction of the financial burden in the public healthcare system which is responsible for the medical care of mother-foetus dyad.

9.2 Personal contributions

1. For 12.4% of the study participants, the current pregnancy was unplanned; a proportion of 64.9% of the interviewed teenagers reported that in their family becoming pregnant during adolescence was a tradition

2. A proportion of 3.5% of the study population reported suicidal ideation on the screening questionnaire for PDS

3. Reporting acute stress factors during the last year represented a risk factor for developing PDS, identified using the Edinburgh screening instrument: likelihood ratio p=0.010

4. The analysis of "lockdown" versus "open" period assisted in the identification of planned pregnancies as a protective factor regarding PDS development, while cigarette use was proven to be a risk factor in the appearance of emotional depression disturbances in the perinatal period

5. Episiotomy is a frequently used practice in the study population, documented in 66.91% of young pregnant women and it is a protective factor for the development of category 2 and 3 lacerations: Pearson chi-square test p=0.000

6. Episiotomy is a high-risk factor for the occurrence of PDS: Pearson chi-square test p=0.001, while spontaneous lacerations did not influence the EPDS scoring

7. The association of primiparity and premature delivery in the context of infectious complications, anaemia, and obesity, while practising episiotomy, composes an efficient model of prediction of intrapartum spontaneous lacerations with 99.95% precision

8. Groups 1 and 5.1.A in the Robson classification mark the targeted teenage population who would most benefit from the strategies destined to reduce the CS rates

9. Groups 7 and 8 in the Robson classification associate the most neonatal adverse events

10. Delivery through CS does not represent a risk factor for the development of PDS in the adolescent population screened using the Edinburgh instrument

Bibliography

[1] World Health Organization. Orientation Programme on Adolescent Health for Health-care providers – handout. Module B: meaning of adolescence and its implications for public health. World Health Organization 2006

[2] Salvati Copiii Romania. Proiect comun România – Republica Moldova pentru sprijinirea mamelor adolescente din comunități defavorizate. Radio Romania Agentia de Presa 2021.

[3] Asif S, Mulic-Lutvica A, Axfors C, Eckerdal P, Iliadis SI, Fransson E, et al. Severe obstetric lacerations associated with postpartum depression among women with low resilience – a Swedish birth cohort study. BJOG 2020;127:1382–90. https://doi.org/10.1111/1471-0528.16271.

[4] Dimitriu M, Ionescu CA, **Matei A**, Viezuina R, Rosu G, Ilinca C, et al. The problems associated with adolescent pregnancy in Romania: A cross-sectional study. J Eval Clin Pract 2019;25:117–24. https://doi.org/10.1111/jep.13036.

[5] Eurostat. Large differences in share of caesarean births. Products Eurostat News 2019. https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20191217-1 (accessed July 11, 2022).

[6] Eyi EGY, Mollamahmutoglu L. An analysis of the high cesarean section rates in Turkey by Robson classification. Journal of Maternal-Fetal and Neonatal Medicine 2021;34:2682–92. https://doi.org/10.1080/14767058.2019.1670806.

[7] Cammu H, Martens E, van Maele G. Using the Robson Classification to Explain the Fluctuations in Cesarean Section. J Pregnancy 2020;2020. https://doi.org/10.1155/2020/2793296.

[8] World Health Organization. Comprehensive Mental Health Action Plan 2013–2030. Https://WwwWhoInt/Publications/i/Item/9789240031029 2021.

[9] UNICEF. ADOLESCENT MENTAL HEALTH: TIME FOR ACTION. Https://WwwUnicefOrg/Media/82931/File/AMH-Knowledge-SummaryPdf 2019.

[10] UNICEF INNOCENTI RESEARCH CENTRE. STATE OF THE WORLD'S CHILDREN 2021 : on my mind promoting, protecting and caring for children's... mental health. UNICEF; 2022.

[11] Ministerul Sanatatii. Strategia Naţională de Sănătate 2014-2020 Sănătate pentru Prosperitate. Ministerul Sanatatii 2014.

[12] Oţelea MR, Nanu MI, Stativa E, Valceanu D. Adolescent pregnancy in Romania. UNICEF 2021.

[13] Erfina E, Widyawati W, McKenna L, Reisenhofer S, Ismail D. Adolescent mothers' experiences of the transition to motherhood: An integrative review. Int J Nurs Sci 2019;6:221–8. https://doi.org/10.1016/j.ijnss.2019.03.013.

[14] Tyokighir D, Hervey A, Schunn C, Clifford D, Ahlers-Schmidt C. Qualitative Assessment of Access to Perinatal Mental Health Care: A Social-Ecological Framework of Barriers. Kans J Med 2022;15:48–54. https://doi.org/10.17161/kjm.vol15.15853.

[15] American Psychiatric Association., American Psychiatric Association. DSM-5 Task Force. Diagnostic and statistical manual of mental disorders: DSM-5. American Psychiatric Association; 2013.

[16] Waschmann M, Rosen K, Gievers L, Hildebrand A, Laird A, Khaki S. Evaluating the Impact of the COVID-19 Pandemic on Postpartum Depression. J Womens Health 2022. https://doi.org/10.1089/jwh.2021.0428.

[17] Wallis AB, Fernandez R, Oprescu F, Cherecheş R, Zlati A, Dungy CI. Validation of a Romanian scale to detect antenatal depression. Cent Eur J Med 2012;7:216–23. https://doi.org/10.2478/s11536-011-0130-1.

[18] Gustafsson HC, Young AS, Doyle O, Nagel BJ, Mackiewicz Seghete K, Nigg JT, et al. Trajectories of perinatal depressive symptoms in the context of the COVID-19 pandemic. Child Dev 2021;92:e749–63. https://doi.org/10.1111/cdev.13656.

[19] Goh Ryan, Goh Daryl, Ellepola Hasthika. PERINEAL TEARS-A REVIEW. Aust J Gen Pract 2018;47:35–8. https://doi.org/10.31128/AFP-09-17-4333.

[20] The American College of Obstetricians and Gynecologists. Practice Bulletin No 165: Prevention and Management of Obstetric Lacerations at Vaginal Delivery. Wolters Kluwer Health, Inc 2016;128:e1-15.

[21] Williams A, Gonzalez B, Fitzgerald C, Brincat C. Racial/Ethnic Differences in Perineal Lacerations in a Diverse Urban Healthcare System. Female Pelvic Med Reconstr Surg 2019;25:36–40. https://doi.org/10.1097/SPV.0000000000000517.

[22] Pihl S, Blomberg M, Uustal E. Internal anal sphincter injury in the immediate postpartum period; Prevalence, risk factors and diagnostic methods in the Swedish perineal laceration registry. European Journal of Obstetrics and Gynecology and Reproductive Biology 2020;245:1–6. https://doi.org/10.1016/j.ejogrb.2019.11.030.

[23] Abedzadeh-Kalahroudi M, Talebian A, Sadat Z, Mesdaghinia E. Perineal trauma: incidence and its risk factors. J Obstet Gynaecol (Lahore) 2019;39:206–11. https://doi.org/10.1080/01443615.2018.1476473.

[24] Lins VML, Katz L, Vasconcelos FBL, Coutinho I, Amorim MM. Factors associated with spontaneous perineal lacerations in deliveries without episiotomy in a university maternity hospital in the city of Recife, Brazil: a cohort study. Journal of Maternal-Fetal and Neonatal Medicine 2019;32:3062–7. https://doi.org/10.1080/14767058.2018.1457639.

[25] de Souza MRT, Farias LMVC, Ribeiro GL, Coelho T da S, da Costa CC, Damasceno AK de C. Factors related to perineal outcome after vaginal delivery in primiparas: A cross-sectional study. Revista Da Escola de Enfermagem 2020;54. https://doi.org/10.1590/S1980-220X2018043503549.

[26] Chill HH, Lipschuetz M, Atias E, Shimonovitz T, Shveiky D, Karavani G. Obstetric anal sphincter injury in adolescent mothers. BMC Pregnancy Childbirth 2021;21. https://doi.org/10.1186/s12884-021-04045-4.

[27] Agbor VN, Mbanga CM, Njim T. Adolescent deliveries in rural Cameroon: An 8-year trend, prevalence and adverse maternofoetal outcomes. Reprod Health 2017;14. https://doi.org/10.1186/s12978-017-0382-6.

[28] Abdulrahman M, Abdullah SS, Alaani AFK, Alabdool NH, Sherif FEY, Ahmed ZS, et al. Exploring Obstetrical Interventions and Stratified Cesarean Section Rates Using the Robson Classification in Tertiary Care Hospitals in the United Arab Emirates. Revista Brasileira de Ginecologia e Obstetricia 2019;41:147–54. https://doi.org/10.1055/s-0038-1676524.

[29] Paixao ES, Bottomley C, Smeeth L, da Costa MCN, Teixeira MG, Ichihara MY, et al. Using the Robson classification to assess caesarean section rates in Brazil: an observational study of more than 24 million births from 2011 to 2017. BMC Pregnancy Childbirth 2021;21. https://doi.org/10.1186/s12884-021-04060-5.

[30] Topçu HO, Özel Ş, Üstün Y. Identifying strategies to reduce cesarean section rates by using Robson ten-group classification. Journal of Maternal-Fetal and Neonatal Medicine 2021;34:2616–22. https://doi.org/10.1080/14767058.2019.1670792.

[31] Tontus HO, Nebioglu S. Improving the caesarean decision by robson classification: A population-based study by 5,323,500 livebirth data. Ann Glob Health 2020;86:1–11. https://doi.org/10.5334/AOGH.2615.

[32] Robson MS. Known knowns, unknown unknowns and everything in-between – the Ten Group Classification System (TGCS). BJOG 2021;128:1454–5. https://doi.org/10.1111/1471-0528.16679.

[33] Ladfors L v., Muraca GM, Zetterqvist J, Butwick AJ, Stephansson O. Postpartum haemorrhage trends in Sweden using the Robson ten group classification system: a population-based cohort study. BJOG 2022;129:562–71. https://doi.org/10.1111/1471-0528.16931.

[34] Editor: Prof. Dr. Mircea Onofriescu. Operatia cezariana - ghid clinic. Societatea de Obstetrică Şi Ginecologie Din România Și Colegiul Medicilor Din România 2019.

[35] Kuo T-C, Au H-K, Chen S-R, Chipojola R, T Lee G, Lee P-H, et al. Effects of an integrated childbirth education program to reduce fear of childbirth, anxiety, and depression, and improve dispositional mindfulness: A single-blind randomised controlled trial. Midwifery 2022;113

[36] Mateus V, Cruz S, Costa R, Mesquita A, Christoforou A, Wilson CA, et al. Rates of depressive and anxiety symptoms in the perinatal period during the COVID-19 pandemic: Comparisons between countries and with pre-pandemic data. J Affect Disord 2002.

[37] Brodie K, Alaniz V, Buyers E, Caldwell B, Grantham E, Sheeder J, et al. A Study of Adolescent Female Genitalia: What is Normal? J Pediatr Adolesc Gynecol 2019;32:27–31. https://doi.org/10.1016/j.jpag.2018.09.007

[38] Pasc A, Navolan D, Pușcașiu L, Ionescu CA, Szasz FA, Carabineanu A, et al. A multicenter cross-sectional study of episiotomy practice in Romania. J Eval Clin Pract 2019;25:306–11. https://doi.org/10.1111/jep.13062.

[39] **Matei A**, Poenaru E, Dimitriu MCT, Zaharia C, Ionescu CA, Navolan D, et al. Obstetrical soft tissue trauma during spontaneous vaginal birth in the romanian adolescent population—multicentric comparative study with adult population. Int J Environ Res Public Health 2021;18. https://doi.org/10.3390/ijerph182111491.

[40] Christophe C, Jonathan C, Joelle LA, Karine G, Michele S, Paul S, et al. Episiotomy practices in France: epidemiology and risk factors in non-operative vaginal deliveries. Sci Rep 2020;10. https://doi.org/10.1038/s41598-020-70881-7.

[41] Entringer AP, Pinto M, Gomes MA de SM. Cost-effectiveness analysis of natural birth and elective C-section in supplemental health. Rev Saude Publica 2018;52. https://doi.org/10.11606/S1518-8787.2018052000373.

[42] Kawakita T, Wilson K, Grantz KL, Landy HJ, Huang CC, Gomez-Lobo V. Adverse Maternal and Neonatal Outcomes in Adolescent Pregnancy. J Pediatr Adolesc Gynecol 2016;29:130–6. https://doi.org/10.1016/j.jpag.2015.08.006.

List of publications

Articles published in speciality journals:

[1] **Matei A**, Dimitriu MCT, Cirstoveanu CG, Socea B, Ionescu CA. Assessment of Postpartum Depression in Adolescents Who Delivered during COVID-19 Social Restrictions: The Experience of a Tertiary Hospital from Bucharest, Romania. Healthcare (Basel). 2021 Jun 26;9(7):807.

doi: 10.3390/healthcare9070807. PMID: 34206891; PMCID: PMC8307397.

Impact factor: 3.160

https://www.mdpi.com/2227-9032/9/7/807

[2] **Matei A**, Poenaru E, Dimitriu MCT, Zaharia C, Ionescu CA, Navolan D et al. Obstetrical Soft Tissue Trauma during Spontaneous Vaginal Birth in the Romanian Adolescent Population-Multicentric Comparative Study with Adult Population. Int J Environ Res Public Health. 2021 Oct 31;18(21):11491.

doi: 10.3390/ijerph182111491. PMID: 34770005; PMCID: PMC8582859.

Impact factor: 4.614

https://www.mdpi.com/1660-4601/18/21/11491

[3] **Matei A**, Dimitriu MC, Roşu GA, Furău CG, Ionescu CA. Investigating Caesarean Section Practice among Teenage Romanian Mothers Using Modified Robson Ten Group Classification System. Int J Environ Res Public Health. 2021 Oct 13;18(20):10727.

doi: 10.3390/ijerph182010727. PMID: 34682473; PMCID: PMC8536039.

Impact factor: 4.614

https://www.mdpi.com/1660-4601/18/20/10727

ANNEX 1

QUESTIONNAIRE REGARDING DEMOGRAPHIC, CLINICAL AND PSYCHOSOCIAL PECULIARITIES OF PREGNANT ADOLESCENTS ADMITTED IN OBSTETRICS AND GYNECOLOGY DEPARTMENT OF "SF. PANTELIMON" EMERGENCY HOSPITAL BUCHAREST

CHART NO. _____ DATE: _____

The patient was interviewed by Dr_____. By signing this document, the patient/legal representative expresses her/his spoken and written agreement to respond to this present questionnaire, all questions asked by Dr_____, under careful guidance and coordination of the patient's current Obstetrician, the patient being informed with respect to their data analysis exclusively in educational, research and for publication purposes. The patient/legal representative, by signing this document, renounces voluntarily to any remuneration or compensation, which can result from their data analysis and consequent publication. The name of the study coordinator has been previously presented to the patient. The patient has been informed with respect to the nature and limits of confidentiality. Information from the patient will be analysed in conformity with General Data Protection Regulation 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data.

Signature of patient/ legal representative,

Signature of physician taking the interview,

I.   Social and demographic aspects

Patient initials:

Age (years):

Area of provenance (urban/rural):

Education (number of graduated years):

Writing (yes/no):

Reading (yes/no):

Do you wish to continue your studies? (yes/no):

Occupation:

Number of family members (brothers/sisters):

Parent's relationship (married/divorced/separated):

Marital status:

Age of partner (years):

Relationship duration (years):

Does your family/partner support you? (yes/no):

Will your partner register the newborn on his name? (yes/no):

Current residence (with your family/partner/partner's family):

Number of sexual partners:

Methods of contraception used:

Stress factor over the last year (yes/no):

Would you change the timing of this pregnancy in your life? (yes/no):

Is it a tradition in your family to become pregnant during adolescence? (yes/no):

II. Medical aspects

Menarche (age in years):

Previous births: _____

- Vaginal:_____
  - Birthweight (kg):_____
  - At term / premature delivery_____
- Caesarean section:_____
  - Birthweight (kg):_____
  - At term / premature delivery _____

Abortions: _____
- On demand:_____
- Spontaneous pregnancy loss:_____

Have you ever been diagnosed with depression? _____
Currently:
Date of last menstrual period: _____
Height (m): _____
Weight (kg): _____
Arterial blood pressure (mmHg): _____
Smoking: _____
Use of alcohol/drugs:
_____
Pregnancy follow-up:
Family phisician (number of visits) _____
Obstetrician (number of visits): _____
No follow-up (number of visits): _____

III.   Questionnaire regarding Edinburgh postnatala depression scale (EPDS)

As you are pregnant or have recently had a baby, we would like to know how you are feeling. Please check the answer that comes closest to how you have felt IN THE PAST 7 DAYS, not just how you feel today.

In the past 7 days:

1. I have been able to laugh and see the funny side of things:

( )As much as I always could

( )Not quite as much now

( )Definitely not so much now

( )Not at all

2. I have looked forward with enjoyment to things:

( ) As much as I ever did

( ) Rather less than I used to

( ) Definitely less than I used to

( ) Hardly at all

3. I have blamed myself unnecessarily when things went wrong:

( ) Yes, most of the time

( ) Yes, some of the time

( ) Not very often

( ) No, never

4. I have been anxious or worried for no good reason:

( ) No, not at all

( ) Hardly ever

( ) Yes, sometimes

( ) Yes, very often

5. I have felt scared or panicky for no very good reason:

( ) Yes, quite a lot

( ) Yes, sometimes

( ) No, not much

( ) No, not at all

6. Things have been getting on top of me:

( ) Yes, most of the time I haven't been able to cope at all

( ) Yes, sometimes I haven't been coping as well as usual

( ) No, most of the time I have coped quite well

( ) No, I have been coping as well as ever

7. I have been so unhappy that I have had difficulty sleeping:

( ) Yes, most of the time

( ) Yes, sometimes

( ) Not very often

( ) No, not at all

8. I have felt sad or miserable:

( ) Yes, most of the time

( ) Yes, quite often

( ) Not very often

( ) No, not at all

9. I have been so unhappy that I have been crying:

( ) Yes, most of the time

( ) Yes, quite often

( ) Only occasionally

( ) No, never

10. The thought of harming myself has occurred to me:

( ) Yes, quite often

( ) Sometimes

( ) Hardly ever

( ) Never

*11. I feel safe in my house:

( ) Yes

( ) No

( ) Sometimes

ANNEX 2

Patient data

Pregnancy:
- single
- multiple

Obstetrical complications: _____

_____
_____
_____
_____
Mode of delivery:_____
- E/R (yes/no):
- Intact soft tissue (yes/no):
- Suture of cervix/vagina/perineum:
- Labour duration (hours):

Indication for CS:_____
Robson group:_____
Gestational age (weeks): _____
Haemoglobin levels (g/dl):_____
MCV (fl):_____
MCHC(g/dl):_____
MCH (pg):_____

Foetus data:
Weight (g):_____
APGAR scoring:_____
Sex: _____
Admission to Neonatal Intensive care unit (number of days)_____

ANNEX 3

The modified Robson classification for deliveries through CS

GROUP	DESCRIPTION
1	Nulliparous women, single cephalic, ≥37 weeks, in spontaneous labour

2	Nulliparous women, single cephalic, ≥37 weeks, with:
	    A. Induced labour
	    B. CS before labour

3	Multiparous women excluding previous CS, single cephalic, ≥37 weeks, in spontaneous labour

4	Multiparous, singleton, cephalic, without previous CS, with:
	    A. Induced labour
	    B. CS before labour

5	Multiparous women, previous CS, single cephalic, ≥37 weeks, with:
	1. One previous CS
	2. Two or more previous CS
	    A. Spontaneous labour
	    B. Induced labour
	    C. CS before labour

6	All nullipara breeches with:
	    A. Spontaneous labour
	    B. Induced labour
	    C. CS before labour

7	All multipara breeches, including previous CS, with:
	    A. Spontaneous labour
	    B. Induced labour
	    C.CS before labour

8	All multiple pregnancies with:
	    A. Spontaneous labour
	    B. Induced labour
	    C.CS before labour

9	Transverse and oblique lies, including previous CS with:
	    A. Spontaneous labour
	    B. Induced labour
	    C.CS before labour

10	All single cephalic, ≤36 weeks, including previous CS, with:
	    A. Spontaneous labour
	    B. Induced labour
	    C.CS before labour