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MATERNAL NEAR MISS: AN URGENT HEALTH CONCERN

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ABSTRACT A "near miss" refers to an unexpected event that could have caused harm but did not result in any injury. The World Health Organization (WHO) defines a maternal near miss as a woman who almost died but survived a life-threatening complication during pregnancy, childbirth, or within 42 days after pregnancy termination. This term indicates that the woman's condition was serious enough to endanger her life, but she managed to survive, often due to intensive medical treatment. Maternal mortality serves as a crucial indicator in assessing maternal health outcomes. Enhancing maternal health is a key objective of the Millennium Development Goals (MDGs), particularly Goal 5, which includes Target 5A, aiming to reduce the maternal mortality ratio by three-quarters (1).

KEYWORDS : Maternal Near Miss, Maternal Mortality

INTRODUCTION

Maternal health plays a pivotal role in global public health, with maternal mortality often serving as a key measure of a nation's healthcare system and accessibility. In addition to maternal deaths, another important indicator is the "maternal near miss" (MNM). A maternal near miss refers to a woman who encounters life-threatening complications during pregnancy, childbirth, or within 42 days after the termination of pregnancy, yet survives. These incidents provide critical insights into the quality of maternal healthcare and help identify preventable causes of maternal mortality (2).

Maternal near misses are particularly common in low-resource settings where healthcare systems may be underdeveloped, though they can also occur in high-income countries. In both cases, timely medical intervention and access to quality healthcare are essential to prevent these situations from leading to maternal deaths. The World Health Organization (WHO) reports that more than 300,000 women die each year due to pregnancy-related complications, with many others facing life-threatening near-miss complications. Although maternal mortality has seen significant reductions in recent decades, understanding maternal near misses remains critical to further improving maternal health and achieving a lower maternal mortality rate. In India, there has been notable progress in decreasing the maternal mortality rate from 254 (SRS 2004-06) to 212 (SRS 2007-09), and to 178 (SRS 2010-12) per 100,000 live births. However, much work remains to be done in order to meet the Millennium Development Goals (3).

Near Miss Cases can be Identified Using Criteria (4)

Based on- disease, organ dysfunction & management.

- Disease-specific Criteria
  Severe pre-eclampsia, Eclampsia, HELLP syndrome, Severe hemorrhage, Severe sepsis, and Uterine rupture.
- Organ Dysfunction Criteria
- Cardiovascular dysfunction, such as shock, cardiac arrest, or severe hypoperfusion
- Respiratory dysfunction, such as severe tachypnea or severe hypoxaemia
- Renal dysfunction, such as oliguria or severe acute azotaemia
- Coagulation or hematological dysfunction, such as failure to form clots or severe thrombocytopenia
- Hepatic dysfunction, such as jaundice or severe acute hyper-bilirubinaemia
- Management-based Criteria
- ICU capacity and guidelines for ICU admission

Inclusion Criteria for Baseline Assessment of Quality of Care (5,6)

- Severe maternal complications
- Severe postpartum haemorrhage
- Severe pre-eclampsia
- Eclampsia
- Sepsis or severe systemic infection
- Ruptured uterus
- Severe complications of abortion
- Critical interventions or intensive care unit use
- Admission to intensive care unit
- Interventional radiology
- Laparotomy (includes hysterectomy, excludes caesarean section)
- Use of blood products

Life-threatening Conditions (Near-miss Criteria)

- Cardiovascular dysfunction– Shock, cardiac arrest (absence of pulse/heart beat and loss of consciousness), use of continuous vasoactive drugs, cardiopulmonary resuscitation, severe hypoperfusion (lactate >5 mmol/l or >45 mg/dl), severe acidosis (pH <7.1)
- Respiratory dysfunction– Acute cyanosis, gasping, severe tachypnoea (respiratory rate>40 breaths per minute), severe bradypnea (respiratory rate <6 breaths per minute), intubation and ventilation not related to anaesthesia, severe hypoxemia (O2saturation <90% for ≥60 minutes or PAO2/FiO2 <200)
- Renal dysfunction– Oliguria non-responsive to fluids or diuretics, dialysis for acute renal failure, severe acute azotemia (creatinine ≥300 µmol/ml or ≥3.5 mg/dl)
- Coagulation/haematological dysfunction– Failure to form clots, massive transfusion of blood or red cells (≥5 units), severe acute thrombocytopenia (<50 000 platelets/ml)
- Hepatic dysfunction– Jaundice in the presence of preeclampsia, severe acute hyperbilirubinemia(bilirubin >100 µmol/l or >6.0 mg/dl)
- Neurological dysfunction– Prolonged unconsciousness (lasting ≥12 hours)/coma (including metabolic coma), stroke, uncontrollable fits/status epilepticus, total paralysis
- Uterine dysfunction– Uterine haemorrhage or infection leading to hysterectomy

Maternal Vital Status

- Maternal death

Importance of Tracking Maternal Near Miss (7,8)

Examining near miss cases offers valuable insights into the three delays in seeking healthcare, helping to guide appropriate actions. This process is crucial for identifying weaknesses in the healthcare system and evaluating the quality of maternal care provided. Several maternal near miss indicators have been proposed to assess the effectiveness of care and ensure improvements in health outcomes (1).

1. Indicators of Healthcare System Quality: MNM serves as a measure of the effectiveness and quality of healthcare services. The existence of maternal near miss cases often suggests that medical interventions are available, yet there are gaps that could be addressed to prevent further complications.
2. Preventing Maternal Mortality: Identifying and understanding the causes of maternal near misses can help identify trends and common factors that lead to maternal deaths. Improving the management of these cases can help reduce maternal mortality rates.
3. Public Health Insights: Monitoring MNM gives valuable insights into the health system's performance. For example, it can point to

inadequate access to timely care, or highlight specific medical complications that need more focused attention, such as haemorrhage, anemia or pre-eclampsia.
4. Risk Factors and Interventions: Studying the characteristics of women who experience near misses can identify risk factors that predispose women to complications. Interventions targeting these factors can help to prevent the escalation of these issues.

Key Factors Contributing to Maternal Near Miss (9)
1. Healthcare system limitations: Lack of access to skilled care, inadequate infrastructure, and delays in receiving treatment contribute significantly to near miss events.
2. Socioeconomic factors: Women from low-income and marginalized communities are at higher risk due to limited access to healthcare, poor nutrition, and inadequate prenatal care.
3. Health conditions and pre-existing diseases: Women with conditions such as hypertension, diabetes, anemia or obesity are at greater risk for complications that can lead to near misses.
4. Delayed care or diagnosis: In many cases, delays in recognizing or responding to complications, such as obstructed labour, abruption, hypertensive disorders, heart disease in pregnancy and acute fatty liver of pregnancy, can result in near misses.
5. Inadequate training or resources for healthcare providers: Lack of proper training, equipment, or facilities in hospitals can delay diagnosis and treatment, leading to near miss situations.

Addressing Maternal Near Miss: Strategies for Improvement (10)
1. Strengthening Healthcare Systems: Improving healthcare infrastructure and ensuring that facilities are well-equipped to handle high-risk pregnancies can reduce the frequency of near misses.
2. Access to Skilled Care: Ensuring that every woman has timely access to skilled birth attendants, and that care is available during labour and delivery, can prevent many near miss situations.
3. Training Healthcare Providers: Ongoing education for healthcare providers, particularly obstetricians, midwives and nurses, is crucial. Training in the management of high-risk pregnancies and emergency obstetric care can dramatically reduce the incidence of maternal near miss.
4. Improved Early Detection and Timely Interventions: Early detection of complications such as hypertension, haemorrhage, anemia, heart disease, liver disorders and sepsis, coupled with prompt interventions, is key to preventing women from reaching the "near miss" threshold.
5. Data Collection and Research: Implementing systems for recording maternal near miss cases and conducting research can help identify patterns and risk factors, which will inform better clinical practices and policies.
6. Empowering Women: Educating women about maternal health risks and ensuring they have access to prenatal and postnatal care can improve their ability to seek care in time to prevent complications.

Preventive Measures for Maternal Near Miss (11)
Preventing maternal near misses involves addressing both the clinical and systemic factors that contribute to severe complications during pregnancy, childbirth, and the postpartum period. A comprehensive approach to prevention not only improves maternal outcomes but also enhances the overall quality of healthcare for women. Below are several key preventive measures that can be taken at various levels — from individual care to health system strengthening.

1. Access to Skilled Care and Timely Interventions
Timely and Skilled Birth Attendance: Ensuring that every woman has access to skilled healthcare during pregnancy, labour, and delivery is crucial in preventing complications that could result in near misses. Skilled birth attendants, including obstetricians, midwives, and nurses, should be trained to recognize and manage high-risk pregnancies and complications.

Emergency/Critical Obstetric Care: Hospitals and healthcare facilities should be equipped with the capacity to handle obstetric emergencies. Access to emergency cesarean sections, blood transfusions, and intensive care units (ICU) is critical for managing severe complications like postpartum haemorrhage, eclampsia, or obstructed labour.

In rural or low-resource settings, mobile clinics or well-trained midwives can play a role in detecting complications early and facilitating timely transfers to higher-level facilities if necessary.

2. Improving Antenatal Care (ANC)
Routine Screening and Monitoring: Regular prenatal check-ups are key to identifying and managing high-risk conditions such as pre-eclampsia, gestational diabetes, anemia, or infections before they become severe. Screening for conditions like hypertension, diabetes, heart disease and infections (such as HIV, syphilis, or urinary tract infections) during antenatal visits allows for early intervention, reducing the risk of maternal near miss.

Timely Diagnosis of High-Risk Pregnancies: Women at high risk for complications, such as those with previous cesarean deliveries, multiple pregnancies, or pre-existing health comorbidities, should receive more frequent monitoring and specialized care. Early detection of potential complications can help healthcare providers intervene early, reducing the likelihood of a near miss.

3. Managing Common Pregnancy Complications
Prevention and Management of Hypertensive Disorders: Hypertensive disorders of pregnancy (HDPs), including chronic (pre-existing) hypertension, gestational hypertension, and particularly pre-eclampsia, continue to be major contributors to maternal and perinatal morbidity and mortality (12). These conditions also identify individuals at higher risk for early cardiovascular disease. Regular blood pressure monitoring, especially for women with a history of hypertension or pre-eclampsia, and timely management of these conditions, are crucial in preventing severe complications such as stroke, organ damage, or even death. Aspirin prophylaxis is recommended for women at high risk of developing pre-eclampsia to reduce potential adverse outcomes.

Prevention of Postpartum Haemorrhage: Postpartum hemorrhage (PPH) is the leading direct cause of maternal mortality worldwide. Analyzing maternal near miss cases can provide valuable insights into the survival of women experiencing life-threatening PPH (13). The active management of the third stage of labor, which includes administering uterotonics drugs like oxytocin after delivery, is essential in preventing excessive bleeding. Women at higher risk, such as those with multiple pregnancies or large babies, should be closely monitored during and after delivery to detect excessive bleeding early and implement appropriate interventions, including uterine massage, medication, or surgical procedures.

Prevention of Infection: Infection is another leading cause of maternal near miss. Proper aseptic techniques during childbirth, early diagnosis of infections (such as sepsis, septic abortion or chorioamnionitis), and appropriate antibiotic treatment are essential. Ensuring that women have access to postnatal care that includes infection screening can reduce the risks associated with untreated infections.

4. Emergency Obstetric Care
Strengthening Health Facilities: The World Health Organization (WHO) recognizes healthcare quality as fundamental to population health and well-being, as well as a basic human right. The facility-based maternal near-miss case review (NMCR) is a criterion-based audit conducted at the hospital level to evaluate and improve maternal and perinatal healthcare outcomes. This review aims to assess the care provided to maternal near-miss cases (14). To prevent near misses, it is crucial for healthcare facilities, particularly in rural and underserved areas, to have sufficient resources, such as trained personnel, surgical capabilities, blood banks, and ICU facilities. Well-equipped hospitals are better able to manage critical complications. One common obstacle in many low-resource settings is the lack of adequate emergency transport to higher-level facilities. By investing in reliable transport systems and ensuring 24/7 emergency obstetric services, maternal near-miss rates can be significantly reduced.

Training Healthcare Providers: Regular training of healthcare providers, including obstetricians, critical care medicine specialist, and midwives, in managing obstetric emergencies is essential. Training should focus on the timely identification of complications, communication skills, and decision-making under pressure. Implementing simulation-based training (e.g., using mannequins and role-playing scenarios) allows healthcare professionals to practice handling emergencies in a low-risk setting.

5. Blood Transfusion and Surgical Preparedness
Improving Blood Availability: Ensuring a steady supply of blood in health facilities, especially in areas with high maternal risk, is essential to saving lives. Hospitals should have protocols for quick and efficient

blood transfusion in emergencies, including emergency blood reserves and trained staff to manage blood transfusions.

Surgical Capacity and Readiness: In cases of obstructed labour or uterine rupture, cesarean sections or PAS, health facilities should be equipped to perform these surgeries, and staff should be trained to respond quickly in such cases.

6. Improved Postpartum Care

Postnatal Monitoring: Many complications that contribute to maternal near miss can occur in the immediate postpartum period. Ensuring that women are monitored closely for at least 24 hours after delivery in healthcare facilities can catch problems early. Home visits by skilled healthcare providers within the first week of delivery can also help identify issues like infection, secondary postpartum haemorrhage, or high blood pressure that may have been missed in the hospital setting.

Psychosocial Support: Mental health is an often-overlooked aspect of maternal care. Postpartum depression, anxiety, and other mental health issues can exacerbate complications or delay women from seeking care. Providing mental health support, counselling, and education on self-care can improve maternal health outcomes.

7. Community Engagement and Education

Empowering Women and Families: Educating women about the signs of complications (such as severe headaches, vision changes, abdominal pain, or swelling) and when to seek care can help prevent near misses. Empowered women are more likely to seek timely care and adhere to medical advice. Community-based maternal health programs, including those that educate on danger signs during pregnancy, the importance of antenatal care, and how to seek help in emergencies, can make a significant impact on reducing maternal morbidity and mortality. Delays in decision-making, reaching healthcare facilities, and receiving appropriate care are common in many settings. Community education can reduce the delay in recognizing complications and seeking timely care, while improving the efficiency of healthcare delivery at the local level.

CONCLUSION

Preventing Maternal near miss is a critical yet often overlooked aspect of maternal health. Maternal near miss requires a multi-pronged approach that includes improving healthcare infrastructure, ensuring skilled care, addressing social determinants of health, and fostering community awareness. A focus on preventive care, timely interventions, and robust health systems can drastically reduce maternal morbidity and mortality. Strengthening maternal health systems, enhancing the quality of care, and educating both healthcare providers and the public will be key to improving maternal outcomes and ultimately eliminating preventable maternal deaths. Healthcare systems can address gaps in care and develop strategies to prevent maternal deaths. Improving maternal care, addressing the socioeconomic determinants of health, and investing in healthcare infrastructure are vital steps toward ensuring that every woman has a safe pregnancy and childbirth experience. Monitoring and addressing maternal near miss cases should be a global priority to reduce maternal morbidity and mortality in all countries, regardless of their development status. Prioritisation of health policies, programmes, and funding to reduce maternal deaths at regional and global levels will make a pivotal role to reduce MNM.

Conflicts of Interest

The author has none to declare.

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