

**MINISTRY OF HEALTH OF UKRAINE**

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UDC: 618.3-08**

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**Master's Thesis**

**MANAGEMENT OF RISKS AND COMPLICATIONS DURING  
PREGNANCY**

**Master of Science in Nursing**

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**Ternopil – 2022**

## ABSTRACT

Managing high-risk pregnancies, the nurse will need to keep in mind that more attention and regular health checks will be needed to make sure everything is in order. If serious complications due to high-risk factors do develop during pregnancy a team of medical specialists will help to solve these problems in the best possible way. In addition, doctors and nurses will work to keep the mother and baby safe. The aim of the study was to study the specific features of health care and management of risks and complications during pregnancy.

The data for this project was collected through observation at various hospitals and has been compared with literature database analysis. The patterns and features of pregnancy as a physiological process have been studied. The features of the organization of medical care in pregnancy, labor and delivery have been studied. The authors have investigated the presence or development of risks and complications during pregnancy. The options for scoring of risk factors during pregnancy have been evaluated. The impact of alcohol, smoking and drug abuse on pregnancy has been analyzed.

These findings indicate the need for doctor consulting for women who are taking drugs due to a disease whether it is safe to continue and whether their treatment schedule needs adjustments during pregnancy. The main rule of thumb is that it is best to avoid using medications during pregnancy. Future mother should always alert the doctor and nurse that she is expecting a baby, if the physician is about to prescribe her a medication or advise an over-the-counter product or supplement.

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## INTRODUCTION

**The relevance of the study.** As reported by the WHO, approximately 88% of all pregnancies have a physiological course [43], where only basic care is provided; the other 12% are high-risk pregnancies, which require additional and specific care interventions [17, 18].

The approach to be taken is to monitor all pregnant women for their ability to have a normal pregnancy until there is clear evidence to the contrary. A pregnancy is considered at risk [1, 11, 14] if there are medical conditions that could affect the health of the mother [20, 25, 33] or the fetus [12, 13, 16, 19, 38, 39], or both. Among the risk factors for pregnancy, the primary one is the woman's age [1, 7, 22, 26], because the increase in high-risk pregnancies over the past 20 years is directly associated with an increase in the average age of women who become pregnant.

In addition, proper diet and maintaining a healthy body weight [1, 16] are very important during pregnancy [2, 3], while diabetes, cardiovascular disease [20, 30, 31], stress [20] or autoimmune and hereditary diseases [14 ] often lead to miscarriage [19], or even stillbirth [38]. The risk factors of pregnancy also include the complications that occurs already in the course of pregnancy, such as hypertension of pregnancy, eclampsia [6], as well as infectious diseases [24, 27, 28, 35], including COVID-19 [2, 5, 23, 37, 42]. The fears and anxieties that are common in high-risk pregnancies make it difficult for a couple to live a happy life during the months of gestation. Effective communication, control and early detection of risk factors [1, 3, 29], as well as effective management [21, 30, 33, 36] and monitoring [41] are important tools that doctors and nurses [15, 17, 18] use to plan their best treatment strategies and to minimize both maternal [11, 20, 33] and fetal [12, 16, 39] risks.

World Health Organization (WHO) strives to build a world where every pregnant woman and every newborn will receive quality care throughout pregnancy, childbirth and the postpartum period [17, 18, 43]. As part of the

continuum of reproductive health care, antenatal care (ANC) serves as a platform for important health interventions, including healthy lifestyle promotion, screening, diagnosis, and disease prevention [9, 39]. It has been proven that the timely implementation of evidence-based interventions in the framework of antenatal care can save lives.

It is very important that at this crucial time in a woman's life, antenatal care provides an opportunity to give information and support to expecting women and their families. When organizing care for pregnant women [17], there is an obvious importance of effective and respectful communication with pregnant women concerning the physiological, biomedical, behavioral and sociocultural issues, as well as effective and respectful provision of social, cultural, emotional and psychological support. These educational and supportive functions of antenatal care are not only key to saving lives, but also improve well-being, as well as accessibility and quality of medical and perinatal care. The positive experiences of a woman during antenatal care and childbirth lay the foundation for a healthy motherhood.

Medical care for women during pregnancy is provided as part of primary health care, specialized (including high-tech tertiary care) and emergency care, including specialized emergency care in medical organizations having a license to provide medical services [15, 17, 18, 43].

The procedure for providing medical care to women during pregnancy includes two main stages, namely outpatient care (provided by obstetricians and gynecologists, and in their absence, in a physiological pregnancy, by general practitioners and family doctors and nurses/midwives) and inpatient care (provided in abnormal pregnancy units in case of obstetric complications or in specialized departments of medical organizations for patients with somatic disease).

Most pregnancies are low-risk and proceed normally. But sometimes the maternal health becomes problematic during pregnancy. In addition, the health

problems that women have before pregnancy [4, 11] may cause serious problems if not treated correctly [3, 39].

High-risk gravida [14, 20, 33] often need special care and special management [21, 30, 33, 36] of pregnancy, especially when reproductive technologies are used [34]. This is necessary so that the physician monitors the risks to make sure they have no adverse impact on fetal [12, 19, 38] or maternal health [25].

When managing high-risk pregnancies, the nurse will need to keep in mind that more attention and regular health checks will be needed to make sure everything is in order. If serious complications due to high-risk factors do develop during pregnancy [3, 6, 7, 40], a team of medical specialists will help to solve these problems in the best possible way. In addition, doctors and nurses [15, 18] will work to keep the mother and baby safe.

**The aim of the study:** to study the specific features of health care and management of risks and complications during pregnancy.

**Study objectives.**

1. To study the patterns and features of pregnancy as a physiological process.
2. To study the features of the organization of medical care in pregnancy, labor and delivery.
3. To investigate the presence or development of risks and complications during pregnancy.
4. To evaluate the options for scoring of risk factors during pregnancy.
5. To study the impact of alcohol, smoking and drug abuse on pregnancy.

**The object of the study.** Patients, i.e. pregnant women of various gestational ages who received medical care when they were identified as having risks and complications during pregnancy.

**The subject of research.** The specific features of detecting risks and complications of pregnancy, as well as the peculiarities of health care in risks and complications in pregnant women of different gestational ages.

**The methods of study:** clinical study of pregnant women, examination by obstetrician/gynecologist and internist, special laboratory methods and tests, as well as well-known scientific methods including the bibliosemantic method, the method of system analysis and statistical methods.

**The scientific and practical value of the study.** This research project has studied the patterns and features of pregnancy as a physiological process, the features of the organization of medical care in pregnancy, labor and delivery, the presence or development of risks and complications during pregnancy, the options for scoring of risk factors during pregnancy and the impact of alcohol, smoking and drug abuse on pregnancy.

CHAPTER 1  
PREGNANCY AS A PHYSIOLOGICAL PROCESS. MEDICAL CARE IN  
PREGNANCY, LABOR AND DELIVERY  
(REVIEW OF LITERATURE)

From the very first days of pregnancy, a woman's body undergoes profound transformations. These transformations are the result of coordinated work involving almost all bodily systems, as well as the result of the continuous mother-child physiological interaction [12, 13, 38]. During pregnancy, many internal organs are undergoing significant restructuring. These changes are of adaptive nature; in most cases, they are not lasting and completely reverse in the postpartum period. Here we shall consider the changes in the principal vital bodily functions of a woman during pregnancy.

The respiratory system works in an enhanced mode during pregnancy. The respiratory rate increases. This is due to an increased oxygen demands of the mother and fetus. Other changes include the limited respiratory movements of the diaphragm due to the increased size of the uterus, which occupies a significant part of the abdominal cavity.

During pregnancy, maternal cardiovascular system needs to pump large amounts of blood to ensure an adequate supply of the fetus with nutrients and oxygen [20, 30, 31]. In this respect, the thickness and contractile strength of the heart muscle increases during pregnancy, the pulse becomes more rapid and the heart begins to pump more blood in a minute. In addition, circulating blood volume increases. In some cases, blood pressure is increased. The vascular tone decreases during pregnancy, which creates favorable conditions for increased supply of tissues with nutrients and oxygen. During pregnancy, the network of blood vessels in the uterus, vagina and mammary glands reduces significantly. Dilated veins are often observed on the external genitals and in the lower extremities; formation of varicose veins is not infrequent. Heart rate is lower in the second half of pregnancy. It is generally accepted that a BP elevation above

120-130 mm Hg and a reduction below 100 mm Hg may signal the occurrence of complications of pregnancy [6]. This is why it is important to have data on baseline BP.

Changes in the blood system. During pregnancy, there is an increase in hematopoiesis; the counts of red blood cells, and the amount of hemoglobin, plasma and CBV are increased [14]. By the end of pregnancy, CBV is 30-40% greater, and RBC count is 15-20% higher. Many healthy gravida are reported to have a low-grade leukocytosis. ESR during pregnancy climbs to 30-40 mm/hour. The coagulation system undergoes changes that contribute to hemostasis and prevention of significant blood loss during labor, when shedding the placenta and in the early postpartum period.

The kidneys are also working much harder during pregnancy. They secrete metabolic by-products from the mother and fetus (waste products from the fetus pass through the placenta into the mother's blood).

Changes in the digestive system are represented by increased appetite (in most cases), as well as by cravings for salty and sour foods. In some cases, there is aversion to certain foods that were favorable tolerated before pregnancy. Due to the increased tone of the vagus nerve, constipation may occur.

The most significant changes, however, occur in the genitals of a pregnant woman. These changes prepare the woman's reproductive system for childbirth and breastfeeding.

The uterus of a pregnant woman increases in size significantly. Its weight increases from 50 g at the beginning of pregnancy to 1200 g at the end of pregnancy. By the end of pregnancy, the volume of the uterine cavity increases more than 500-fold. The blood supply of the uterus is substantially increased. The number of muscle fibers is increased in the walls of the uterus. The cervix is filled with dense mucus, which seals the lumen of the cervical canal. The fallopian tubes and ovaries also increase in size. In one of the ovaries, there is a "corpus luteum of pregnancy", a site for the synthesis of hormones that support pregnancy. The walls of the vagina loosen and become more elastic. The

external genitals (labia minora and labia majora) also increase in size and become more elastic. The tissues of the perineum are loosened. In addition to the above, there is an increased mobility in the joints of the pelvis and pubic dehiscence. The above changes in the genital tract are highly physiologically important for labor and delivery. Loosening of the walls, as well as the increased mobility and elasticity of the genital tract increases its capacity and facilitates fetal descent during childbirth [41].

The skin in the genital area and along the midline of the abdomen usually becomes darker in color. Sometimes, stretch marks are formed on the skin of the lateral parts of the abdomen, which turn into whitish stripes after childbirth.

The mammary glands increase in size, and become more elastic and tense. When gentle pressure is applied to the nipple, colostrum (primary milk) is released.

Skeletal and muscular system changes. Increased serum levels of such hormones as relaxin and progesterone contribute to the leaching of calcium from the skeletal system. This reduces the rigidity of the joints between the pelvic bones and increases the elasticity of the pelvic ring. Increased pelvic elasticity is of great importance for increasing the diameter of the internal bone ring during the first stage of labor, as well as for further reduction in the resistance of the birth canal to fetal movement during the second stage of labor. The calcium, which is leached from the maternal skeletal system, is used up to form fetal skeleton [16, 19].

It is worth mentioning that calcium salts are leached from all bones of the maternal skeleton (including bones of the foot and spine). As shown earlier, the woman's weight increases by 10 to 12 kg during her pregnancy. This additional burden, in the setting of reduced bone density, may cause foot deformity and flat foot. A shift in the center of gravity of a pregnant woman's body due to a heavier uterus may lead to a change in the spinal curvature and the resulting back pain and pelvic bones pain. This is why gravidas are advised to wear comfortable shoes on low heels to prevent flat foot. It is advisable to use insoles

that support the arch of the foot. Special physical exercise that “unload” the spine and the sacrum are recommended to prevent back pain, as well as wearing a comfortable bandage. Despite the intensive calcium loss by the skeletal bones in pregnant women and increased bone elasticity, the structure and the density of bones are not compromised (unlike osteoporosis in the elderly women).

Changes in the nervous system. In the first months of pregnancy and at the end of pregnancy, there is a decrease in the excitability of the cerebral cortex, which reaches its nadir by the time of delivery [3, 4, 6]. Simultaneously, the excitability of the receptors in the pregnant uterus increases. In early pregnancy, there is an increased tone of the vagus nerve, which may often result in changes of taste and smell, nausea, increased salivation, etc.

Substantial changes in the activity of endocrine glands, which contribute to proper course of pregnancy and labor. Changes in body weight. By the end of pregnancy, the body weight of the gravida increases by approximately 10-12 kg. This total value is distributed as follows: fetus, placenta, membranes and amniotic fluid – approximately 4.0 to 4.5 kg; uterus and mammary glands – 1.0 kg; blood – 1.5 kg; intercellular fluid (tissue fluid) – 1 kg; increased maternal adipose tissue – 4 kg.

All these physiological changes in organs and systems must be kept in mind in order to produce a timely response to possible abnormal changes, especially those in preexisting disease [4, 11, 31, 44], during surgical interventions [3, 29], as well as in exposure to toxins [8, 9, 10, 39], radiation [32], stress [20] and other risk factors [20, 25, 33].

In the world, there are different variants of differentiated approach to gravida depending on the risk [21, 36]. For example, in England, New Zealand and Australia, obstetric care is provided in the following settings:

- in the Birth Center, staffed by midwives only and without any specialized equipment. Such centers provide services to low-risk gravidas. When complications occur, the patient is transferred to a specialized care institution;

- in the Alongside Unit, also staffed by midwives, but having hardware monitoring of the fetus and the pregnant woman. In case of complications, the puerpera is transferred to a hospital;
- in the Integral Unit, where general profile physicians work alongside midwives, and where the use of obstetrical monitors is available. A specialist physician is available on call, who may provide care on-site.

In the United States, a similar three-tier system of obstetric care has been developed and implemented.

In some countries, the health care model includes perinatal centers on the premises of multidisciplinary medical institutions [17]. Such centers offer consultative-diagnostic, medical and rehabilitation care chiefly in the most problem-laden populations of pregnant women, puerperas and newborn children, as well as in women with impaired reproductive function. These institutions use modern preventive, therapeutic and diagnostic technologies [34], conduct statistical monitoring [41] and analyze the cases of maternal, perinatal and infant mortality.

Perinatal centers should not be viewed as a replacement for conventional maternity hospitals, but rather serve as hubs for women at high obstetric risk. Creating such regional centers is beneficial from both economic and practical viewpoint, because there is no dissipation of funds on all labor and delivery facilities in the region, and the main task of the outpatient level becomes to single out patients at high obstetric risk [1, 20, 25].

The first attempts at predicting perinatal outcomes were made in the early 50s of the twentieth century, when obstetricians and pediatricians began to notice that perinatal mortality was higher in children whose mothers had pregnancy complications [3, 7, 40], a history of somatic disease [4, 11] and adverse social habits.

A. Lilienfeld and B. Pasamanick were among the first scholars to analyze the causes and frequency of central nervous system (CNS) disorders in children whose mothers had pregnancy complications. Subsequently, the authors

have conducted an analysis of the causes of perinatal mortality and morbidity and suggested a concept of “total reproductive losses”, which included not only perinatal mortality, but also the morbidity represented by CNS disease.

At the same time, it was noted that the mothers of children included in this “population” had identical complications during pregnancy, i.e. mostly severe nephropathy, threatened miscarriage, placenta previa and abruption of placenta [10], as well as fetal malpositions and history of stillbirths. The differences in the rates of these complications of pregnancy between the test group and the control group were statistically significant. The suggested theory was confirmed by the studies of J.F. Donnelly on the impact of adverse factors on the course of pregnancy. This author found a statistically significant connection between the presence of these factors in the mother and the high levels of perinatal disease.

As a rule, the initial attempts at singling out risk factors [1, 11, 12] concerned a particular disease and were mainly built on a formal basis: positive family history, perinatal factors, history of diseases, unfavorable microsocial environment, socio-hygienic factors, etc. The groups of risk factors have been determined by the time of exposure, the type of factor (biological, environmental, etc.), as well as the number of factors in place. Gradually, this circle of factors, united under the umbrella concept of “risk factors of perinatal disease” [13, 16, 19, 38, 39], has become relatively stable. It included medical and socio-demographic factors. However, the main task was not only to single out the risk factors, but also to assess their individual contributions to shaping the rates of perinatal disease.

Prenatal care, i.e. regular contact with qualified medical personnel during pregnancy, is a core component of maternity care based on a human rights-based approach.

The WHO recommends that women see a healthcare professional eight times during their pregnancy [18, 43] to identify potential complications and to manage problems as they arise, including prevention of stillbirths [38].

In spite of the fact that a substantial proportion of women seeks such services at least once during pregnancy, less than half of all women in limited-resources countries received prenatal care in the first trimester.

The WHO works to improve access to and quality of prenatal care for all populations, including adolescent girls [1, 7, 22], as well as in hard-to-reach areas or in conflict settings. Digital health interventions such as appointment reminders have had a positive impact and are an ongoing area of work.

By focusing on positive pregnancy experiences, the WHO aims to ensure not only a healthy pregnancy for every woman and child [18, 43], but also an effective transition to a positive birth and ultimately a positive parenting experience.

## CHAPTER 2

### THE OBJECT OF RESEARCH AND METHODS OF STUDY

The object of research involved patients, i.e. pregnant women of various gestational ages who received medical care when they were identified as having risks and complications during pregnancy.

The subject of research involved the specific features of detecting risks and complications of pregnancy, as well as the peculiarities of health care in risks and complications in pregnant women of different gestational ages.

In this research paper, we have done a review of scientific literature on the research question, conducted several series of clinical observations of gravidas, have worked with medical records, and analyzed the results obtained.

Regular observation of pregnancy allows for an early detection of various complications, which may occur during pregnancy and provision of the required treatment. Therefore, there are higher chances for a normal pregnancy and giving birth to a healthy child.

An important part in detecting the risks and observation of gravidas is performing the required tests, which are suggested to non-high risk pregnant women at various stages of pregnancy. As required, there may be changes within the framework of pregnancy monitoring and in the scope of recommended tests.

At the first doctor visit, the physician should obtain from the gravida any medical information on her health and the health of her family members, and recommend tests, treatments and consultations, etc., which have to be taken before and during pregnancy.

It is preferable that both the physician and the nurse conduct monitoring during pregnancy.

The tests should be specified in accordance with the gestational age. Most tests are offered as routine procedures to every pregnant woman, in every pregnancy. Some tests are designed for early detection of birth defects in the

fetus. It is likely that the gravida may be recommended to have additional tests according to her health status and the course of her pregnancy.

Within the framework of private and public medicine, an increasing number of tests during pregnancy are offered, including tests for which there are no recommendations from professional medical organizations.

Table 2.1. The tests that are recommended for gravidas to detect risks and complications of pregnancy

Timing	Test	The purpose of the test
Before pregnancy or at the earliest stage of pregnancy	Blood test to identify carriers of genetic diseases.	In identification of couples with an increased risk of having a child with genetic defects, additional tests will be done as necessary to diagnose the fetus
Immediately after the first visit to the mother and child center, and preferably before the 12th week of pregnancy	Blood test for blood type and Rh factor, fasting sugar test; VDRL test; urinalysis and urine sample for culture and sensitivity test.	Identification of anemia, carriers of thalassemia, mismatch of blood types in spouses, pre-pregnancy diabetes mellitus and evidence of occult urinary tract infection.
Week 6 to 12	Ultrasound	Determination of gestational age, viability of the pregnancy and the number of embryos.
Week 10 to 12	Chorionic villous test (CVS, placenta test).	Analysis of fetal chromosomes, diagnosis of genetic disease in the fetus.
Week 11+0_13+6	Tests of the first trimester, including: 1. Ultrasound of the collar zone. 2. Blood tests for PAPP-A and free beta HCG.	Early detection of various defects and assessment of the risk for Down syndrome in the fetus.
Week 13 to 17	Early assessment of body system using	Identification of fetal defects or disease.

	ultrasound.	
Week 16 to 20	Second trimester tests: triple test (free estriol, alpha-fetoprotein and b-hCG). OR Second trimester test: quadruple test (triple test + inhibin).	Detecting potential risk for Down syndrome and/or other severe defects of the brain and neural tube, of abdominal wall, etc. in the fetus.
Week 16 and later	Amniocentesis – amniotic fluid testing.	Analysis of fetal chromosomes, diagnosis of genetic disease in the fetus.
Week 19 to 25 Recommended Week 20 to 23	Ultrasonography for the “basic” assessment of organs and systems. OR Ultrasonography for the “advanced” assessment of organs and systems.	Detection of birth defects or diseases of fetal organs and systems. This test is routine in each pregnancy.
The second or the third trimester	Ultrasound examination of a specific organ or in connection with a specific clinical situation.	This method provides a clear and focused response concerning fetal defect or medical situation of a mother or a fetus.
Week 24 to 28	Blood tests, blood sugar (Rh antibodies as needed).	Diagnosis of anemia, suspicion of gestational diabetes.
Third trimester	Third trimester ultrasound	Monitoring of fetal development and diagnosis of fetal position.
After the expected due date	Observation by a doctor, including ultrasound and fetal monitor.	Make sure the pregnancy is going normally.

As part of the research study, we used the following methods: clinical study, examination by obstetrician/gynecologist and internist, special laboratory

methods and tests, as well as well-known scientific methods: the bibliosemantic method, the method of system analysis and statistical methods.

### CHAPTER 3

#### INVESTIGATION INTO THE PRESENCE OR DEVELOPMENT OF RISKS AND COMPLICATIONS DURING PREGNANCY

The study and systematization of risk factors.

The main risk factor that increases the number of perinatal losses is obviously preterm birth, since it ranks first within the structure of the causes for perinatal mortality and morbidity. The next important risk factors of perinatal morbidity vs. mortality include severe nephropathy, Rh isoimmunization, the presence of meconium in the amniotic fluid, breech presentation of the fetus, multiple pregnancy, maternal diabetes, obesity, maternal age over 30 years, prolonged infertility, etc.

In this series of the research study, we defined the constituents of certain risk factors, which were found in the 532 pregnant women monitored in our study.

It should be noted that some pregnant women were found to have more than one concurrent risk factor.

Table 3.1. The major risk factors that increase the number of perinatal losses according to our study

The risk factor	Number of patients	%
Premature birth	24	4.5
Severe nephropathy	18	3.4
Rh-isoimmunization	65	12.2
Presence of meconium in the amniotic fluid	34	2.3
Breech presentation of the fetus	52	9.8
Multiple pregnancy	27	5.1

Maternal diabetes	35	6.6
Obesity	48	9.0
Maternal age over 30 years	159	29.9
Prolonged infertility	26	4.9
Total	532	100

The data obtained have been extracted from the applicable medical records of 532 pregnant women registered in the healthcare institution.

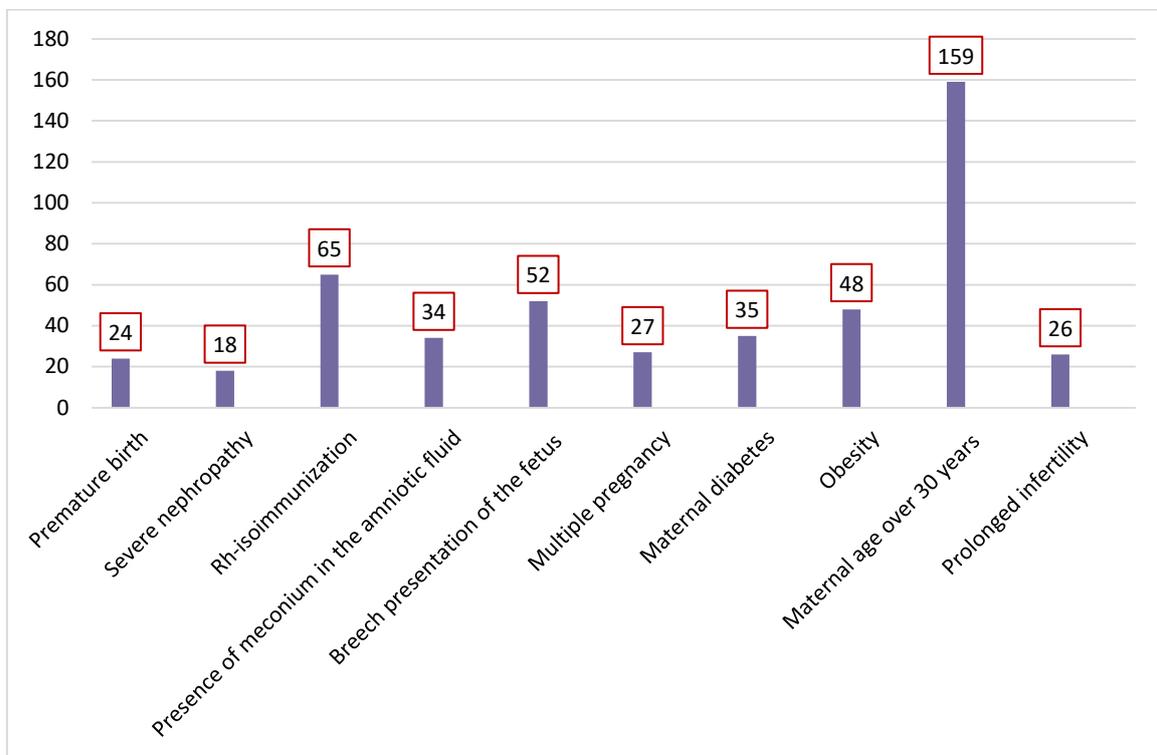


Figure 3.1. The results of the study of major risk factors that increase the number of perinatal losses in pregnant women

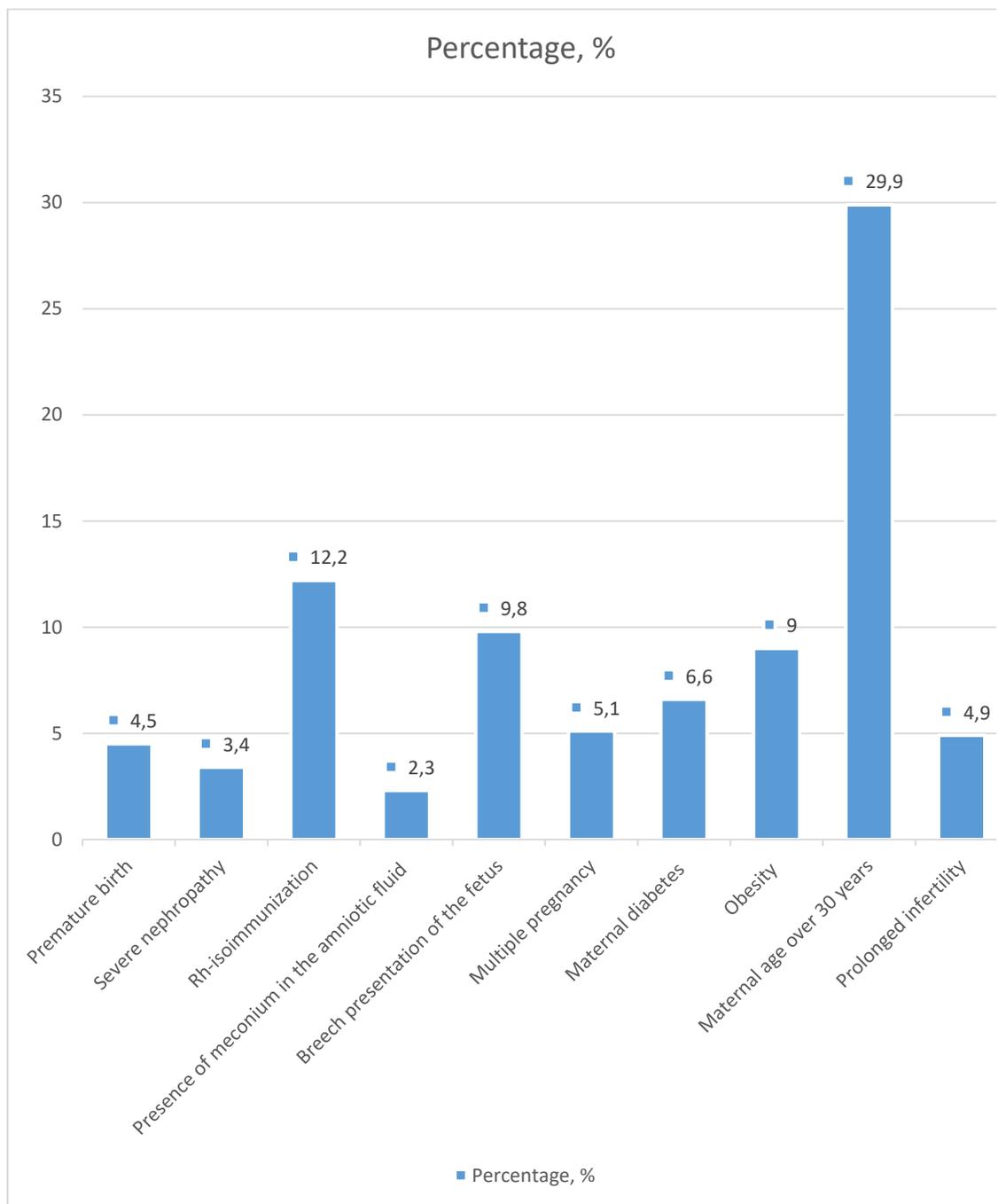


Figure 3.2. The results of the study of major risk factors (as a percentage of the total number of observed pregnant women) that increase the number of perinatal losses

For identification of high-risk gravidas, perinatology services distinguish the following categories of factors: obstetric history, extragenital disease, obstetric factors, demographic factors and other factors. A number of

perinatologists have proposed more detailed modifications of risk factors, to include adverse social habits of parents, dietary disorders, working conditions, methods of contraception, etc. Of the systems mentioned above, the most widely used is the method for identifying high-risk pregnancies proposed by S. Babson et al., which provides a list of the following risk factors that contribute to a higher incidence of perinatal morbidity and mortality:

- family history of hereditary or familial abnormalities, such as defective osteogenesis or Down's syndrome;
- the mother herself was born prematurely or with lower than normal body weight. Giving birth to a premature or underweight child;
- serious congenital anomalies of the central nervous system, cardiovascular system and skeletal system; anomalies of lung development and hematological diseases, including hereditary anemia;
- social problems such as teenage pregnancy, drug addiction, absence of a father;
- lack or late start of medical observation in the perinatal period;
- age under 18 or over 35 years;
- height less than 152.4 cm and pre-pregnancy weight 20% below or above normal for height;
- fifth and subsequent pregnancy, especially if the pregnant woman is older than 35 years;
- another pregnancy occurring within 3 months of the previous one;
- history of prolonged infertility or hormonal therapy;
- teratogenic viral disease in the first trimester;
- stressful conditions, emotional burden;
- uncontrollable vomiting of gravidas;
- anesthesia, shock, exposure to radiation;
- smoking;

- complications of current or previous pregnancy: preeclampsia, placental abruption, isoimmunization, polyhydramnios, premature rupture of membranes;
- multiple pregnancy;
- fetal growth retardation;
- absence of or minimal weight gain;
- fetal malposition, breech presentation, transverse position, unidentified fetal position;
- gestational age over 42 weeks.

The above risk factors are found in approximately 10-20% of pregnant women. To ensure a more precise detection of these factors, a comprehensive step-by-step assessment of individual risk factors has been suggested, including not only history-related, but also postnatal factors.

This method included several stages of selecting women at high risk for unfavorable outcome:

- initial screening;
- screening during visits to the maternity welfare center;
- screening during labor and delivery: first screening on admission to the obstetric institution, second screening on admission to the maternity ward;
- identification of high obstetric risk for the mother and newborn;
- postpartum assessment for the mother and newborn.

During the initial screening, we identified the following risk factors in some gravidas:

#### 1. Biological and marital factors

##### A. High risk

- Maternal age 15 years or younger.
- Maternal age 35 years or older.
- Morbid obesity.

##### B. Moderate risk

- Maternal age from 15 to 19 years.

- Maternal age from 30 to 34 years.
- Not married.
- Obesity (body weight 20% above normal).
- Wasting (body weight less than 45 kg).
- Height less than 152 cm.

## 2. Obstetric history

### A. High risk

- Anomalies of the birth canal (incompetence of the cervix, abnormal development of the cervix, abnormal development of the uterus).
- Two or more previous abortions.
- Intrauterine fetal death or neonatal death in a previous pregnancy.
- History of two preterm births, or giving birth to full-term neonates weighing less than 2500 g.
- Two previous children weighing more than 4000 g at birth.
- Malignant tumor in the mother.
- Uterine fibroids (15 cm or larger, or submucosal location).
- Cystic changes in the ovaries.
- Eight or more children.
- History of isoimmunization in a previous child.
- History of eclampsia.
- History of genetic abnormalities or congenital malformations in previous children.
- History of complications that required intensive care in the neonatal period, or giving birth to a child with a birth injury.
- Termination of a previous pregnancy for medical reasons.

### B. Moderate risk

- History of one preterm birth, or giving birth to a full-term neonate weighing less than 2000 g.
- Giving birth to one child weighing more than 4000 g at birth.

- Previous labor that ended with a surgical delivery: Cesarean section, obstetric forceps, extraction by the pelvic end.
- Previous prolonged labor.
- Contracted pelvis.
- Having serious emotional problems related to a previous pregnancy or childbirth.
- Previous surgeries on the uterus or cervix.
- Number of children from 5 to 8.
- Natural sterility.
- History of ABO incompatibility.
- Malpresentation of fetus in previous labor.
- History of endometriosis.
- Pregnancy that occurred 3 months or earlier after the last delivery.

### 3. Medical and surgical history

#### A. High risk

- Moderate hypertension.
- Moderate kidney disease.
- Severe heart disease (II-IV degree of heart failure) or congestion caused by heart failure.
- Diabetes.
- History of surgical removal of endocrine glands.
- Cytological changes in the cervix.
- Sickle cell anemia.
- Drug addiction or alcoholism.
- History of tuberculosis.
- Lung disease.
- Malignant tumor.
- Gastrointestinal disease or liver disease.
- Previous heart surgery or vascular surgery.

#### B. Moderate risk

- Initial stage of hypertension.
- Mild kidney disease.
- Mild heart disease (I degree).
- History of mild hypertensive states during pregnancy.
- History of pyelonephritis.
- Diabetes (mild).
- Family history of diabetes.
- Thyroid disease.
- Positive results of serological testing.
- Excessive use of medications.
- Emotional problems.
- The presence of sickle-shaped erythrocytes in the blood.
- Epilepsy.

In this research study, we also paid attention to assessment of gravidas and identification of risk factors during visits to the maternity welfare center, and in the prenatal period in early and late pregnancy.

#### I. Early pregnancy

##### A. High risk

- Lack of uterine enlargement or disproportionate uterine enlargement.
- Effects of teratogenic factors (radiation, infections, chemical agents).
- Pregnancy complicated by immunization.
- The need for genetic diagnosis in the antenatal period.
- Severe anemia (Hb below 90 g/l).

##### B. Moderate risk

- Recalcitrant urinary tract infections.
- Suspected ectopic pregnancy.
- Suspected failed abortion.
- Severe uncontrollable vomiting of gravidas.
- Positive serological test for gonorrhoea.
- Anemia refractory to iron therapy.

- Viral disease.
- Vaginal bleeding.
- Mild anemia (hemoglobin content from 90 to 109 g/l).

## II. Late pregnancy

### A. High risk

- Lack of uterine enlargement or disproportionate uterine enlargement.
- Severe anemia (Hb below 90 g/l).
- Gestational age over 42.5 weeks.
- Severe preeclampsia.
- Eclampsia.
- Breech presentation if normal delivery is planned.
- Moderate isoimmunization (there is a need for intrauterine blood transfusion or total exchange transfusion for the fetus).

- Placenta previa.
- Polyhydramnios or multiple pregnancy.
- Intrauterine fetal death.
- Thromboembolic disease.
- Premature birth (gestational age less than 37 weeks).
- Premature rupture of membranes (gestational age less than 38 weeks).
- Obstruction of birth canal caused by a tumor or other causes.
- Premature placental abruption.
- Chronic or acute pyelonephritis.
- Multiple pregnancy.
- Abnormal reaction to an oxytocin test.
- Decreased estriol levels in the urine of a gravida.

### B. Moderate risk

- Hypertension during pregnancy (mild).
- Breech presentation if Cesarean section is planned.
- Unidentified fetal position.
- The need to determine the degree of maturity of the fetus.

- Post-term pregnancy (41-42.5 weeks).
- Premature rupture of membranes (labor has not began for more than 12 hours).
- Induction of labor.
- Suspected cephalopelvic disproportion at the time of delivery.
- Unidentified presentations 2 weeks or less prior to due date.

Particular attention was paid to assessment of pregnant women and identification of risk factors during childbirth.

#### Screening during childbirth

##### A. High risk

- Previously identified factors that suggest high risk.
- Severe preeclampsia or eclampsia.
- Polyhydramnios or oligohydramnios.
- Amnionitis.
- Premature rupture of membranes more than 24 hours before delivery.
- Rupture of the uterus.
- Placenta previa.
- Premature placental abruption.
- Meconium staining of amniotic fluid.
- Malpresentation.
- Multiple pregnancy.
- Fetal weight less than 2000 grams.
- Fetal weight more than 4000 grams.
- Fetal bradycardia (longer than 30 minutes).
- Childbirth in breech presentation.
- Prolapse of the umbilical cord.
- Fetal acidosis (pH 7.25 or less in the first stage of labor).
- Fetal tachycardia (longer than 30 minutes).
- Shoulder dystocia.
- Presenting part not descended by the time of delivery.

- Maternal fatigue.
- Abnormal reaction to an oxytocin test.
- Decreased estriol levels in the urine of a gravida.
- Insufficient or intermediate fetal maturity, as established by lecithin/sphingomyelin (L/S) ratio or a rapid surfactant test.

#### B. Moderate risk

- Mild hypertension during pregnancy.
- Premature rupture of membranes (more than 12 hours before delivery).
- Primary uterine inertia.
- Secondary failure of cervical dilation.
- Promedol (more than 200 mg).
- Magnesium sulfate (more than 25 g).
- Labor lasting more than 20 hours.
- Duration of the second stage of labor more than 1 hour.
- Cephalopelvic disproportion.
- Pharmacological induction of labor.
- Impetuous labor (lasting less than 3 hours).
- Induction of labor as a choice.
- Protracted latent phase of labor.
- Uterine tetany.
- Oxytocin stimulation.
- Marginal placental abruption.
- Forceps delivery.
- Vacuum assisted delivery.
- General anesthesia.
- Any disturbances of respiration, pulse and temperature in the mother.
- Abnormal uterine contractions.

The next stage was examination of gravidas and identification of risk factors in the postnatal period.

Risk criteria in the postnatal period

### A. High risk

- Prematurity (body weight less than 2000 g).
- Apgar score of 6 or less at 5 minutes after birth.
- Resuscitation after birth.
- Developmental anomalies of the fetus.
- Respiratory distress syndrome.
- Immature fetus with meconium staining of amniotic fluid.
- Congenital pneumonia.
- Anomalies of the respiratory system.
- Respiratory arrest in a newborn.
- Other respiratory disorders.
- Hypoglycemia.
- Hypocalcemia.
- Major congenital malformations that do not require immediate intervention.
- Congestion caused by heart disease.
- Hyperbilirubinaemia.
- Mild bleeding diatheses.
- Chromosomal abnormalities.
- Sepsis.
- Central nervous system depression lasting more than 24 hours.
- Persisting cyanosis.
- Cerebrovascular accidents or cerebral hemorrhages.

### B. Moderate risk

- Insufficient fetal maturity.
- Prematurity (body weight from 2000 to 2500 g).
- Apgar score of 4 to 6 or less at one minute after birth.
- Difficulties with feeding.
- Multiple birth.
- Transient tachypnea.

- Hypomagnesemia and hypermagnesemia.
- Hypoparathyroidism.
- Absence of weight gain.
- Inhibition or hyperactivity due to specific causes.
- Cardiac anomalies that do not require immediate catheterization.
- Heart murmurs.
- Anemia.
- Central nervous system depression lasting no less than 24 hours.

According to modern trends in care, it is recommended that high risk gravidas be monitored by a perinatologist with subsequent delivery in specialized centers.

In pregnant women with high perinatal risks, there is a multifactorial combination, and there is often a certain synergy between the risk factors that increases their adverse effects on the mother and fetus.

Timely identification of high risk gravida is very important, since they require intensive maternal and fetal monitoring literally from the very beginning of pregnancy.

This concept has been confirmed in many countries where health systems have managed to achieve the lowest rates of perinatal mortality due to the extended prenatal screening of pregnant women and centralized monitoring of the high-risk populations at large obstetric hospitals equipped with modern diagnostic modalities and staffed with highly qualified personnel.

Thus, the concept of perinatal risk has been formed. This concept is aimed at preservation of the life and health of the fetus and newborn and has been created based on the study of factors affecting the level of perinatal morbidity and mortality. It involves the study of the course of pregnancy, the nature of its complications and planning of ways to improve medical and social care for pregnant women and children.

## CHAPTER 4

### SCORING OF RISK FACTORS DURING PREGNANCY

Scoring of risk factors. During data analysis for risk prognostication, various risk factors were found to have different effects on perinatal mortality and morbidity. This influence is integrative, that is, their influence is not the result of a simple summation. Therefore, a need arose to identify and study the overall combined effect of risk factors that contribute to implementation of hereditary predisposition.

Within the pool of unfavorable factors, it was difficult to determine the degree of influence of one factor upon the other, their overall influence, and the possible synergy or antagonism of the factors.

To solve this problem, various methods are used to quantify factors using mathematical calculation systems, with the highest rating for the highest risk.

The use of mathematical calculations makes it possible to assess not only the probability of an unfavorable outcome of childbirth for the fetus regarding each risk factor, but also to obtain a summary expression of the action of these factors.

In one of such methods, R. Nesbitt and R. Aubry suggested using an arbitration points system, where each factor of the scale is estimated by a certain number of points depending on its effect on the perinatal outcome.

The maximum score is 30 points, the minimum score is 5 points. The level of perinatal risk is determined as a subtraction from the maximal score, i.e. 100 points minus the sum of the scores obtained by the patient at screening. The smaller the difference, the higher the risk.

Thus, we have divided the group of gravidas in our study into the following 3 subgroups: high, moderate and low risk. Patients with the difference of 70 and less belonged to the high risk subgroup; the difference of 70–84 stood for the moderate risk subgroup, and the difference of 85 and more stood for the

low risk subgroup. As suggested by the authors of the technique, we have assessed gravidas using a score-based screening at 12 weeks of pregnancy and again at 36 weeks. At the same time, in the group of high risk gravidas, these measurements increased from 20% in early pregnancy to 30% in late pregnancy.

Risk factors are defined as external and internal environmental factors that affect the prevalences of disease. To identify high risk subjects, the investigators use a screening that ensures hyper-diagnosis in detection of populations at high risk for disease. Risk factors can also be interpreted as conditional factors, which contribute to manifestation or development of an abnormal condition. Elimination or improvement of these factors may lead to reduction of the event.

One of the widely used approaches to determine the risk of complications is based on the relative risk concept, which views the relation between patients with a particular disease and disease-free individuals, in connection with certain risk factors of the disease in question. Based on this assumption, an empiric assessment of relative risk of developing a disease can be represented by the following formula:

$$r = \frac{a1(1 \times a2)}{(1 \times a1)a2} = \frac{p1(1 \times p2)}{(1 \times p1)p2},$$

where  $r$  is an a posteriori estimate of relative risk;  $a1$ ,  $a2$  represent the number of cases of the disease per 10 raised to the 3d power – 10 raised to the 5th power;  $p1$ ,  $p2$  represent the probabilistic characteristics that assess the relative incidence of the risk in the main and control groups, respectively.

There are two conceptually different models based on the method of primary division of the study population. In the first model, the study group is divided into two subgroups: susceptible and insusceptible to the effect of risk factors. In each subgroup, objective actual indicators of the studied disease are checked, in order to assess whether the threatened subgroup has a higher incidence of disease.

The second model involves dividing the overall group into the subgroups of subjects who have or have not got the disease; then each subgroup is tested

for susceptibility to risk. In practice, the second model or a combination of both is used for the most part. This allows obtaining good statistical estimates, which provide useful information on the relative risk of the disease.

The first model requires a large pool of data, since it is otherwise difficult to detect a difference between the actual coefficients of disease incidence in the groups. In addition to that, the use of the second model allows for a more precise identification of susceptibility to an anticipated risk, by singling out the subgroups with various risk factors.

Relative risk-based group design is widely used in research studies. Among the methods, primarily aimed at detection of risk factor combinations, regression analysis of qualitative indicators and multiple logistic regression should be mentioned. It should be noted that such procedures, which make it possible to use a geometric approach (as in the method of principal components), make it possible to improve specialist interpretation of the risk groups formed by visualizing the results of processing.

The pattern recognition methods used to analyze and form risk groups include both deterministic and stochastic methods. When choosing an algorithm, it is necessary to take into account the nature of the analyzed indicators (quantitative, rank, graded or nominal), class homogeneity, pattern of distribution, sample size, etc. Insufficient consideration or ignoring these issues may distort the results and lead to false conclusions. At the same time, it is necessary to remember about the importance of identifying the cumulative effects of the most significant factors.

The use of modern mathematical methods allows to objectify risk factor assessments and, in some cases, to solve the problems of identification of “risk symptom complexes” and prognostication of disease. The use of classic regression analysis, discriminant analysis, cluster analysis and the principal components method is possible with prior use of a procedure to digitization of non-quantitative variables, i.e. when such variables are assigned “reasonable” numerical labels within the framework of a specific task. Using these methods to

evaluate the efficacy of various interventions allows selecting an optimal modality and time of preventive and therapeutic interventions.

Isolated prognostication systems determine the risk of an adverse outcome in a certain condition, i.e., in breech presentation of the fetus, large fetus or determine the risk for a particular abnormal situation, e.g., the risk of developing perinatal CNS damage. These systems are very sensitive and accurate to determine the likelihood of an unfavorable outcome. However, due to their narrow specificity, they have a limited practical significance.

It is quite difficult for an obstetrical practitioner to remember or store a large number of risk scales for all possible abnormal obstetrical conditions in everyday practice. Therefore, as a rule, a limited number of risk scales are used for the most common conditions; for example, the choice of specific scales may be informed by the specialization of the institution.

Therefore, we have reviewed several of the most common isolated scales for risk prediction.

**Risk of preterm birth.** The scale for the risk of preterm birth may be considered the most popular (see Table 4.1).

Preterm birth, or birth before 37 weeks of gestation, is the leading cause of neonatal death; moreover, it can also lead to long-term disability in surviving infants.

There are many ways in which health professionals try to prevent preterm labor in pregnant women. Pregnant women may be recommended to take vitamin supplements, to quit smoking if they continue to smoke, to take medication for the treatment of infections or to have regular visits to specialists.

Some medical interventions are used by the physicians to help the specific groups of pregnant women to avoid preterm labor. These may include continuous obstetric monitoring models vs. other care models for all women; screening for genital infections; zinc supplementation for pregnant women without systemic disease. Cervical suturing (cerclage) was only useful for women at high risk of preterm birth and singleton pregnancies.

Its practical value is due to the sufficiently high incidence of preterm labor in general population (up to 5-10%), a trend towards higher incidence of preterm labor and the high perinatal mortality in preterm labor.

It is recommended to conduct testing with this scale during the first doctor visit and once more, at Week 22–26 of pregnancy. In case the total score is 10 points or more, the patient is considered to be at high risk for spontaneous preterm labor.

Table 4.1. Risk for preterm labor

Points	Socio-economic factors	History	Daily activity	Course of present pregnancy
1	Two children. Low socio-economical level	One abortion. Last delivery less than 1 year ago.	Working (not counting household chores)	Increased fatigue
2	Age less than 20 years or more than 40 years. Not married.	Two abortions. Smoking more than 10 cigarettes a day.		Weight gain less than 4.5 kg by Week 32.
3	Very low socio-economical level. Height less than 150 cm. Body weight less than 45 kg.	Three abortions	Physically or emotionally challenging work. Long and tiresome commuting.	Breech presentation at 32 weeks. Weight loss of 2.3 kg. Insertion of fetal head at Week 32. Fever disease.
4	Age less than 18 years.	Pyelonephritis		Bleeding after 12 weeks. Cervical effacement. Cervical dilatation. Increased uterine tone.
5		Morphological anomalies of the uterus. Miscarriage in the 2 <sup>nd</sup> trimester. Cervical conization.		Placenta previa. Polyhydramnios.
10		Preterm labor. Repeated miscarriages in the 2 <sup>nd</sup> trimester.		Twins. Abdominal surgery.

We have also reviewed the possibilities of assessing the risk and prognosis of childbirth in a breech presentation of a full-term fetus (Table 4.2).

The incidence of breech presentation is 3-5% in the population, and its rates do not tend to either decrease or increase. The breech presentation is notable for high rates of birth injury to the fetus, and, as a result, high perinatal morbidity and mortality. The below scale of birth prognosis in breech presentation suggests an assessment after 36 weeks of gestation or at the time of

labor. If the summary score is 16 or more, the childbirth may proceed through the natural birth canal. The authors stipulate that if at least one of the internal dimensions of the pelvis scores 0 points, if there is an excessive fetal head extension, if estimated fetal weight is 4000 g or more, if significant fetal distress is diagnosed, if a puerpera goes into labor with an immature cervix, in post-term pregnancy, as well as in fetal weight of 3500–3999 g and pelvic dimension score of 1 in primiparas, then delivery by Cesarean section is indicated.

Table 4.2. The scale of birth prognosis in breech presentation of a mature fetus

Parameter	Points		
	0	1	2
Gestational age	37-38 weeks and > 41 weeks	40-41 weeks	38-39 weeks
Expected fetal body weight	4000 g and more	3500-3999 g	2500-3499 g
Type of breech presentation	Footling	Mixed	Pure breech presentation
Number of births in history	Primiparas > 30 years of age, multiparas with history of complicated delivery	Primiparas	Multiparas with uneventful delivery
Fetal head position	Very extended	Moderately extended	Flexed
Cervical maturity	Immature	Insufficiently mature	Mature
Fetal status	Chronic distress	Initial signs of distress	Satisfactory

In breech presentation, perinatal outcomes depend on the method of delivery: in Cesarean section, perinatal morbidity is lower than in vaginal delivery, and is practically independent of perinatal risk. However, in low perinatal risk scores (less than 10), these differences are leveled; therefore, according to a number of authors, breech presentation cannot be considered an absolute indication to abdominal delivery. Given that the personal responsibility of the physician for the outcome of childbirth has increased more recently, an optimal option for selecting a delivery method should include a comprehensive assessment of perinatal risks in a given gravida combined with obstetric situation

assessment. All of the above circumstances should be explained to the gravida in clear lay language, and her wishes should be taken into account as much as possible.

In this series of the research study, we have also reviewed the possibilities to assess the risk of fetal hypoxia in labor (see Table 4.3).

Risk of fetal hypoxia in labor. Cord entanglement is seen in 20–24% of all births; as a rule, this does not lead to significant fetal hypoxia with acidosis. However in rare cases, this may lead to fetal hypoxia, contribute to the development of labor anomalies, incorrect insertion of the head, and cause placental abruption.

For a differentiated approach to the gravida diagnosed with cord entanglement, a scale for the risk of fetal hypoxia has been suggested.

A score of up to 4 points corresponds to a low risk of fetal hypoxia; 5–9 points correspond to a moderate risk of fetal hypoxia. In delivery through natural birth canal, continuous fetal monitoring is used.

When symptoms of cord compression escalate, surgical delivery or application of forceps is indicated.

The score of 10–14 points corresponds to a high risk for fetal hypoxia; the authors recommend delivery via Cesarean section.

Table 4.3. Risk of fetal hypoxia in labor

<b>Assessment parameters</b>	<b>0 points</b>	<b>1 point</b>	<b>2 points</b>
Age, years	19-25	26-29	Over 30, younger than 18
Parity	Multipara	Multipara	Primipara
Expected fetal body weight	2800-3200 g	3200-3800 g	>3800 g
<b>Cardiocotography findings</b>			
Baseline heart rate	120-160	160-180	180-200
Variability of baseline rhythm, type	Undulating	Low-undulating type. Saltatory	Reduced variability, intermittent
Accelerations	Accelerations of normal type, 2 or more per 20 minutes of recording	High-amplitude accelerations, NMT 2 per 40 minutes of recording	High-amplitude, multiple-peak, prolonged accelerations.
Decelerations	Absence of	Shallow and short	Heavy variable V-,

	decelerations.	decelerations, NMT 45 seconds, with rapid regain of baseline HR	W-, and U-shaped decelerations
Amount of amniotic fluid	Normal	Moderate polyhydramnios	Pronounced polyhydramnios

<b>Assessment parameters</b>	<b>0 points</b>	<b>1 point</b>	<b>2 points</b>
Position of the placenta relative to the longitudinal axis of the uterus	Placenta is located mid-uterus; the lower edge is 5 cm above the internal os	The main part of the placenta is located mid-uterus; the upper edge reaches the fundus of the uterus	The main part of the placenta is located in the fundus of the uterus
Number of cord loops in the cervical region (as reported by ultrasound)	No loops	1 cord loop detected	2 or more cord loops are detected

The evaluation version of perinatal risk assessment using antenatal assessment system is also a noteworthy instrument, where a number of perinatal factors are quantified on a graduated scale.

First of all, cardiovascular disease, kidney disease, metabolic disorders, unfavorable obstetric history, developmental anomalies of the genital tract, etc. are taken into account. The risk factor score makes it possible to assess not only the likelihood of an unfavorable outcome of childbirth, but also the specific contribution of each individual factor.

Approximately 10–20% of women are at higher risk of neonatal morbidity and mortality in the perinatal period, which explains the death of fetuses and newborn of these women in more than 50% of the cases.

There is also an approximate scoring system for certain extragenital complications of pregnancy, including collagenosis, severe systemic disease, epilepsy, infection, etc. (Table 4.4).

Table 4.4. Approximate scoring system for certain extragenital complications of pregnancy, used with the Manitoba system

• <b>Collagenoses</b>	
- in state of remission	1
- on maintenance doses of steroids	2
- in active phase	3
• <b>Infections</b>	
- TORCH* (during current pregnancy)	3
- pyelonephritis	2
- other severe systemic disease	3
• <b>Epilepsy</b>	
- history of	1
- on maintenance doses of drugs	2

\* Toxoplasmosis, rubella, Chlamydia, herpes.

According to this system, a screening examination was performed at the gravida's first visit to her doctor, with a repeated examination between the 30-36th week of pregnancy. As pregnancy progressed, the perinatal risk was reassessed. In case any new complications developed, the gravida was re-scored from low risk to high risk. In case the gravida was assessed as having a high risk, it was recommended that the physician selected appropriate monitoring modalities in order to ensure a favorable outcome of pregnancy for both the mother and child. In most cases, it was recommended to transfer such women under the observation of a perinatologist.

We have also studied individual factors of perinatal risk. These only included the factors leading to a higher level of perinatal mortality compared to the average perinatal mortality in the entire pool of gravida in our study.

A scoring system was used for quantitative assessment of significance of the factors. The principle for scoring the degree of risk was as follows: each perinatal risk factor was assessed retrospectively based on Apgar scores and perinatal mortality. The risk of perinatal disease was considered high in children with an Apgar score of 0-4 points at birth; moderate in an Apgar score of 5-7 points and low in an Apgar score of 8-10 points.

In order to determine the degree to which risk factors affect pregnancy and delivery from fetal perspective, it has been recommended to make a cumulative scoring of all antenatal and intranatal risk factors.

The scale contains 72 factors of perinatal risk, which are divided into 2 large groups: prenatal (A) and intranatal (B).

In order to make using the scale more convenient, prenatal factors were organized into 5 subgroups 1) socio-biological; 2) obstetric and gynecological history; 3) extragenital disease; 4) complications of current pregnancy; 5) assessment of fetal status. The total number of prenatal factors was 52.

Intranatal factors were also divided into 3 subgroups. Factors concerning: 1) the mother; 2) placenta and umbilical cord; 3) fetus. This subgroup contained 20 factors. Thus, a total of 72 risk factors were identified.

Based on the above scale, the likelihood of risk for unfavorable fetal outcome of pregnancy and delivery was divided into 3 degrees: high, moderate and low. The cohort of high risk gravidas included all gravidas with a total score of prenatal factors of 10 points and greater; 5–9 points corresponded to moderate risk and a score of up to 4 points corresponded to low risk. In addition to that, a single factor assessed as 4 points was interpreted as high perinatal risk.

Along with a change in the incidence of a factor, the degree of influence of an unfavorable factor on the perinatal outcome may change. This continuous process is due to the diagnostic advances, as well as improvement of therapeutic and preventive measures aimed at improving the health of the population.

The boundaries of high perinatal risk, which were determined using a scoring system for risk factor assessment, are subject to even more dramatic changes over time.

The value of the factor, expressed as a score, may become lower owing to development of therapeutic technologies or increase due to a decline in population's health. Through development of diagnosis, new factors will emerge, and, respectively their scoring will be required.

As a result, it is impossible to create a single "permanent" scale of perinatal risk; the system must be constantly appended and re-evaluated. Given the current information flow, this should happen once every 15–20 years. However, this circumstance does not diminish the advantages of the risk scoring system. On the contrary, its modernization capacity is one of its greatest advantages.

Identification of risk groups made it possible to differentiate the system of medical observation of pregnant women and to allocate a group of children under the supervision of a pediatrician. Already at the gravida's first visit, comprehensive assessment and mandatory determination of prenatal risk began to be carried out. After an outpatient assessment of high risk gravidas, an individual plan of observation was compiled, which specified the timing of preventive hospitalizations. Extended outpatient assessment and treatment was performed as indicated.

Dividing the gravidas into risk groups and their differentiated management during pregnancy and delivery allowed reducing the perinatal mortality by 30% compared to perinatal mortality in a similar group of gravidas who were under regular monitoring.

## CHAPTER 5

### THE IMPACT OF ALCOHOL, SMOKING AND DRUG ABUSE ON PREGNANCY

The birth of a child has a huge impact on the lives of his parents and other family members. Most future parents make use of the time of pregnancy to adjust their lifestyle and environment to new circumstances, with particular attention to the safety of the child they are responsible for. One of the problems that need special attention is the use of tobacco, alcohol and drugs by parents. A woman who wants to become a mother should take every effort to stop the consumption of these substances, as they reduce the ability to bear children and increase the risk of miscarriage.

Maternal lifestyle, especially her diet and other habits, can greatly affect her child's future development. Food should contain all the necessary nutrients for the mother and unborn child, and it is very important to avoid foods that can harm the fetus in the womb. If the lifestyle of immediate family and friends does not meet the needs of the mother and child, certain difficulties may arise. Family support and willingness to meet the new demands are crucially important, and the related issues should be discussed frankly with the family.

The impact of alcohol on pregnancy. Women with chronic alcohol use have the following problems in their newborns:

- premature: in 34.5% of cases;
- physically debilitated: in 19% of cases;
- with developmental malformations: in 3% of cases.

There is no such thing as a safe amount of alcohol that can be used during pregnancy. This means that a dose dependency between the amount of consumed alcohol and the risk of developmental defects has not been determined, and that the effect of alcohol largely depends on the individual characteristics of the mother and the fetus.

The use of alcohol may harm the child, and the danger increases with the quantity of consumed alcoholic drinks. The baby is at risk for the entire duration of the pregnancy, but the harm varies depending on the developmental stage of fetal brain. Internal organs are formed at different stages of pregnancy, and each of them is the most vulnerable at the time of their most intensive growth. If a pregnant woman refrains from consumption of alcoholic beverages, she avoids the hazards associated with alcohol.

It is known that alcohol consumption during pregnancy may cause irreparable harm to the child and manifest in the form of facial defects, an unnaturally small head and, in some cases, heart disease and deformed limbs. It may also be accompanied by mental disorders and intellectual deficits, which may not be apparent until the child reaches school age. Such serious consequences are not very frequent. However, it is beyond doubt that much more children have milder symptoms of learning disorders and behavioral problems later in life, even if the expectant mother drank moderately.

Even if the woman consumed alcohol before she knows she's expecting, immediate cessation once pregnancy is detected will definitely benefit her unborn child. It is prudent to seek advice from a midwife or a doctor if the woman is concerned about using alcohol or drugs in the early weeks of pregnancy.

Newly born children of drinking women may have the following problems: general delays in physical and mental development, abnormal brain formation (i.e. microcephaly, a decrease in brain size, or hydrocephaly, i.e brain dropsy), neurological disorders (trembling of the limbs, convulsions, reduced muscle tone), insufficient sucking reflex, and congenital heart and kidney defects.

The influence of smoking on pregnancy. It is well known that neonatal body weights in smoking mothers are lower than in non-smokers, which is attributable to a direct effect of nicotine on uterine vessels, as well as the oxygen deficiency, i.e. hypoxia in smoking gravidas. Smoking pregnant women are

more prone to premature ruptures of membranes and premature placental abruption, and, as a result, to preterm labor. The tars from tobacco smoke that accumulate in fetal tissues significantly increase the risk of malignant tumors in neonates.

The influence of narcotic substances on pregnancy. Cocaine is known to possess a remarkably high teratogenic potential in the embryo and fetus, which sets it apart from many other illicit drugs.

Illicit psychoactive substances such as marijuana, amphetamine, cocaine or heroin may cause miscarriage, placental abruption and preterm labor.

In addition, there is a danger of limited mental development of the child, who may have serious health problems that require a lot of care and attention. Any woman who abuses drugs must stop using them as soon as she learns she is expecting. Without hesitation, she should seek advice from her midwife or her doctor.

Children of drug addicts often have various disorders of vascular formation, for example, vascular cysts of the brain.

Pregnant women who abuse drugs often have premature placental abruption, leading to the birth of preterm children.

There is also a congenital drug addiction, which is evident immediately after birth and is characterized by impaired sucking reflex, gastrointestinal dysfunction, agitation and anxiety (withdrawal syndrome).

When planning pregnancy, the parents should know that alcohol, tobacco and illicit drugs may lead to giving birth to a child with developmental defects and delays in mental and physical development.

Women who are taking drugs due to a disease should consult with their doctor whether it is safe to continue and whether their treatment schedule needs adjustments during pregnancy. The main rule of thumb is that it is best to avoid using medications during pregnancy. Future mother should always alert the doctor and nurse that she is expecting a baby, if the physician is about to prescribe her a medication or advise an over-the-counter product or supplement.



## CONCLUSIONS

1. The patterns and features of pregnancy as a physiological process have been studied.
2. The features of the organization of medical care in pregnancy, labor and delivery have been studied.
3. The authors have investigated the presence or development of risks and complications during pregnancy.
4. The options for scoring of risk factors during pregnancy have been evaluated.
5. The authors have investigated the impact of alcohol, smoking and drug abuse on pregnancy.

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