

Study On Causes of Maternal Near Miss and Their Outcome in a Tertiary Care Centre of Ananthapur**Bala Harshitha Siva Tej¹, K. Niveditha², P. Sarada³**¹Assistant Professor, Department of Obstetrics and Gynaecology, GMC, Ananthapur, Andhra Pradesh, India²Assistant Professor, Department of Obstetrics and Gynaecology, GMC, Ananthapur, Andhra Pradesh, India³Assistant Professor, Department of Obstetrics and Gynaecology, GMC, Ananthapur, Andhra Pradesh, India

Received: 01-03-2024 / Revised: 15-04-2024 / Accepted: 21-05-2024

Corresponding author: Dr. P. Sarada

Conflict of interest: Nil

Abstract

Background: Maternal near miss (MNM) events are cases in which a woman almost dies of a complication occurring during pregnancy, childbirth or within 42 days of pregnancy termination. They are very informative on the status of the health care of the mother and also assist in revealing the pitfalls in obstetric care and management. Assessment of Maternal near miss (MNM) cases, which are the cases of maternal deaths, enables to examine the efficiency of the emergency obstetric service.

Methods: It was carried out as a prospective observational study at Department of OBGYN, GMC, Ananthapur, Andhra Pradesh, India, between July 15th, 2023 to January 15th, 2024. The WHO near-miss criteria were applied to collect and study data. There were 4265 deliveries, and 40 women were reported with severe maternal outcomes (SMO) which consisted of 35 MNM and 5 maternal deaths. The SPSS version 29 was used in analyzing the demographic information, obstetric history, mode of delivery, underlying disorders, and critical interventions. The statistical significance was tested using chi-square tests.

Results: The MNM ratio (NMR) was 8.22 per 1000 live births and the ratio of maternal mortality (MMR) was 117.5 per 100,000 live births. The severe maternal outcome ratio (SMOR) was 9.4 per 1000 live births. The booked cases amounted to the majority cases of MNM (70%), and those cases in which lower segment cesarean section (LSCS) was used, constituted the majority (55%). Primarily, it was haemorrhage (20%) followed by hypertensive disorders (27.5%). The most common interventions were blood transfusion (42.5) and mechanical ventilation (40%). Mode of delivery and patient outcome had statistically significant correlation ($\chi^2=17.281$, $df=5$, $p=0.04$). Mortality was significantly higher in ventilated patients. ($\chi^2=8.571$, $p=0.03$).

Conclusion: Maternal near miss gives a crucial perspective of maternal health system performance. Hypertensive disorders and hemorrhage contributed largely to MNM in this research. Timely identifying, multidisciplinary care, and enhancement of referral and critical care establishments can become significant contributors of decreased maternal mortality.

Keywords: Maternal Near Miss, Severe Maternal Outcomes, Maternal Mortality, Hemorrhage, Hypertensive Disorders, Ananthapur.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Mother mortality remains a major health issue of the world even with the considerable improvement in obstetric care. Every death of a woman giving birth is a tragedy in its own right, as well as indicates the lack of health system responsiveness and accessibility [1].

WHO said that a maternal near miss (MNM) is described as a woman who almost died but survived a complication in pregnancy, birth, or in 42 days of pregnancy termination [2]. The MNM

method was proposed by WHO in 2009, and it focuses on determining the life-threatening maternal complications and their treatments in order to enhance the quality of care [3].

MNM case studies have got special merits. Although there is a relative scarcity of maternal deaths incidents, the MNM incidences are more frequent and can be used to base a wider range of data on evaluating the system vulnerabilities and strengths [4]. In addition, MNM analysis is not

affected by emotional and legal challenges that come with maternal mortality auditing, and hence it is a sensible procedure in continuous quality improvement [5].

The MNM load distribution is observed to be diverse across the world basing on the ability to access emergency obstetric care. The lowest MNM ratio is 3 per 1000 live births in high-income nations, but in the low and middle-income, and the example of India is between 15 and 40 per 1000 live births [6]. The maternal mortality ratio (MMR) of India is reported as 113 per 100,000 live births (Sample Registration System (SRS) 2020) which means that India is still facing the challenge of meeting the Sustainable Development Goal (SDG) target of less than 70 per 100,000 by 2030 [7].

States such as Andhra Pradesh of the southern states of India have had significant advancements into institutional delivery rate and emergency obstetric coverage. Nevertheless, there are still inequalities in the results because of unequal quality of care, referral delays, and absence of intensive care support [8].

This current research study of Causes of Maternal Near Miss and their outcome in a tertiary care centre of Ananthapur, seeks to establish the frequency, etiology and the outcome on the MNM cases in a tertiary hospital. It also strives to point out certain spheres that need to be improved in maternal care delivery so as to reduce preventable mortality.

Materials and Methods

Study design and setting: A prospective observational study was conducted in the Department of OBGYN, GMC, Ananthapur, Andhra Pradesh, India, between July 15th, 2023 to January 15th, 2024.

Study population: Women who made the WHO near-miss criteria and were admitted throughout the study period were included.

Inclusion Criteria: Women who come to life with life-threatening conditions during pregnancy, delivery or within 42 days after childbirth and meet the WHO MNM requirements.

Exclusion Criteria: Women that failed to meet the WHO near-miss clinical or laboratory-based parameters were not included.

Data Collection: The near-miss proforma of the WHO was used to retrieve the data contained in medical records. Data gathered were of the sociodemographic, booking status, obstetric history, cause of morbidity, mode of delivery, interventions done, and outcome.

Sample size and analysis: Among 4265 deliveries in the study period, 40 women had been found with severe maternal outcome (35 MNM cases and 5 maternal deaths). The SPSS version 29 was used to do statistical analysis. The characteristics of the data were used: descriptive statistics, frequencies, and chi-square tests. Statistically significant P-values were under 0.05.

Results

During the six-month study period, there were 4265 deliveries and 4254 live births. A total of 40 severe maternal outcome (SMO) cases were identified, comprising 35 maternal near miss (MNM) and 5 maternal deaths (MD).

Overall Indicators: The MNM ratio (NMR) was 8.22 per 1000 live births, MMR was 117.5 per 100,000 live births, and SMOR was 9.4 per 1000 live births. Of the total cases, 28 (70%) were booked and 12 (30%) were unbooked. There was one HIV-positive case, one twin pregnancy, and one unmarried girl with septic abortion included under MNM.

Table 1: Maternal Near Miss Indicators

Indicator	Number / Rate
Near miss cases	35
Maternal deaths	5
Total deliveries	4265
Live births	4254
MNM Ratio (per 1000 live births)	8.22
MMR (per 100,000 live births)	117.5
SMOR (per 1000 live births)	9.4

Comparison by Mode of Delivery: Among MNM cases, LSCS (55%) was the most common mode of delivery. Mortality was significantly higher among women delivered by hysterotomy or NVD ($\chi^2=17.281$, $df=5$, $p=0.04$).

Table 2: Comparison of Patient Status across Mode of Delivery

Mode of Delivery	Patient's Survived n (%)	Patients Died n (%)	Total
Not delivered	9 (100%)	0	9
NVD	1 (33.3%)	2 (66.7%)	3
LSCS	20 (90.9%)	2 (9.1%)	22
Hysterotomy	0	1 (100%)	1
Laparotomy	3 (100%)	0	3
Dilatation & Curettage	2 (100%)	0	2

Underlying Disorders: Hypertensive disorders (27.5%), hemorrhage (20%), and anemia (10%) were the predominant causes among MNM patients. Cardiac dysfunction was exclusively seen among those who died ($\chi^2=18.182$, $df=10$, $p=0.05$).

Table 3: Comparison across Underlying Disorders

Disorder	Patient's Survived n (%)	Patients Died n (%)	Total
Hemorrhage	8 (100%)	0	8
Sepsis	1 (100%)	0	1
Hypertension	9 (81.8%)	2 (18.2%)	11
Cardiac Dysfunction	0	2 (100%)	2
Anaemia	3 (75%)	1 (25%)	4
Respiratory Dysfunction	4 (100%)	0	4

Critical Interventions: The most frequent interventions were blood transfusion (42.5%), mechanical ventilation (40%), and use of cardiotonics (35%).

Table 4: Critical Interventions in MNM Cases

Intervention	n (%)
Blood transfusion	17 (42.5%)
Hysterectomy	2 (5%)
Ventilation	16 (40%)
Cardiotonic / Inotropic use	14 (35%)

Ventilation and Mortality: Mortality was significantly associated with the need for ventilation ($\chi^2=8.571$, $p=0.03$).

Table 5: Comparison of Patient Outcome with Mechanical Ventilation

Category	Survived n (%)	Died n (%)	Total
On mechanical ventilation	11 (68.8%)	5 (31.3%)	16
Not on ventilation	24 (100%)	0	24

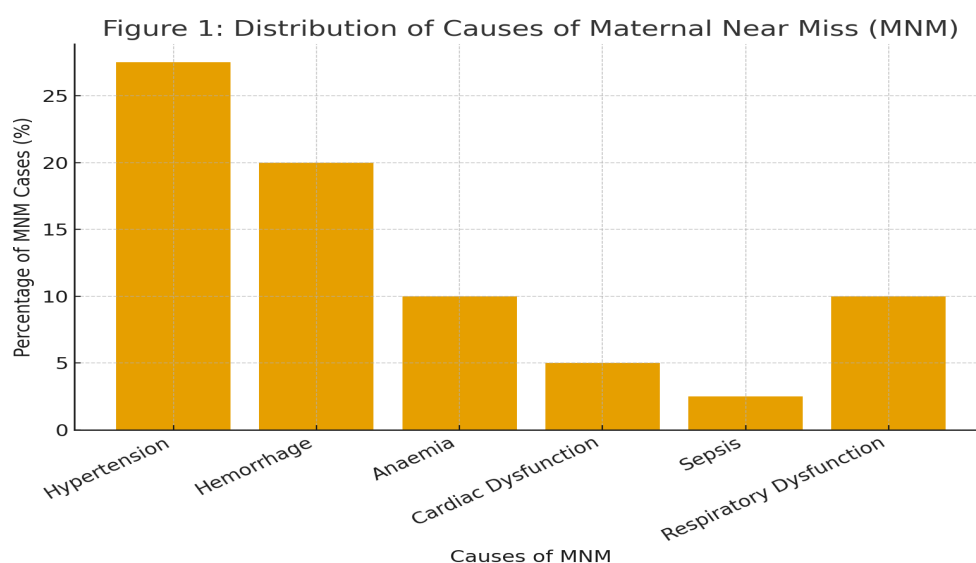
**Figure 1: Distribution of Causes of MNM**

Figure 2: Correlation between Ventilation and Maternal Outcome

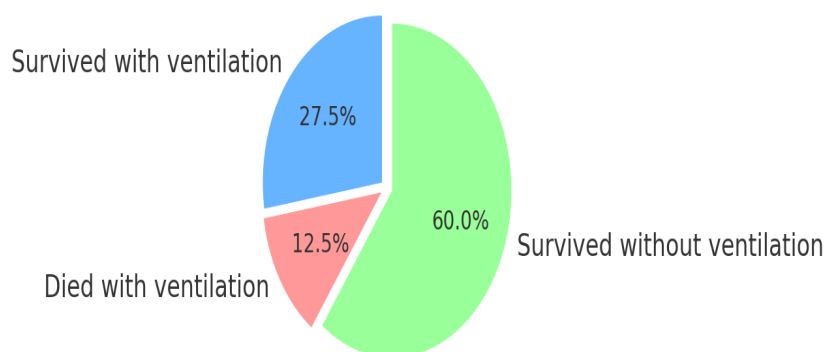


Figure 2: Correlation between Ventilation and Maternal Outcome.

Discussion

The maternal near miss ratio (8.22 per 1000 live births) in this study was comparable to reports from other tertiary centres in India, such as Mumbai (7.6 per 1000) and West Bengal (9.4 per 1000) [9,10]. The maternal mortality ratio (117.5 per 100,000 live births) indicates effective yet improvable critical care management. As Purandare et al. and Jayaratnam et al. did, hypertensive disorders and hemorrhage were the most common causes of MNM [11,12]. These preventable causes are the leading ones, and this highlights the need to screen victims during antenatal care early on, administer antihypertensive treatment promptly, and anticipating these complications and need for vigilant labour monitoring protocols too.

The high percentage of MNM cases necessitating cesarean section is in line with the trend being witnessed in tertiary care hospitals where complicated cases of referrals and severe obstetric emergencies result in the need to have surgical intervention [13]. The few number of deaths which have occurred after NVD and hysterotomy, however, is the indication that the increased length of labor and insufficient intrapartum monitoring is contributory. The most common procedures were mechanical ventilation and blood transfusion that proves the paramount significance of the intensive care and transfusion medicine support in the course of MNM management. The same result was found by Kaye et al. and Souza et al. who pointed out that blood and ventilatory support availability directly affects the survival rate [14,15].

One of the studies related cardiac dysfunction and anemia with increased mortality. The cardiac dysfunction, which was rare, was all lethal, as it is reported in the literature that cardiovascular compromise is one of the determinants of maternal death [16]. The near-miss strategy of WHO is very useful in locating weaknesses at the system level.

The delay model, delay in seeking care, delay in reaching care and delay in receiving care, is still applicable. This occurrence of the unbooked cases (30 percent) shows that there should be better community awareness, transport, and referral linkage [17].

The institutionalization of continuous auditing of the MNM and maternal deaths should be aimed at measuring the quality of care. Standard clinical care procedures, educating staff about emergency obstetrics and reinforcing blood banks and intensive care units are also necessary measures.

Conclusion

Maternal near miss surveillance is a feasible method of assessing the quality of obstetric care. Hypertensive disorders and hemorrhage were the major causes of MNM in the current study. The maternal mortality can be effectively reduced by early diagnosis and intervention, and proper critical care support. By making near miss audits a regular practice, maternal health systems will be strengthened and help hasten the achievement of SDG maternal health goals.

References

1. Agarwal, N., Jain, V., Bagga, R., Sikka, P., Chopra, S., & Jain, K. (2022). Near miss: determinants of maternal near miss and perinatal outcomes: a prospective case control study from a tertiary care center of India. *The Journal of Maternal-Fetal & Neonatal Medicine*, 35(25), 5909-5916.
2. Verma, A., Choudhary, R., Chaudhary, R., Kashyap, M., & Chaudhary Sr, R. (2023). Maternal Near-Miss and Maternal Mortality in a Tertiary Care Center of Western Uttar Pradesh: A Retrospective Study. *Cureus*, 15(7).
3. Lakshmi, S. (2017). A Prospective study of Maternal Near Miss and Maternal Mortality in

- a Tertiary Care Center with Special Reference to its Etiology and Management (Doctoral dissertation, Thanjavur Medical College, Thanjavur).
4. Singh, S. (2024). Maternal and Child. Blue Rose Publishers.
 5. Roy, P., Sahu, D. P., Behera, B. K., & Pal, D. (2024). Health System Interventions to Reduce Maternal Mortality in India: A Narrative Review. *DY Patil Journal of Health Sciences*, 12(4), 119-124.
 6. Palli, K., Chidrawar, V., Veerendra, U., Chenchu, S., Devangam, M., Shiromwar, S., & Mogarala, D. (2023). Drug Prescribing Pattern in Myocardial Infarction Patients at a Tertiary Care Hospital in South India. *International Journal of Pharmaceutical Investigation*, 13(4).
 7. Salini, Y., Mohanty, S. N., Ramesh, J. V. N., Yang, M., & Chalapathi, M. M. V. (2024). Cardiotocography data analysis for fetal health classification using machine learning models. *IEEE Access*, 12, 26005-26022.
 8. Kumaraswamy, M., Ariya Chacko, D. C. S. E., George, N. J., Thomas, A. A., & Wagle, L. (2017). Drug Prescribing Practice among Anemic Patients in a Tertiary Care Teaching Hospital.
 9. Easwaran, V., Orayj, K., Goruntla, N., Mekala, J. S., Bommireddy, B. R., Mopuri, B., & Bandaru, V. (2025). Depression, anxiety, and stress among HIV-positive pregnant women during the COVID-19 pandemic: a hospital-based cross-sectional study in India. *BMC Pregnancy and Childbirth*, 25(1), 134.
 10. Sreerama, G., Matavalum, S., Chandrasekharan, P., & Thunga, V. (2015). Difficulties in accessing and availing of public health care systems among rural population in Chittoor District, Andhra Pradesh. *International Journal of Medicine and Public Health*, 5(4), 265-9.
 11. Goruntla, N., Jampala, S., Mallela, V., Bandaru, V., Thamineni, R., & Bhupalam, P. (2019). Epidemiology and antibiotic sensitivity pattern of asymptomatic bacteriuria during pregnancy: A cross-sectional study. *Journal of Health Research and Reviews (In Developing Countries)*, 6(1), 5-10.
 12. Reddy, P. A. (2023). Impact Of Indira Kranthi Patham On The Living Conditions Of Weaker Sections Women A Case Study Of Anantapur District In Andhra Pradesh. Laxmi Book Publication.
 13. Prakasamma, M. (2009). Maternal mortality-reduction programme in Andhra Pradesh. *Journal of health, population, and nutrition*, 27(2), 220.
 14. Neelaiah, R. (2017). Poverty Alleviation Through Self-Help Groups in Anantapur District of Andhra Pradesh. diplom. De.
 15. RAMESH, J. V. N., YANG, M., & CHALAPATHI, M. M. V. (2024). Cardiotocography Data Analysis for Fetal Health Classification Using Machine Learning Models.
 16. Sen, D., Vimal, S., Shamanna, P., Sumathi, M. E., & Deepak, S. (2025). Phenotypic clustering of type 2 Diabetes mellitus: exploring heterogeneity And Advancing precision medicine in urban Bangalore.
 17. Gupta, M., Mavalankar, D., & Trivedi, P. (2009). A study of referral system for EmOC in Gujarat.