

Maternal Near Miss as a Better Tool for Prevention of Maternal Mortality: An Observational Study with Focus on Preventive Measures

Anusha Guddeti¹, Rekha N², Dwarakanath L³

¹Postgraduate Resident Department of Obstetrics and Gynecology, Sri Siddhartha Medical College and Hospital, Sri Siddhartha Academy of Higher Education, Tumkur, Karnataka, India (Corresponding Author)

²Associate professor, Department of Anesthesiology, Siddaganga Medical college and Research Institute, Tumkur, Karnataka, India

³Professor, Department of Obstetrics and Gynecology, Sri Siddhartha Medical College and Hospital, Sri Siddhartha Academy of Higher Education, Tumkur, Karnataka, India

Abstract: Background: Maternal near miss (MNM) refers to a woman who nearly died but survived a life-threatening complication occurring during pregnancy, childbirth, or within 42 days of termination of pregnancy. Maternal near miss is a useful indicator of the quality of obstetric care because it reflects severe maternal morbidity, emergency response, referral efficiency, and health system preparedness. Objectives: To study the clinical profile and associated factors of maternal near miss events, to determine their causes, to document interventions undertaken, and to assess fetal-maternal outcomes. Results: Most women were aged 21-35 years (95.08%) and were primigravida (44.26%). Maternal near miss events occurred predominantly after 28 weeks of gestation (77.04%). Referred cases constituted 52.46%. Hypertensive disorders were the leading cause, particularly eclampsia without HELLP syndrome (26.47%), followed by antepartum hemorrhage (14.71%), severe preeclampsia (13.24%), and postpartum hemorrhage (11.76%). Neurological (29.89%) and hematological (25.29%) dysfunction were the most common organ system involvements. All women required ICU admission; 70.49% stayed for 11-20 days. Blood and blood product transfusion was required in 37 cases (25.69%), antihypertensive therapy in 23 (15.97%), ventilatory support in 10 (6.94%), hysterectomy in 9 (6.25%), and dialysis in 4 (2.78%). Maternal survival was achieved in all cases. Fetal outcome showed 34 live healthy babies, 14 NICU admissions, 7 stillbirths, and 6 first-trimester terminations. Conclusion: Maternal near miss events in this study were mainly due to preventable causes, especially hypertensive disorders and hemorrhage. Late gestational presentation, referrals from peripheral centers, multisystem involvement, and need for intensive care were common. Strengthening antenatal surveillance, early diagnosis, timely referral, and emergency obstetric critical care can reduce severe maternal morbidity and improve maternal and perinatal outcomes.

Keywords: Maternal near miss, severe maternal morbidity, hypertensive disorders, obstetric haemorrhage, ICU, fetal outcome

1. Introduction

Maternal health is a key indicator of the effectiveness of a health care system. Although maternal mortality remains a major public health concern, it represents only the tip of the iceberg of severe maternal complications. For every woman who dies from pregnancy-related causes, many more survive life-threatening events during pregnancy, delivery, or the puerperium.²

The World Health Organization defines maternal near miss as a woman who nearly died but survived a complication that occurred during pregnancy, childbirth, or within 42 days of termination of pregnancy.³ This concept has emerged as an important tool for evaluating the quality of obstetric care because near-miss cases occur more frequently than maternal deaths and provide valuable opportunities to assess delays in care, referral pathways, emergency response, and the adequacy of clinical interventions.⁴

The major causes of maternal near miss are often similar to those of maternal mortality and include hypertensive disorders of pregnancy, severe obstetric haemorrhage, sepsis, uterine rupture, and indirect medical disorders.⁵ In low- and middle-income countries, the burden of maternal near miss remains high because of delayed access to health facilities, inadequate antenatal care, poor transport systems, and

limitations in emergency obstetric and critical care services.⁶

Assessment of maternal near miss is therefore not only a measure of disease burden but also a reflection of health system performance.⁷ Tertiary care hospitals receive complicated referrals and provide intensive obstetric care, making them ideal settings for studying the epidemiology, management, and outcomes of maternal near miss events. The present study was undertaken to evaluate the clinical profile, causes, interventions, and outcomes of maternal near miss events in a tertiary care teaching hospital.⁸

2. Objectives

- 1) To study the clinical profile and factors associated with maternal near miss events.
- 2) To determine the causes of maternal near miss events.
- 3) To document the interventions undertaken in maternal near miss cases.
- 4) To assess the maternal and fetal outcomes of maternal near miss events.

3. Materials and Methods

3.1 Study Design and setting

This was a hospital-based longitudinal observational study

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conducted in the Department of Obstetrics and Gynaecology at a tertiary care teaching hospital.

3.2 Study duration

The study was carried out over 24 months, from February 2024 to January 2026.

3.3 Sample Size

A total of 61 women with maternal near miss events were included in the study.

Sampling method

Purposive sampling was used to include all eligible cases fulfilling the study criteria.

Data collection

Data were collected prospectively using a predesigned and pretested proforma.

Information recorded included: Maternal age, Obstetric score, Gestational age, Booking/referral status, Clinical diagnosis and cause of maternal near miss, Organ system involvement, Duration of ICU stay, Interventions performed, Maternal outcome and Fetal outcome

Maternal near miss cases were identified using WHO criteria.

Inclusion Criteria

- Women aged 22-40 years
- Women admitted with maternal near miss
- Cases managed in ICU or labor room
- Women during pregnancy, childbirth, or within 42 days postpartum meeting WHO maternal near miss criteria

Exclusion Criteria

- Patient refusal

Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS version 24.0.

Descriptive statistics such as frequency, percentage, mean, and standard deviation were used for data summarization. Associations between categorical variables were assessed using the Chi-square test. A p value <0.05 was considered statistically significant.

4. Results

A total of 61 maternal near miss cases were studied.

A total of 61 maternal near miss cases were studied. Most women were aged 21-35 years (95.08%), were primigravida (44.26%), and presented after 28 weeks of gestation (77.04%). Referred cases (52.46%) were slightly more common than booked cases.

Causes of maternal near miss

Hypertensive disorders and haemorrhagic causes were the major contributors.

Cause	Number	Percentage
Severe preeclampsia	9	13.24
Eclampsia without HELLP	18	26.47
HELLP syndrome	3	4.41
Abortion-related haemorrhage	2	2.94
Ruptured ectopic pregnancy	4	5.88
APH	10	14.71
PPH	8	11.76
Uterine rupture	5	7.35
Sepsis	3	4.41
Severe anaemia	1	1.47
Conditions unrelated to pregnancy	5	7.35

Organ system involvement

Neurological dysfunction (29.89%) was the most common organ system involvement, followed by haematological dysfunction (25.29%). All women required ICU admission, and the majority had an ICU stay of 11-20 days (70.49%).

Interventions required

All women required ICU admission.

Intervention	Number	Percentage
Hysterectomy	9	6.25
Antihypertensives	23	15.97
Blood and blood products	37	25.69
Ventilator support	10	6.94
Dialysis	4	2.78
ICU admission	61	42.36
Laparotomy for ruptured ectopic	6	9.83

Maternal & Fetal outcomes

Variable	Category	Number	Percentage
Maternal outcome	Good	44	72.13
Maternal outcome	Poor	17	27.87
Fetal outcome	Alive and healthy	34	39.08
Fetal outcome	Alive, NICU admission	14	16.09
Fetal outcome	Stillbirth	7	8.05
Fetal outcome	First trimester termination	6	6.9

5. Discussion

Maternal near miss has emerged as a practical and informative indicator for evaluating the quality of maternal health care, particularly in settings where maternal deaths alone may not adequately reflect the burden of severe maternal morbidity.⁹ In the present study, most women with maternal near miss belonged to the 21-35 years age group, which is comparable to observations reported in other hospital-based studies.^{10,11} This is not unexpected, as this age group constitutes the majority of pregnant women seeking obstetric care.

Primigravidae formed the largest proportion of cases in this study. Similar findings have been reported in previous studies, especially in settings where hypertensive disorders are the dominant cause of maternal near miss.¹² The higher contribution of first pregnancies may be explained by the increased susceptibility of primigravidae to preeclampsia and eclampsia.

A substantial majority of maternal near miss events in the present study occurred after 28 weeks of gestation, which

corresponds to the period when hypertensive disorders, hemorrhage, and complications related to labor and delivery become more prominent.^{13,14} This finding is consistent with the recognized epidemiology of severe maternal outcomes.

Referred cases slightly outnumbered booked cases in the present study. This observation highlights the importance of delays in referral and transport, which remain major determinants of severe maternal morbidity in resource-constrained settings.¹⁵ The three-delay model proposed by Thaddeus and Maine remains relevant in understanding how delayed decision-making, delayed transport, and delayed receipt of appropriate care contribute to maternal near miss and mortality.⁸

Hypertensive disorders of pregnancy were the leading cause of maternal near miss in the present study, particularly eclampsia and severe preeclampsia. This is in agreement with studies that have documented the central role of hypertensive disorders in severe maternal morbidity.¹⁶ However, some studies have reported obstetric hemorrhage as the leading cause, indicating regional variation in the distribution of severe obstetric complications.^{17,18}

Obstetric hemorrhage also accounted for a substantial proportion of cases in the present series, emphasizing the need for rapid diagnosis, blood transfusion services, and emergency surgical preparedness.

Neurological dysfunction was the most frequently involved organ system in this study, followed by hematological dysfunction. This pattern is compatible with the predominance of eclampsia, severe preeclampsia, and hemorrhagic disorders.^{3,14} Multisystem involvement in maternal near miss cases has been recognized in previous literature and reflects the severity of the underlying condition as well as the need for multidisciplinary care.^{10,12}

All women in the present study required ICU admission, and most remained in the ICU for 11-20 days. This indicates the seriousness of maternal near miss events and the intensity of treatment required. Blood and blood product transfusion was the commonest intervention, followed by antihypertensives, ventilator support, and surgical procedures. These findings underline the importance of well-equipped tertiary centers with obstetric critical care services, ICU support, emergency surgical capability, and a functional blood bank.¹⁹

No maternal death occurred in the present study, which reflects successful rescue of severely ill women after appropriate intervention. Nevertheless, 17 women had poor maternal outcomes in the form of chronic morbidity or complicated recovery, emphasizing that survival alone should not be considered the only endpoint in maternal care.^{3,11} Adverse fetal outcomes were also notable, with NICU admissions, stillbirths, and first-trimester losses observed. This demonstrates that even when maternal survival is achieved, fetal and neonatal risks remain considerable.^{16,18}

Overall, the findings of the present study reinforce the need for improved antenatal risk identification, early recognition of complications, timely referral, rapid institution of

treatment, and strengthening of emergency obstetric care systems to reduce both maternal near miss and maternal mortality.¹⁹

6. Conclusion

Maternal near miss is an important marker of severe maternal morbidity and quality of obstetric care. In the present study, maternal near miss events occurred predominantly among women aged 21-35 years, in primigravidae, and after 28 weeks of gestation. Hypertensive disorders of pregnancy and obstetric haemorrhage were the major causes. Neurological and haematological dysfunction were the most common organ system involvements.

All women required ICU admission, and many needed blood transfusion, ventilatory support, surgical intervention, and prolonged critical care. While maternal survival was achieved in all cases, adverse fetal outcomes were still observed.

The study highlights the need for:

- Strengthened antenatal surveillance
- Early recognition of high-risk pregnancy
- Timely referral and stabilization from peripheral centers
- Ready availability of blood products
- Well-equipped ICU and emergency obstetric services
- Routine maternal near miss audits for quality improvement

Improving these components can reduce severe maternal morbidity and contribute to better maternal and perinatal outcomes.

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