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Healthcare and Management Strategies for Reducing Maternal Deaths from Obstetric Hemorrhage

Abdullayeva Lola Sayfullayevna
Samarkand State Medical University, Faculty of Postgraduate Education Department of Obstetrics and Gynecology, PhD

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Annotation: In connection with the above, the purpose of this study was to study the risk factors leading to the development of massive obstetric hemorrhage. An analysis of 302,000 birth histories in the Samarkand region for the period 2021-2023 was conducted, among which 51 cases of MOH were identified during childbirth and the postpartum period, which amounted to 0.2%. Clinical, laboratory, functional and statistical research methods were used.

The article discusses strategies to reduce maternal mortality based on global and local experiences, including training skilled midwives, monitoring reproductive health, providing medical equipment and medicines, and optimizing the health management system. The results of the study have scientific and practical significance in developing prevention and treatment strategies for MMR, formulating health policies, and effectively implementing them in clinical practice.

Keywords: obstetric hemorrhage, maternal mortality, postpartum period, uterine atony, thrombocytopenia, somatic diseases.

Introduction. Obstetric hemorrhage (OH) continues to be one of the leading causes of maternal morbidity, disability and mortality worldwide. Despite significant medical advances and improvements in health care, severe obstetric complications continue to pose a serious threat to

women. In some cases, they lead to what are known as near miss (NM) conditions - critical situations in which the patient's life can be saved only by timely medical attention. However, in some cases, even surgical interventions fail to avoid lethal outcome [3, 4, 13].

In recent decades, the maternal mortality rate has generally decreased. Thus, between 2000 and 2020, this indicator at the global level decreased by 38%, which corresponds to an average annual decrease of 2.9%. Nevertheless, even with this improvement, the situation remains alarming, with a global average of 211 maternal deaths per 100,000 live births. According to statistics, complications of pregnancy and childbirth claim the lives of up to 300,000 women each year [14].

Geographical analysis of maternal mortality shows that the highest level is registered in regions with low levels of development. Up to 86% of all deaths among women of reproductive age occur in Africa and South Asia. In contrast, the rate in European countries is much lower, at about 10 per 100,000 live births. This difference emphasizes the uneven access to health services, differences in their quality, and significant socioeconomic factors affecting women's health in different parts of the world [2,7].

Obstetric hemorrhage is a threat at all stages of pregnancy, but the greatest danger is associated with the postpartum period. At this point, massive blood loss can provoke the development of hemorrhagic shock and multiple organ failure. According to research data, about 80% of obstetric bleeding cases lead to serious complications. Moreover, every fourth maternal lethal complication is caused by bleeding. To date, postpartum hemorrhage accounts for 25% of all maternal deaths [5, 14].

Despite the remaining risks, there is a positive trend in the dynamics of maternal mortality. For example, in Russia, from the late 1980s to 2015, the mortality of women from obstetric hemorrhage decreased by 10%. In Uzbekistan, this indicator has tripled over the past three decades. However, even with these improvements, the maternal mortality rate in developing countries remains significantly higher than in economically developed regions, at 18-20 per 100,000 live births [2].

The incidence of obstetric haemorrhage and maternal mortality depend not only on medical factors, but also on social, economic and organizational aspects. The key conditions affecting this indicator are the standard of living of women, accessibility of medical care, place of residence (urban or rural), qualifications of medical personnel, as well as features of labor management and promptness of obstetric care [9, 10, 16]. That is why reducing maternal mortality requires comprehensive measures, including improvement of the health care system, increasing women's awareness of possible risks during pregnancy and implementation of effective prevention programs.

To date, the World Health Organization (WHO) and other international medical structures are actively developing and implementing strategies aimed at reducing maternal mortality, including by optimizing approaches to the management of obstetric hemorrhage. These programs focus on improved diagnosis, timely identification of risk factors and the development of personalized management of pregnancy and childbirth. However, a significant reduction in maternal mortality requires not only the introduction of modern medical technologies, but also comprehensive reforms in the health care system, improving the level of medical literacy of the population, and ensuring women's access to qualified medical care.

Obstetric hemorrhage as a major cause of maternal mortality

Obstetric hemorrhage (OH) is one of the most serious threats to women's health during pregnancy, labor and delivery and in the postpartum period. Despite the achievements of modern medicine, improvement of diagnostic techniques and introduction of new therapeutic strategies, AKs continue to occupy leading positions among the factors leading to maternal mortality and disability. In some cases, massive blood loss leads to critical conditions known as “near miss”

(NM), when the patient is on the verge of life and death. Without emergency intervention of medical specialists, the probability of lethal outcome increases manifold [3, 4, 13].

According to the WHO report, by 2020, the global maternal mortality ratio has decreased by 38% since 2000, which corresponds to an average annual decrease of 2.9%. However, even with this progress, the number of deaths among pregnant and postpartum women remains high, with 211 deaths for every 100,000 live births. In total, about 300,000 deaths of women from pregnancy and childbirth-related causes are recorded annually [14].

Maximum maternal mortality rates are registered in countries with a low level of economic development. Thus, 86% of all female deaths occur in Africa and South Asia. At the same time, in European countries this indicator is much lower - about 10 deaths per 100,000 live births. The significant difference between developed and developing countries is due to differences in the availability and quality of medical care, as well as socioeconomic conditions of women [2,7,8].

The risk of AK exists throughout pregnancy, but the greatest risk is in the postpartum period, when massive blood loss can lead to hemorrhagic shock and multi-organ failure. According to clinical data, about 80% of all obstetric hemorrhages are accompanied by severe complications, and every fourth maternal fatal complication is caused by bleeding after delivery. To date, postpartum hemorrhage remains responsible for 25% of all maternal deaths [5, 14].

Despite the high risks, in recent years there has been a positive dynamics of maternal mortality reduction. For example, in Russia, from the late 1980s to 2015, the number of deaths caused by obstetric hemorrhage decreased by 10%. In Uzbekistan, this figure has tripled over the past 30 years. However, even with these successes, maternal mortality rates in developing countries remain significantly higher than in developed countries, reaching 18-20 deaths per 100,000 live births [2].

The causes of AK development and associated risks of maternal mortality go beyond purely medical aspects and include socioeconomic and organizational factors. The key factors include the standard of living of women, accessibility of medical care, place of residence (urban or rural), qualification of medical personnel, and promptness of specialized care [9, 10, 16]. Given these factors, reducing maternal mortality requires a comprehensive approach that includes improving the health care system, implementing preventive measures, and raising women's awareness of possible risks.

Today, strategies to control obstetric hemorrhage are being actively implemented worldwide. International organizations, including WHO, are developing and implementing recommendations aimed at improving the diagnosis and management of pregnant women at high risk of complications. However, significant reductions in maternal mortality require not only advances in medical technology, but also systemic health care reforms, better training of specialists and increased access to qualified medical care for women.

Geographical peculiarities of maternal mortality and the impact of obstetric hemorrhage

Analysis of statistical data shows significant differences in maternal mortality rates depending on the socio-economic development of the country and the state of the health care system. The highest number of deaths among pregnant women and women in labor and delivery is recorded in low- and middle-income regions. In developed countries, this indicator is significantly lower. According to studies, about 86% of all maternal deaths occur in Africa and South Asia. The main reasons for this situation are limited access to qualified medical care, insufficiently equipped obstetric facilities and lack of emergency medical intervention capacity [2,7,8].

In contrast, the mortality rate among pregnant women in Europe and North America is much lower. For example, in most European countries, this rate does not exceed 10 cases per 100,000 live births. This success is largely due to the functioning of an effective system of obstetric care, the high level of training of medical personnel, and the widespread use of modern diagnostic and

treatment methods [14].

Among the factors that have the most significant impact on the differences in maternal mortality rates between regions, obstetric hemorrhage plays a crucial role. These complications are particularly dangerous in conditions of inadequate medical supervision, when lack of timely diagnosis and delayed care lead to critical blood loss and death. In developing countries, bleeding is responsible for up to 25% of all maternal deaths. At the same time, in economically developed countries, this figure is much lower due to the introduction of effective prevention methods and timely medical intervention [5, 14].

In addition to the quality of medical care, maternal mortality rates are influenced by a number of factors, including women's socio-economic status, their level of education, transportation accessibility to medical care and the degree of development of health infrastructure. The situation is particularly difficult in rural areas, where the remoteness of health facilities makes it difficult to provide emergency care. In such conditions, even controlled obstetric complications can be fatal [9, 10, 16].

Despite the existing problems, in recent years a positive dynamics of maternal mortality reduction has been observed in a number of countries. This has become possible due to the improvement of medical protocols for the management of pregnancy and childbirth, improvement of the quality of medical care, as well as the development of educational programs for women. For example, in Russia and Uzbekistan, maternal mortality caused by obstetric hemorrhage has decreased several times over the past 30 years. However, even with these successes, this indicator in developing countries remains significantly higher than in economically developed regions [2].

To combat maternal mortality, the World Health Organization (WHO) has developed global strategies to comprehensively address the problem. The key measures envisaged in these strategies are increasing access to qualified medical care, introducing effective methods of preventing obstetric complications, and training medical personnel in algorithms for emergency response to critical conditions. Raising women's awareness of the risks of pregnancy and childbirth is also important, which contributes to more timely access to medical care and reduces the likelihood of complications.

Thus, obstetric hemorrhage continues to be one of the leading causes of maternal mortality, especially in resource-limited regions. Effective reduction of this indicator requires a comprehensive approach that includes improvement of medical infrastructure, introduction of modern methods of prevention and treatment, and implementation of awareness programs among women.

Risk factors and pathogenesis of obstetric hemorrhage

Obstetric bleeding can occur at any stage of pregnancy, during labor or in the postpartum period. Their occurrence is due to a combination of physiological changes in the woman's body and the presence of pathological conditions. In some cases, bleeding becomes the first and only symptom of a complication, which significantly complicates its early diagnosis. According to statistical data, such conditions occur in every fifth pregnant woman, and in half of cases they are associated with serious pathological processes, often leading to spontaneous abortion [4]. The highest incidence of obstetric bleeding is in the first and third trimesters. In the early periods, the causes may be implantation bleeding, threatened miscarriage or ectopic pregnancy. In later periods and during labor, the main provoking factors are placenta previa or premature placental abruption, uterine rupture, and postpartum hypotonia and atony of the myometrium [15, 17,18,19].

According to the International Classification of Diseases 10th Revision (ICD-10), obstetric bleeding is categorized into several categories depending on the etiology and period of occurrence:

- ✓ O03 - spontaneous abortion,
- ✓ O08.1 - massive or prolonged bleeding associated with abortion, ectopic or molar pregnancy,
- ✓ O20 - bleeding in early pregnancy,
- ✓ O44.1 - placenta previa with hemorrhage,
- ✓ O45 - premature placental abruption,
- ✓ O46 - antenatal hemorrhage of unspecified nature.

One of the most significant risk factors for obstetric bleeding is uterine atony, a condition in which the myometrium loses its ability to contract, resulting in massive blood loss. The reason for this phenomenon is the impaired retraction of muscle fibers and insufficient activation of thrombosis in the vessels of the placental site, which consists of about 200 spiral arteries [49].

In addition, there are a number of predisposing factors that increase the likelihood of obstetric hemorrhage:

- ✓ Infectious diseases during pregnancy,
- ✓ Somatic pathologies such as arterial hypertension, anemia, diabetes mellitus,
- ✓ Hormonal disorders affecting the contractility of the myometrium,
- ✓ Multiple pregnancies and polyuria leading to overstretching of the uterine walls,
- ✓ Uterine anomalies or scarring following surgery,
- ✓ Errors in the management of labor, including overstimulation of labor.

The pathogenesis of obstetric bleeding is directly related to disorders in the hemostasis system, which regulates blood coagulation. Normally, after the birth of the placenta, the intense contraction of the myometrium provides closure of the spiral arteries and the formation of stable clots, preventing significant blood loss. However, in case of hypotonia or uterine atony, this mechanism is disturbed, which leads to uncontrolled bleeding [18, 19].

An additional threat is the development of disseminated intravascular coagulation (DIC), a condition in which excessive activation of the coagulation system leads to depletion of coagulation factors and a paradoxical increase in the risk of bleeding. In obstetric practice, DIC often complicates the course of massive blood loss and can be life-threatening for the patient [14,15].

Thus, obstetric bleeding is a complex and multifactorial problem requiring timely diagnosis and emergency medical care. Modern studies confirm that the introduction of effective risk prediction methods and a comprehensive approach to pregnancy management can significantly reduce the incidence of severe complications and improve maternal mortality rates.

Clinical manifestations and diagnosis of obstetric hemorrhage

Obstetric bleeding can occur at any stage of pregnancy, in labor and in the postpartum period. Their clinical picture depends on the cause of occurrence, the amount of blood loss and the rate of progression of the complication. In some cases, bleeding is accompanied by a pronounced symptomatology, but hidden forms are also possible, which greatly complicates their timely detection and requires increased vigilance on the part of medical personnel.

Clinical manifestations

The main symptoms of obstetric bleeding include:

- ➢ Visible bloody discharge from the genital tract, the intensity of which varies from minor smeary to massive uncontrolled bleeding.

- Signs of hypovolemic shock, manifested by a sharp drop in blood pressure, tachycardia, pale skin, cold sweat, dizziness and weakness.
- Pain syndrome, characteristic of bleeding caused by placental abruption or uterine rupture.
- Decreased blood coagulation, especially with the development of disseminated intravascular coagulation (DIC), which leads to multiple hemorrhages and reduced effectiveness of standard hemostatic measures.

Diagnostic methods

Early diagnosis of obstetric hemorrhage plays a key role in preventing severe consequences. For this purpose, the following methods are used:

- Clinical examination, including an assessment of the general condition of the patient, the degree of blood loss, uterine tone and hemodynamic parameters.
- Laboratory studies that determine the level of hemoglobin, hematocrit, platelets, as well as coagulogram parameters to assess the coagulation system of the blood.
- Ultrasound (ultrasound) to identify possible causes of bleeding, including placenta previa, placental abruption, intrauterine hematomas.
- Cardiotocography (CTG) and Dopplerometry, used to assess the fetus and possible signs of hypoxia in antenatal bleeding.
- Instrumental diagnostic techniques such as hysteroscopy and diagnostic scraping are used when the genesis of bleeding is unclear, especially in the postpartum period.

Rapid identification of the source of bleeding and timely treatment can significantly reduce the risk of severe complications. Therefore, medical professionals providing obstetric care should have sufficient training for rapid diagnosis and emergency response to critical conditions.

Thus, the clinical picture of obstetric bleeding varies from minimal symptomatology to massive blood loss requiring immediate intervention. The use of modern diagnostic methods makes it possible to accurately determine the cause of the complication and choose the optimal treatment tactics, which is a key factor in reducing maternal mortality.

Modern methods of prevention and treatment of obstetric bleeding

Effective reduction in the incidence of obstetric bleeding requires a comprehensive approach that includes preventive measures, timely diagnosis and modern treatment. The introduction of standardized algorithms for the management of patients at high risk of bleeding helps to reduce maternal mortality and the severity of possible complications.

Prevention of obstetric bleeding

Prevention of bleeding begins with careful monitoring of the pregnant woman at all stages of gestation. The main preventive measures include:

- Early identification of risk factors. Women with an aggravated obstetric-gynecological anamnesis require special attention: previous cases of uterine hypotonia, multiple pregnancies, placenta previa, uterine scarring after surgery, hypertensive disorders and other pathologies. Such patients should be under special medical supervision.
- Use of uterotonic drugs. According to WHO recommendations, oxytocin administration immediately after labor significantly reduces the risk of postpartum uterine atony and associated massive blood loss [14,15].
- Rational management of labor. Control over the dynamics of the labor process, minimization of traumatization of the birth canal, exclusion of excessive stimulation of

contractions and timely decision-making on the method of delivery significantly reduce the likelihood of bleeding.

- Emergency preparedness. Maternity hospitals should have a stock of donor blood and its components for possible hemotransfusions in patients with a high risk of blood loss.

Methods of treatment of obstetric hemorrhage

When obstetric hemorrhage develops, immediate treatment measures are required to stabilize the patient's condition and stop blood loss.

The main methods include:

- Pharmacologic therapy. Uterotonics (oxytocin, methylergometrine, carbetocin) are used to stimulate uterine contractions, antifibrinolytics (tranexamic acid) to prevent the destruction of blood clots, as well as drugs to correct blood coagulation disorders.
- Mechanical methods of hemostasis. They include intrauterine tamponade with a balloon catheter, compression massage of the uterus, ligation of vessels, compression sutures on the myometrium. These methods allow to control blood loss without the need for radical surgical intervention.
- Minimally invasive technologies. Embolization of uterine arteries is a modern method that allows you to stop bleeding by artificial occlusion of vessels. It is used in cases of ineffectiveness of conservative therapy and avoids removal of the uterus.
- Emergency surgical measures. When uncontrolled bleeding is carried out extirpation (removal) of the uterus, especially in the development of DIC or massive blood loss threatening the life of the patient.

A comprehensive approach to the prevention and treatment of obstetric bleeding is a key factor in reducing maternal mortality. The introduction of modern algorithms of patient management, improvement of diagnostic and treatment technologies, as well as high qualification of specialists allow to significantly reduce the frequency of critical complications and improve the safety of childbirth.

Global strategies to reduce maternal mortality associated with obstetric hemorrhage

Reducing maternal mortality is a major challenge for modern medicine and global health. The World Health Organization (WHO) and leading medical institutions around the world are developing strategies to prevent deaths due to obstetric haemorrhage. A comprehensive approach, including improved clinical protocols, access to skilled care and increased training of medical professionals, has contributed to significant progress in combating this problem.

WHO international initiatives and recommendations

WHO identifies several priority areas in the prevention and treatment of obstetric hemorrhage:

- Ensuring accessibility of emergency obstetric care. Developing a system of mandatory medical monitoring of pregnant women, equipping maternity hospitals with the necessary drugs and equipment for effective control of bleeding.
- Improving the level of training of medical personnel. Introduction of trainings, simulation courses and educational programs for doctors and midwives aimed at practicing skills in critical situations.
- Monitoring and analyzing maternal mortality cases. Introduction of an audit system of lethal outcomes, which makes it possible to identify weak links in the organization of medical care and develop effective prevention strategies.
- Development of transport medicine. Improving the logistics of transporting pregnant women to specialized medical centers with the necessary equipment for emergency care.

- Development and implementation of modern clinical protocols. Use of algorithms for early detection of bleeding, active use of uterotonic drugs, minimally invasive and surgical methods of treatment.

Differences in maternal mortality rates across countries

Despite strong global efforts, maternal mortality rates remain uneven across the world and depend largely on a country's economic development. In developing countries, high mortality is due to a lack of skilled professionals, limited access to health services and a shortage of essential medicines. For example, in Africa and South Asia, there are up to 500 deaths per 100,000 live births, whereas in developed countries this figure does not exceed 10-20 [2,4,5,6].

In Russia and CIS countries, the maternal mortality rate has decreased in recent decades due to the modernization of the health care system. The introduction of mandatory prenatal care, the development of perinatal centers and improved equipment of maternity hospitals contributed to a significant reduction in obstetric complications and fatal outcomes [2]. However, despite the positive changes, the rates in these countries remain higher than in Western Europe and North America.

Prospects for reducing maternal mortality

To further reduce the maternal mortality rate, a comprehensive approach is needed, including:

- ✓ Strengthening control over the quality of medical care at all levels;
- ✓ Introduction of innovative methods of diagnostics and treatment of obstetric complications;
- ✓ Expansion of educational programs for medical workers;
- ✓ Development of reproductive health and family planning programs;
- ✓ Improvement of medical infrastructure, especially in rural and remote areas.

Thus, combating maternal mortality associated with obstetric hemorrhage requires a systemic approach and interdisciplinary collaboration. The development of international and national programs aimed at improving the quality of medical care, introducing modern technologies and improving women's risk awareness is a key step in addressing this problem.

Conclusion.

Obstetric hemorrhage continues to be one of the leading causes of maternal mortality, especially in countries with limited medical resources. Despite significant progress in the development of medical technologies and improvement of the healthcare system, the problem remains relevant, as obstetric complications can develop suddenly, requiring immediate intervention.

An analysis of the factors affecting maternal mortality rates has shown that the highest mortality rates are observed in countries with a low level of economic development. The main reasons for this are limited access to qualified medical care, lack of specialized specialists and insufficient organization of emergency obstetric care. At the same time, in countries with developed health systems, timely diagnosis and effective treatment of obstetric hemorrhage have significantly reduced the mortality rate among pregnant women and women in labor and delivery.

Thus, an effective solution to the problem of obstetric hemorrhage requires a comprehensive approach that includes modernizing the medical infrastructure, increasing women's awareness of possible risks, and improving the training of health care providers. Current research in obstetrics and perinatal medicine confirms that only systemic changes in the organization of medical care can further reduce maternal mortality and improve pregnancy outcomes.

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