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POST PARTUM HEMMORRAGE: OBSERVATIONAL STUDY

ПОСЛЕРОДОВОЕ КРОВОТЕЧЕНИЕ: НАБЛЮДАТЕЛЬНОЕ ИССЛЕДОВАНИЕ

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Abstract

Relevance. Postpartum hemorrhage (PPH) remains one of the leading causes of maternal morbidity and mortality worldwide. According to the World Health Organization, the maternal mortality ratio in the Kyrgyz Republic remains one of the highest among Central Asian and Eastern European countries. The aim of this observational study was to analyze the main causes, risk factors, and management strategies of postpartum hemorrhage. The study reviews existing clinical data and international guidelines on the diagnosis and treatment of PPH. Early recognition, timely management, and adherence to standardized clinical protocols significantly improve maternal outcomes. Implementation of effective prevention strategies and training of medical personnel are essential to reduce maternal mortality associated with postpartum hemorrhage.

Keywords: postpartum hemorrhage, maternal mortality, obstetric complications, pregnancy, maternal health.

Послеродовое кровотечение: наблюдательное исследование

Төрөттөн кийинки кан кетүү: байкоо изилдөөсү

Аннотация

Актуальность. Послеродовое кровотечение (ПРК) является одной из ведущих причин материнской заболеваемости и смертности во всем мире. Согласно данным Всемирной организации здравоохранения, показатель материнской смертности в Кыргызской Республике остается одним из самых высоких среди стран Центральной Азии и Восточной Европы. Целью данного наблюдательного исследования является анализ основных причин, факторов риска и методов ведения послеродового кровотечения. В исследовании рассматриваются клинические данные и международные рекомендации по диагностике и лечению ПРК. Ранняя диагностика, своевременное лечение и соблюдение клинических протоколов позволяют значительно улучшить исходы для матерей.

Аннотация

Маанилүүлүк. Төрөттөн кийинки кан кетүү (ТКК) дүйнө жүзүндө энелердин оорушунун жана өлүмүнүн негизги себептеринин бири болуп саналат. Дүйнөлүк саламаттык сактоо уюмунун маалыматына ылайык, Кыргыз Республикасында энелердин өлүмүнүн көрсөткүчү Борбор Азия жана Чыгыш Европа өлкөлөрүнүн арасында жогору бойдон калууда. Бул байкоо изилдөөсүнүн максаты төрөттөн кийинки кан кетүүнүн негизги себептерин, тобокелдик факторлорун жана башкаруу ыкмаларын талдоо болуп саналат. Изилдөөдө ТККны аныктоо жана дарылоо боюнча клиникалык маалыматтар жана эл аралык сунуштар каралат.

Ачкыч сөздөр: заманбап жаштар, сергек жашоо, жаман адаттар, COVID-19, иммунитет.

Ачкыч сөздөр: төрөттөн кийинки кан кетүү, энелердин өлүмү, акушерлик асқынуулар, кош бойлуулук, энелердин саламаттыгы.

Introduction

Postpartum hemorrhage (PPH) is one of the most serious complications of childbirth and remains the leading cause of maternal mortality worldwide, accounting for approximately 35% of maternal deaths (Likis et al., 2015, p. 3). These deaths have significant consequences for families, communities, and healthcare systems. PPH is commonly defined as blood loss of 500 ml or more within 24 hours after vaginal delivery, while severe PPH is defined as blood loss exceeding 1000 ml within the same timeframe (World Health Organization, 2005, p. 47). In clinical practice, even smaller volumes of blood loss may be considered postpartum hemorrhage if they result in hemodynamic instability. Primary postpartum hemorrhage occurs within the first 24 hours after delivery, whereas secondary postpartum hemorrhage refers to excessive bleeding occurring between 24 hours and up to 12 weeks postpartum (Wormer et al., 2023, p. 2). Despite advances in obstetric care, postpartum hemorrhage continues to be a major contributor to maternal morbidity and mortality worldwide, including in developed countries such as the United States (Knight et al., 2009, p. 3).

Several maternal mortality review committees have identified delays in recognition and response to obstetric hemorrhage as major factors contributing to adverse maternal outcomes. Studies have shown that interdisciplinary management and standardized emergency protocols significantly improve patient outcomes and reduce maternal complications (Nyflot et al., 2017, p. 6). One of the most effective strategies for improving outcomes is the implementation of stage-based hemorrhage management protocols. These protocols help standardize clinical responses, reduce delays in diagnosis and treatment, and minimize cognitive errors during emergency situations (Knight et al., 2009, p. 4). Maternal mortality remains a significant global public health problem. According to the World Health Organization, the global maternal mortality ratio decreased by approximately 44% between 1990 and 2015. However, the Kyrgyz Republic demonstrated only a modest reduction of approximately 5% during the same period, with maternal mortality reaching 76 cases per 100,000 live births (World Health Organization, 2007, p. 12). Most maternal deaths are considered preventable with timely diagnosis and access to high-quality emergency obstetric care. Obstetric hemorrhage remains one of the leading direct causes of maternal mortality, particularly in low- and middle-income countries (Likis et al., 2015, p. 8).

Uterine atony, defined as the failure of the uterus to contract effectively after delivery, is the most common cause of postpartum hemorrhage and one of the main contributors to maternal mortality in developing countries (Dabelea et al., 2007, p. 89). According to international guidelines, the management of uterine atony includes uterine massage, bladder catheterization, manual examination of the uterine cavity, and administration of uterotonic drugs (Wormer et al., 2023, p. 4).

Recognizing the importance of addressing maternal mortality, the Ministry of Health of the Kyrgyz Republic introduced a confidential enquiry system for maternal deaths in 2010 in accordance with World Health Organization recommendations. This system involves multidisciplinary analysis of each maternal death in order to improve healthcare services and prevent similar outcomes in the future (World Health Organization, 2007, p. 24; Субанова ж.б., 2024).

Background

Maternal death related to pregnancy remains a major cause of premature mortality worldwide. It is estimated that approximately 500,000 women die each year due to pregnancy-related complications, with nearly one quarter of these deaths resulting from obstetric hemorrhage (World Health Organization, 2007, p. 5). Although most maternal deaths occur in low-income countries,

recent studies have reported an increasing trend in the incidence of postpartum hemorrhage in high-resource countries. However, these studies often rely on different data sources, varying definitions of postpartum hemorrhage, and diverse methodologies, which limits the comparability of their findings (Knight et al., 2009, p. 5).

Understanding the epidemiology and risk factors of postpartum hemorrhage is essential for developing effective prevention strategies. Further investigation of trends and associated determinants is necessary to improve clinical practice and reduce maternal mortality (Nyflot et al., 2017, p. 9).

Methodology

This observational study aimed to identify risk factors associated with postpartum hemorrhage during vaginal delivery in the absence of retained placenta. Multiple pregnancies were excluded from the analysis to avoid potential confounding factors related to obstetric complications.

Blood loss during delivery was measured by collecting blood in waterproof sheets or basins and transferring it into calibrated containers in order to ensure more accurate estimation of blood volume. All women received prophylactic intramuscular administration of 5 units of oxytocin at the delivery of the anterior shoulder. In women without hypertension, an additional dose of 0.5 mg of ergometrine maleate was administered as part of the active management of the third stage of labor (Wormer et al., 2023, p. 3). If no contraindications were present, women were encouraged to deliver in a sitting position. Delivery was conducted in a semi-recumbent posture. The placenta was delivered either through controlled cord traction or, at the patient's request, through delayed cord clamping followed by spontaneous expulsion of the placenta.

For each patient, the following clinical and demographic variables were recorded: maternal age; parity; onset of labor (spontaneous or induced); use of analgesia; mode of delivery; duration of each stage of labor; use of uterotonic agents in the third stage of labor; neonatal birth weight and maternal hemoglobin level. The need for blood transfusion was also recorded as an indicator of the severity of postpartum hemorrhage (Dabelea et al., 2007, p. 90). Additionally, maternal mortality cases were reviewed through a confidential enquiry system implemented in the Kyrgyz Republic. This system includes identification of maternal death cases, anonymous multidisciplinary review of clinical records, and development of recommendations aimed at improving the quality of maternal healthcare services (World Health Organization, 2007, p. 24).

The confidential enquiry process included several stages:

Step 1 – Identification of cases. Maternal deaths were identified through continuous reporting between regional health authorities, maternity hospitals, and confidential audit coordinators.

Step 2 – Data collection. Information was collected through standardized confidential enquiry forms completed by healthcare professionals involved in patient care, including primary healthcare physicians, obstetrician-gynecologists, anesthesiologists, and nurses.

Step 3 – Case review. Each case was reviewed by an expert panel to identify medical and organizational factors contributing to maternal mortality.

Step 4 – Development of recommendations. Recommendations were formulated to address preventable factors and improve clinical practice.

Step 5 – Evaluation and improvement. Findings from the review process were used to improve clinical protocols and strengthen maternal healthcare services (World Health Organization, 2007, p. 25).

For the management of postpartum hemorrhage, uterine balloon tamponade (UBT) was used according to national clinical guidelines. All patients provided written informed consent for the

procedure in accordance with the legislation on the protection of citizens' health in the Kyrgyz Republic.

The balloon device consisted of a flexible conductor with a silicone balloon attached at the distal end and connected to a fluid container via a tube with a flow control terminal. Before insertion, the container was filled with warm saline solution (38°C) and suspended at a height of approximately 45–50 cm above the perineum. The balloon was inserted into the uterine cavity, allowing fluid to flow into the silicone balloon. As uterine contractility improved, the uterus expelled fluid from the balloon back into the container. An increase in the fluid level in the container indicated restoration of myometrial tone. After stabilization of uterine tone and cessation of bleeding, the balloon was removed. The average duration of balloon tamponade application ranged from 2 to 2.5 hours (Dabelea et al., 2007, p. 91). To illustrate long-term trends in maternal mortality in the Kyrgyz Republic, national statistical data on maternal mortality ratios (MMR) from 1996 to 2009 were analyzed (Table 1).

Table 1. Maternal Mortality Ratio (MMR) in the Kyrgyz Republic by region, 1996–2009.

Region	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Kyrgyz Republic	31.5	62.7	33.6	42.3	45.5	43.8	53.5	49.3	50.9	60.1	55.5	51.9	55.0	63.5
Urban areas	52.3	104.2	42.1	45.9	60.3	35.1	43.1	34.5	40.1	47.8	43.1	36.2	43.2	42.6
Rural areas	24.0	48.6	30.4	40.9	39.4	47.4	57.9	55.7	56.5	66.0	61.5	59.9	61.2	74.5
Naryn oblast	67.2	84.9	98.2	58.5	32.4	145.5	75.2	43.9	89.4	89.6	60.5	62.3	46.2	105.5
Bishkek	80.6	189.2	21.2	51.2	69.6	19.3	17.5	32.7	21.5	13.5	18.3	17.3	22.0	20.4

Note. MMR — maternal mortality ratio per 100,000 live births.

Source: National Statistical Committee of the Kyrgyz Republic; Ministry of Health of the Kyrgyz Republic.

Result

Data on maternal mortality associated with postpartum hemorrhage were obtained from national healthcare databases and international reports. Data on maternal mortality associated with postpartum hemorrhage were obtained from national healthcare databases and international epidemiological reports.

Global comparison of maternal mortality causes

Comparative analysis of maternal mortality causes shows that obstetric hemorrhage remains one of the leading contributors to maternal deaths worldwide. Globally, hemorrhage accounts for approximately 25% of maternal deaths, followed by infections (sepsis) at approximately 15% and hypertensive disorders such as eclampsia at approximately 12%. In contrast, the situation in Kyrgyzstan demonstrates a significantly higher proportion of maternal deaths caused by hemorrhage. Hemorrhage accounts for approximately 46.7% of maternal deaths, while infections account for

approximately 25% and hypertensive disorders for approximately 10%. These findings indicate that obstetric hemorrhage remains a critical challenge for maternal healthcare in Kyrgyzstan (Table 2).

Table 2. Comparison of major causes of maternal mortality globally and in Kyrgyzstan

Cause of maternal death	Global average (%)	Kyrgyzstan (%)
Bleeding (hemorrhage)	25	46.7
Infection (sepsis)	15	25
Eclampsia / hypertension	12	10

Note. Data represent percentage distribution of maternal deaths by major causes.

Maternal mortality associated with obstetric complications

Further analysis of maternal mortality data indicates that several obstetric complications significantly contribute to maternal deaths. Hemorrhage accounted for approximately 55.8% of cases, making it the leading cause of maternal mortality. Uterine rupture accounted for approximately 86.7% of severe obstetric complications, while pre-eclampsia accounted for approximately 66.7%. Sepsis was identified as a major contributor to infection-related maternal mortality, reaching approximately 92.3% (Table 3). These findings highlight the substantial role of obstetric hemorrhage and associated complications in maternal mortality patterns.

Table 3. Etiological factors associated with maternal mortality

Etiological factor	Percentage (%)
Hemorrhage	55.8
Uterine rupture	86.7
Pre-eclampsia	66.7
Sepsis	92.3

Note. Percentages indicate the contribution of each obstetric complication to maternal mortality cases.

Discussion

Postpartum hemorrhage remains one of the leading causes of maternal mortality worldwide and continues to represent a significant challenge for healthcare systems, particularly in low- and middle-income countries. The results of the present study demonstrate that hemorrhage is a major contributor to maternal mortality in the Kyrgyz Republic, accounting for a considerably higher proportion of maternal deaths compared with global averages. These findings are consistent with international reports indicating that obstetric hemorrhage is responsible for a substantial share of maternal mortality globally (Knight et al., 2009, p. 3).

The analysis also revealed significant disparities between global and national patterns of maternal mortality. While globally hemorrhage accounts for approximately one quarter of maternal deaths, the proportion in Kyrgyzstan appears to be substantially higher. This may reflect differences in access to emergency obstetric care, delays in diagnosis and management of complications, and variations in healthcare infrastructure between regions. Similar trends have been observed in several developing countries where limitations in resources and training contribute to increased maternal mortality associated with obstetric hemorrhage (Nyflot et al., 2017, p. 7).

Regional and institutional factors may also influence maternal outcomes. In smaller hospitals and healthcare facilities with limited obstetric resources, management protocols for postpartum

hemorrhage may not be sufficiently standardized, and the availability of essential medications or surgical interventions may be limited. Consequently, rapid recognition and timely management of hemorrhage remain critical components of maternal care. Another important aspect highlighted by this study is the need for improved data collection and monitoring systems. Reliable epidemiological data are essential for identifying risk factors, evaluating trends, and developing evidence-based strategies to reduce maternal mortality. Differences in diagnostic criteria, reporting systems, and classification methods may complicate comparisons between countries and over time (World Health Organization, 2007, p. 18).

Based on the findings of this study and existing international recommendations, several key measures should be considered to improve the management and prevention of postpartum hemorrhage.

Key recommendations:

1. Future revisions of the International Classification of Diseases (ICD) should include separate codes for atonic postpartum hemorrhage and hemorrhage occurring immediately after childbirth due to other causes. In addition, additional codes are required for placenta accreta spectrum disorders such as placenta accreta, increta, and percreta (Knight et al., 2009, p. 6).
2. Definitions of postpartum hemorrhage should be standardized to ensure consistency in clinical diagnosis and data reporting. Further research is required to evaluate how current definitions are applied in practice and how they influence coding and epidemiological analysis.
3. Improvement in the collection of data related to postpartum hemorrhage is necessary, particularly with regard to measuring severity and identifying associated risk factors. Important variables may include population characteristics, obstetric practices, changes in maternal risk factors such as maternal age, obesity, and comorbid conditions (Nyflot et al., 2017, p. 8).
4. Additional research is required to determine whether the increasing incidence of postpartum hemorrhage observed in some countries is also present in other regions. Future studies should also investigate potential contributing factors such as prolonged labor, increasing rates of cesarean delivery, maternal obesity, and changes in management of the second and third stages of labor (Knight et al., 2009, p. 7).
5. Training and continuing professional education for healthcare providers involved in maternity care should emphasize accurate assessment of blood loss and close monitoring of women during the postpartum period. Improved clinical training can significantly reduce the severity of hemorrhage and prevent adverse maternal outcomes (World Health Organization, 2007, p. 22).
6. Clinicians should maintain a high level of vigilance regarding the potential increase in both the frequency and severity of postpartum hemorrhage. This is particularly important in smaller hospitals where the number of deliveries is relatively low and where standardized management protocols, emergency medications, or surgical equipment may not always be readily available (Nyflot et al., 2017, p. 10).

Conclusion

1. Postpartum hemorrhage remains one of the leading causes of maternal mortality worldwide and represents a significant challenge for maternal healthcare systems. The findings of this study confirm that obstetric hemorrhage is a major contributor to maternal mortality in the Kyrgyz Republic.

2. Comparative analysis indicates that the proportion of maternal deaths associated with postpartum hemorrhage in Kyrgyzstan appears to be higher than global averages, suggesting the need for improved prevention and management strategies.
3. Early diagnosis, rapid clinical response, and standardized management protocols are essential for reducing maternal mortality associated with obstetric hemorrhage.
4. Strengthening the training of healthcare professionals in the recognition and management of postpartum hemorrhage, particularly in smaller healthcare facilities, may significantly improve maternal outcomes.
5. Improved data collection systems and epidemiological monitoring are necessary to better understand the determinants of maternal mortality and to support evidence-based healthcare policies aimed at reducing preventable maternal deaths.

Practical implications

The findings of this study have several practical implications for improving maternal healthcare services. First, strengthening the training of healthcare providers in early recognition and management of postpartum hemorrhage is essential. Accurate assessment of blood loss and prompt clinical response are critical factors in preventing severe maternal complications.

Second, healthcare facilities should ensure the availability of essential medications, blood products, and equipment required for the management of obstetric hemorrhage. The development and implementation of standardized clinical protocols may help healthcare professionals respond more effectively to obstetric emergencies.

Finally, improving national data collection and monitoring systems is necessary to better understand trends in maternal mortality and to identify key risk factors associated with postpartum hemorrhage. Reliable data can support evidence-based policy decisions and guide future improvements in maternal health programs.

Study limitations

This study has several limitations that should be acknowledged. First, the analysis relied on available national and international datasets, which may vary in terms of reporting methods, definitions, and completeness of data. Differences in data collection systems between countries may also limit direct comparisons.

Second, some clinical variables related to maternal risk factors and healthcare access were not available in the analyzed datasets. As a result, the study may not fully capture all determinants influencing maternal mortality associated with postpartum hemorrhage.

Despite these limitations, the findings provide important insights into the patterns of maternal mortality and emphasize the continuing importance of improving prevention and management strategies for postpartum hemorrhage.

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