

Original Research Article

A retrospective cross sectional study of maternal near-miss cases in a tertiary healthcare centre of Central India- An audit

Abstract

Background: In a country like India decrease in maternal mortality with growing advances has given rise for the need of a new indicator for investigation of severe maternal morbidity- “maternal near-miss” (MNM) event World Health Organization (WHO) defines MNM as “a woman who, being close to death, survives a complication that occurred during pregnancy, delivery or up to 42 days after the end of her pregnancy”.

Methodology: A hospital-based cross-sectional study was carried out at MTH Hospital, Indore a tertiary care referral hospital in Indore, Madhya Pradesh from January to December 2022. MNM events were identified according to the WHO guidelines.

Results: During study period, 9963 live births, 143 maternal deaths and 166 “near-miss” cases were recorded. Among these 166 near-miss cases, Calculated MNM ratio was 16.6/1000 live births, the ratio of maternal death to MNM event was 1. 1/1, and overall Mortality index was 53.7%.

Conclusion: hemorrhage and hypertension are the two most common cause of near miss and deaths and Identification of preventable factors and special preventive actions should be taken to improve the quality of health care.

Keywords- maternal near-miss. Maternal mortality. Ratio. Identification.

INTRODUCTION

Globally, maternal mortality has been used for years to monitor maternal health, quality of reproductive health care, and progress towards international goals. Since last decade, the decrease in the maternal mortality rates has led to an increased interest in analyzing so-called "near miss" events. This has led to the emergence of the concept of maternal near miss (MNM), for evaluating the quality of maternal health care as a proxy indicator for measuring maternal health. According to the World Health Organization (WHO), MNM is defined as “a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy”. [1] It also serves as a surrogate in gaining a better understanding of a set of conditions and preventable factors which contribute to maternal mortality. India’s performance on the maternal mortality front has been improving consistently as the country achieves its national target of reducing MMR to below 100. As per the recent reports, Significant Decline in the Maternal Mortality Ratio (MMR) from 130 in 2014-16 to 97

per lakh live births in 2018-20 was seen. [2] Upon achieving this, India has accomplished the National Health Policy (NHP) target for MMR of less than 100/lakh live births and is on the right track to achieve the SDG target of MMR less than 70/ lakh live births by 2030 [2]. Therefore, Even though maternal mortality is considered to be one of the main indicators of maternal health, it shows only a small fraction of the maternal ill-health continuum and understanding the true burden of maternal ill-health requires studying near miss in addition to maternal deaths.

Our tertiary healthcare setup which is a profound government medical college of Madhya Pradesh, the state which is identified with the third worst maternal mortality rate in india. It receives a large number of obstetric patients daily from rural and suburban areas. Many of them get admission in the hospital in a moribund state. While most of them receive help in the right time, few patients do lose their lives. A study was carried out on these critical patients to know the various factors related to maternal near miss and mortality cases in our set up.

In this study, we aimed to determine the demographical factors of the cases, assess the causes of maternal near miss and maternal mortality and what interventions were taken to treat the patients. Various indices like maternal near miss incidence ratio per 1000 live birth, maternal near miss and mortality ratio, mortality index and maternal mortality rate were calculated. This research was carried out in Madhya Pradesh tertiary care centre to identify causes a being the third worst state with the highest maternal mortality rate.

METHODS

The study was conducted in the obstetrics and gynecology department of MGMMC and MTH Hospital, Indore, serving for both referred and non referred patients. The study was conducted from 1st January 2022 to 31st December 2022.

The cases which met the criteria of MNM as per the Maternal Near Miss Operational Guidelines, were included for audit by the Maternal near miss committee along with maternal death cases. During the study period, all the women who met the criteria for MNM were identified at the time of discharge and enrolled in the study.

Data collection through review of all medical records using a standard checklist prepared for this purpose. Facility based MNM Review form for MNM cases were filled by the treating doctors. Patient characteristics including age, parity, gestational age at the time of admission, booked (at least 3 antenatal visits at the institute), mode of delivery, ICU admission, lifesaving intervention and fetal outcome was analyzed. Audit was conducted by the departmental committee, during the monthly meet.

Patients were categorized by final diagnosis with respect to haemorrhage, hypertension, sepsis, hepatic dysfunction, renal dysfunction, Anemia, thrombocytopenia, and other medical disorders were considered as indirect causes contributing to MNM and deaths. [3]

The above data was analyzed to calculate the following near miss indices:

1. Women with Life-Threatening Conditions (WLTC) refers to all women who either qualified as maternal near-miss cases or those who died (i.e., women presenting a severe maternal

outcome). It is the sum of maternal near-miss and maternal deaths ($WLTC=MNM+MD$).

2. MNM Ratio (MNMR) refers to the number of maternal near miss cases per 1000 live births ($MNMR=MNM/LB$).

3. Maternal Near-Miss Mortality Ratio (MNM: MD) refers to the ratio between MNM cases and Maternal Deaths (MD).

4. Mortality Index (MI) refers to the number of maternal deaths divided by the number of women with life-threatening conditions expressed as a percentage [$MI=MD/(MNM+MD)$].

STATISTICAL ANALYSIS

Data was collected and entered simultaneously in statistical package for social sciences (SPSS) version 23 and coded appropriately. The data was analyzed keeping in view the aim and objectives of the study. Descriptive statistics were calculated to summarize the sample characteristics in terms of frequency and percentage. Graphs and Charts were made. Analytical and inferential analysis was done. Significant was set at standard 0.05.

RESULTS

During the study, there were 9963 live births in our 1 year study period. In the year 2022 from January 2022 to December 2022, there were total 10330 deliveries in our institute out of which 9963 were live births. The total near miss cases were 166 and total maternal mortality was 143. Total live births, maternal mortality and near miss cases are shown in Table 1.

Table 1: Near miss incidence

Incidences	Numbers
Total no. of deliveries	10330
Total no. of live births (LB)	9963
Number of near miss cases (MNM)	166
Number of maternal mortality cases (MM)	143
Maternal near miss incidence ratio	16.6
Maternal near miss: Maternal mortality ratio (MNM: MD)	1.1:1
Mortality index (MD/MNM+MD)	46.2%

The general demographic profile of the near miss patients as compared to that of the mortality cases is listed in Table 2. Maximum near miss and mortality patients were between the age group of 21-30yrs, primipara in their antenatal period in their third trimester.

Table 2: Demographic profile of the patient

Patient characteristics	Maternal Near miss	Maternal mortality
AGE		
<20yrs	8.9%	0.09%
21-30yrs	85.9%	77.4%
>31yrs	5.4%	13.3%
PARITY		
Primipara	42.3%	39.5%
Multipara	57.7%	60.5%
ANTENATAL/POSTNATAL STATUS		
Antenatal	78%	64.1%
Postnatal	22%	35.9%
REFERRAL		
Referred	61.8%	72.2%
Self referred	38.2%	27.8%
PERIOD OF GESTATION		
First trimester	5.8%	7.6%
Second trimester	28.9%	17.7%
Third trimester	65.3%	74.7%

The most common cause of maternal near miss was hemorrhage (55.9%). The most common cause of maternal mortality was hypertensive disorders of pregnancy (19.7%). In the MNM group, admission to ICU was the most common intervention (92.8%).

Table 3: Distribution of maternal near miss according to primary cause in maternal near miss

Primary determinant	Maternal near miss (n=166)	Maternal mortality (n=143)
<u>DIC</u>	3 (1.8%)	5 (3.5%)
<u>Hypertension</u>	9 (5.4%)	5 (3.5%)
<u>Antepartum eclampsia</u>	12 (7.2%)	12 (8.4%)
<u>Postpartum eclampsia</u>	07 (4.2%)	11 (7.7%)
<u>Obstetric hysterectomy</u>	08 (4.8%)	00%
<u>Rupture ectopic</u>	16 (9.6%)	00%
<u>Rupture uterus</u>	6 (3.6%)	01 (0.37%)
<u>AKI</u>	7 (4.2%)	00%
<u>Heart disease</u>	8 (4.8%)	01 (0.70%)
<u>Sepsis</u>	20 (12%)	07 (4.9%)
<u>Post abortal</u>	9 (5.4%)	01 (0.70%)
<u>Hepatic dysfunction</u>	10 (6.02%)	04 (2.8%)
<u>Respiratory dysfunction</u>	5 (3.01%)	08 (5.6%)
<u>Antepartum hemorrhage</u>	10 (6.02%)	04 (2.8%)
<u>Postpartum hemorrhage</u>	18 (10.8%)	13 (9.8%)
<u>Placenta previa</u>	08 (4.8%)	05 (3.5%)
<u>Abruption</u>	09 (5.4%)	07 (4.9%)

<u>Uterine inversion</u>	<u>01 (0.6%)</u>	<u>01 (0.70%)</u>
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Table 4: critical lifesaving procedures done in maternal near miss group

<u>INTERVENTION</u>	<u>Maternal near miss (n=166)</u>
<u>ICU admission</u>	<u>92.8%</u>
<u>Resuscitative procedure</u>	<u>2.1%</u>
<u>Use of cardiotonics/vasopressors</u>	<u>6.6%</u>
<u>Mechanical intubation</u>	<u>29.6%</u>
<u>Massive blood and blood product transfusion</u>	<u>33.1%</u>
<u>Surgical procedures</u>	<u>19.2%</u>
<u>Intravenous higher antibiotics</u>	<u>88.5%</u>
<u>Renal/ peritoneal dialysis</u>	<u>3.6%</u>
<u>Blood coagulation disorder leading to heparinization and anti coagulant use</u>	<u>1.2%</u>
<u>Management of ketoacidosis</u>	<u>0%</u>
<u>Any other intervention which is life saving</u>	<u>2.06%</u>

DISCUSSION

In the current study, mean age, parity, delivery status and mode of delivery were comparable in both the groups and therefore did not affect the final outcomes. The data that we have collected for our study is a hospital based reliable data. The sample size is adequate and collected over a span of 1 year. We have conducted this study in our hospital which had an ICU facility and facility for most relevant investigations

The maternal near miss incidence ratio (MNMR) was 16.6/1000 live births in our hospital. Studies done in the developing countries show the same trend and vary from .anywhere between 15–40/1000 live births. [4] Hemorrhage was the most common cause of near miss cases in our study as followed by hypertensive disorders. Similar results were found in other studies as well. Even in hemorrhage post partum hemorrhage is the most contributory factor. Hemorrhage consist of 26.62% of all near miss cases followed by hypertensive disorders of pregnancy consisting of 16.8% near miss cases. We also studied the outcomes of various interventions as mentioned by the WHO near miss approach. We found that identifying potential nearmiss cases and admitting them in ICU for monitoring was the most common and initial intervention done. Out of the live saving interventions- massive blood transfusions, mechanical intubation followed by aggressive and judicious use of higher antibiotics with inotropic supports on indicated patients did bridge up the gap between near miss and mortality. Also early decision of surgical procedures contributed to many near miss case management.

The leading cause of maternal mortality in our setup was eclampsia(16.1%) followed by post partum hemorrhage(9.8%). The eclampsia patient that were subjected to mortality were mostly referred in moribund condition to our institute and were therefore could not be salvaged. This

calls for a rapid response team and more education about the early diagnosis and timely referrals of high risk patients before they go into irreversible damage. In our institute mortality due to rupture ectopic patients is zero as all the patients are promptly diagnosed on admission and were taken up for surgery without any delay. Maternal mortality index ($MI = MD / (MNM + MD) * 100$) in our set up is 46.2%. This is very high. Near miss to mortality ratio was 1.1:1 which means for every 2-3 life threatening condition, there is one maternal death.

Our study has similar results in comparison with some international studies on near miss cases in Brazil and few African countries. [4] [5] [7] we also compared our studies with few recent studies on near miss in health centres in India. These findings are similar to studies done by Yasmin et al. [8] Kamal et al. [9] and Doreswamy et al. [10] where hemorrhage was the most common cause for near miss mortality and hypertensive disorders was the second-most common cause. This complication is preventable and can be managed successfully provided proper treatment protocol is followed. In contrast to our study, a study conducted in Syria showed hypertensive disorder (52%) to be the most common cause followed by hemorrhage and a study in Ethiopia concluded obstructed labor (45%) to be the predominant cause followed by hemorrhage. [11] [12]

CONCLUSION

Our study result indicates that there is a need of better quality antenatal care and extra resources are needed for identification and transport of the women to reach hospital when the women develops complications. The establishment of well-equipped referral units at the periphery level with trained manpower is essential. Delayed diagnosis, inappropriate transfer and inadequate utilization of resources might have been the cause for maternal morbidities and mortalities in our study. As near miss analysis indicates quality of health care, it is worth presenting in national indices and need for development of an effective audit system for both near miss and mortality cases. The audit system will allow us to identify the problems in early stage and we can initiate various corrective measures to reduce morbidity and mortality.

LIMITATIONS

The study has certain limitations like it was conducted on a single center, the population was restricted to a certain district and, hence, could not give the picture of a large geographical area.

INFORMED CONSENT

An informed written consent was obtained from patients/relatives after fully explaining the nature and purpose of study.

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