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Original Research Article

Maternal near miss: a retrospective study in a tertiary care hospital at South India

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ABSTRACT

Background: A maternal near miss (MNM) case 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. MNM situations tend to mirror the causes of maternal death. Hence, review of these cases has been found to help in the assessment of maternal health services. These cases are called as MNM or severe acute maternal morbidity (SAMM) and auditing these cases is called near miss audit (NMA).
Methods: A retrospective study of 201 MNM cases over a period of 12 months from January 2023- December 2023. Demographic data were collected from MNM review form and records. Data studied and analyzed.
Results: There were 11,340 deliveries and 11,126 live births during the study period out of which 201 MNM cases were studied. Haemorrhage followed by anemia was the most common cause of near miss events. The most common age group affected in the near miss cases in the present study was 20 to 35 years (80%). Majority of the cases were referred from the nearby PHCs and government hospitals.
Conclusions: Most maternal deaths are preventable by optimal utilization of existing MCH facilities, identifying the bottleneck in health delivery system, early identification of high-risk pregnancy and therein timely referral to tertiary care centre.

Keywords*:* MNM, Morbidity, WHO criteria, SAMM, NMA

INTRODUCTION

"*Women are not dying because of diseases we cannot treat. They are dying because societies are yet to make the decision that their lives are worth saving*." -Mahmoud Fathalla, WHO.

A maternal near miss (MNM) case 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] MNM is implemented as a new concept that has been used as an adjunct to the investigation of maternal deaths leading to the severe maternal outcome. Maternal death audit is the mainstay of evaluation of maternal health services in countries where there is high rate of maternal mortality. Unfortunately, most maternal deaths occur in unbooked emergency cases that present late to hospital. Near miss cases share many characteristics with maternal death and can directly inform on obstacles that had to overcome after the onset of an acute complication. At the same time, the survivor herself can be a source of information. As surviving a near miss event mainly occurs because of the care provided, inquiring into the events of near miss would boost up the morale of the care providers. Usually, near miss morbidity precedes maternal death. Therefore, identifying and analysing the cases of MNM helps in understanding the factors that determine maternal mortality.

There are many ways of identifying MNM cases using various sets of criteria like disease specific, management specific and organ system dysfunction based. Amongst

these, organ system dysfunction-based criteria have been noted to be epidemiologically sound and less affected by bias in identifying MNM cases.

The causes of Near Miss reflect the causes of maternal deaths. MNM analysis helps us in identifying and preventing risk factors and thus helps in reducing the maternal morbidity and mortality.

In 2009, world health organization (WHO) has developed new system based on organ system dysfunction which incorporates clinical, laboratory and management-based criteria for identifying MNM. It has been then recommended that WHO near miss approach for maternal death be uniformly used in analyzing the cases of near miss maternal mortality.[2] It includes the following:

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 hypo perfusion (lactate >5 mmol/l or >45 mg/dl), severe acidosis (pH <7.1).

Respiratory dysfunction: Acute cyanosis, gasping, severe tachypnea (respiratory rate >40 breaths per minute), severe bradypnea (respiratory rate <6 breaths/min), intubation and ventilation not related to anesthesia, severe hypoxemia (O_2 saturation <90% for ≥60 min/ PAO_2/FiO_2<200).

Renal dysfunction: Oliguria nonresponsive 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 (<50000 platelets/ml).

Hepatic dysfunction: Jaundice in the presence of pre-eclampsia, 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.

METHODS

It is a retrospective study conducted in the department of obstetrics and gynaecology, government Mohan Kumaramangalam medical college and hospital, Salem, Tamil Nadu, India. Ours is a tertiary care institute and a referral hospital for both public and private hospitals in Salem and other surrounding districts in Tamil Nadu. In addition to providing 24-hour emergency obstetric services, the hospital also provides antenatal care and delivery services for both low and high-risk pregnant women. Hospital has 24-hour facility for blood component therapy, high dependency unit (HDU) in labor room complex and intensive care ICU with 24-hour facility for multidisciplinary specialty.

Any patient who met WHO inclusion criteria for maternal near- miss mortality, mentioned above, during the period January 2023 to December 2023 were included in study.

Data have been collected from the patients having NMM event during hospital stay on a pre-designed proforma prepared for study. Patient characteristics including age, parity, gestational age at admission, type of admission, booking status and interventions taken to save the life of patient. Investigations were done for anemia, septicemia, eclampsia and for organ system dysfunction/ failure. Data were collected for determining the nature of obstetric complication, presence of organ system dysfunction and timing of near miss events with respect to admission.

RESULTS

There were 11,340 deliveries, 11,126 live births and 17 maternal deaths during study period. Total no. of near miss cases-201 from January to December 2023 at government Mohan Kumaramangalam medical college, Salem.

Table 1 shows the demographic characteristics of the near miss cases in the present study. The most common age group affected in the near miss cases in the present study was 20 to 35 years (80%). In this study, 91 cases (45.2%) were primipara; 110 (57.4%) cases were multipara. Maximum cases had received ANC care at nearby PHCs and government hospitals (78.1%). Majority of the cases, i.e. 201 cases out of which 99 were in the third trimester and 77 in the postpartum period indicating that late pregnancy and delivery is the worst affected period. Third trimester was the worst time for the pregnant women to land up in life threatening situations as in the present study.

Table 1: demographic characteristics of near miss cases, (n=201).

Characteristics		N	Percentage (%)
Age (In years)	<20	26	12.9
	20-35	161	80
	>35	14	6.96
Parity	Primi	91	45.2
	Multi	110	54.7
ANC care	Yes	157	78.1
	No	44	21.8
Gestational age (weeks)	<13	17	8.45
	13-28	8	3.98
	>28	99	49.25
	Postnatal	77	38.3
	Total	201	100

Table 2: Types of near miss cases.

Characteristics		N	Percentage (%)
Type of admission	Self	15	7.46
	Referral	186	92.53
Near miss	On admission	160	79.6
	After admission	41	20.39
	Total	201	100

From Table 2, there were 186 cases referred from PHCs, government hospitals and nearby medical college hospitals; on the other hand 15 cases were self-admissions. While 79.6% cases were near miss at the time of admission itself. Only 20.39% became near miss cases after admission in our hospital.

The most common cause of near miss events in the present study (Table 3) was hemorrhage- 79 cases (39.2%), followed by anemia-69 cases (34.32%) and hypertensive disorders of pregnancy-62 cases (30%), thrombocytopenia-10 cases (4.97%) and sepsis-6 cases (2.98%).

Table 3: Outcome of near miss cases.

Mode of delivery	N	Percentage (%)
Vaginal delivery	32	15.92
Caesarean section	108	53.73
Laparotomy	16	7.96
Dilatation and evacuation	26	12.93
Caesarean hysterectomy	19	9.45

Table 4: Causes of near miss.

Causes	N	Percentage (%)
Hypertensive disorders		
Severe preeclampsia	26	12.93
Eclampsia	36	17.91
Haemorrhage		
Abortion	26	12.93
Pph	53	26.36
Sepsis	6	2.98
Anemia	69	34.32
Thrombocytopenia	10	4.97

Table 5 shows the properly timed interventions that were secured to the near miss patients which saved their lives. Most of them needed ICU admission (83.5%). Blood and blood products transfusions were needed in 41.29%. Magnesium sulphate therapy was given in 58 cases; they were all cases of eclampsia or severe pre-eclampsia. 29 cases (14.42%) needed ventilatory support. Inotrope support was needed in 13.93%. Hysterectomy was done in 19 cases. Dialysis was done for 11 cases. Many near miss patients needed more than one intervention during their management.

Table 5: Intervention in near miss cases.

Intervention	N	Percentage (%)
Antibiotic administration	152	75.62
Massive blood products transfusion	83	41.29
Inotrope support	28	13.93
Mechanical ventilation	29	14.42
ICU admission	168	83.58
Magnesium sulphate therapy	58	28.88
Hysterectomy	19	9.45
Laparotomy	16	7.96
Dialysis	11	5.47
Anticoagulant therapy	121	60.19
Craniotomy	3	1.49
Insulin infusion	6	2.98
DC shock	3	1.49

Amongst the near miss cases in the present study the most common organ system dysfunction (Table 6) was neurological dysfunction (23.38%), most of them were in cases of eclampsia. Other organ dysfunctions were hematological (9.45%), coagulation dysfunction (8.45%), renal dysfunction (5.47%), uterine dysfunction leading to hysterectomy in 19 cases (22%), hepatic (4.47%), respiratory dysfunction (17.41%) and cardiovascular dysfunction (4.97%).

Table 6: Organ dysfunction in near miss cases.

Organ dysfunction	N	Percentage (%)
Neurological	47	23.38
Cardiac	10	4.97
Respiratory	35	17.41
Coagulation	17	8.45
Haematological	19	9.45
Hepatic	9	4.47
Renal	11	5.47
Uterine	45	22.38

DISCUSSION

In the present study, we identified women with near miss using the WHO criteria. WHO criteria, 2009 are unique in considering not only clinical but also laboratory and management-based criteria.[3] Most of the cases of MNM in this study were in the age group of 20-35 years (80%) which is similar to the other studies conducted in Ethiopia by Gedefaw et al.[4] The majority of cases 79.6% in GMKMCH were near miss on arrival; This same pattern-73% near miss on arrival was observed in the Bolivian study.[5] In a study by Rakesh et al 62.96% patients were multipara.[6] Similarly in our study, 54.7% were multipara (110 cases).

A study conducted in Syria by Almerie et al showed HDP (52%) to be the most common cause followed by hemorrhage.[7] In contrast, The most common cause of near miss events in our study was hemorrhage-79 cases (39.2%), followed by anemia -69 cases (34.32%) and then by hypertensive disorders of pregnancy-62 cases (30%). These findings are similar to studies done by Yasmin et al, Kamal et al and Doreswamy et al.[8-10] 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. Maternal death due to PPH implies a poor obstetric care at the periphery level. One must also ensure timely referral of the complicated cases to tertiary care hospital to reduce the number of near miss and maternal mortality. Hysterectomy was done in 19 cases in our study, whereas it was done in 43 cases in the study conducted by Shrestra et al.[11]

In this study, 71.8% of the cases received antenatal check-up. Remaining 21.8% were unbooked cases reflecting that the community is still unaware of the complications of pregnancy. Other studies done by Naz et al and Oladapo et al also has similar findings.[12,13] In present study, 23.3% involved neurological dysfunction followed by uterine cause which accounts for 22.38%, similar to the study conducted by Yasmin et al.[8]

Access to good quality EmOC (Emergency obstetric care) is another key strategy to improve maternal outcome. Studies have shown the availability and access of EmOC to be below the target coverage levels especially among the poor and less educated women in poorly performing states.[14,15] The state of Tamil Nadu has been successful in observing a significant decline in maternal mortality due to series of initiatives such as skilled birth attendance for all births and making EmOC more available and accessible. The key lesson learnt from the success is to focus on specific evidence-based strategies to reduce maternal mortality.[16]

The limitation of the study is that it is done over a relatively short period (1 year); when done over a span of years it can be useful to assess the efficacy of improvement measures implemented and the long-term effects of MNM morbidity. Another limitation was that, a wide spectra of organ dysfunction cases were referred to our hospital. Yet certain hematological and rheumatological disorders were not considered in this study.

CONCLUSION

The majority of cases (79.6%) in GMKMCH were near miss on arrival, which attribute to failure to recognize the seriousness of the condition-pre hospital delay. Hypertensive disorders, hemorrhage and anemia complicating pregnancy are the leading causes of near miss situations. Previous LSCS and Anemia seem to be risk factors for developing maternal morbidity, which could be reduced by proper anemia correction and vigilant reduction of primary section rate. Two delays remain the decisive factors in maternal mortality. Most of the near miss cases experienced delay in decision to seek health care, which resulted from underestimating the severity of various pregnancy-related conditions. Poor knowledge of the risk of warning signs of pregnancy plays a major part in the delay of management. The establishment of well-equipped referral units at the periphery 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.

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