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Original Research Article

Study of maternal near miss cases at a tertiary centre

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ABSTRACT

Background: When evaluating the quality of a women's health care system, maternal mortality serves as a sentinel occurrence. Since death rates are steadily declining, attention is now being paid to maternal near misses, which characterize severe maternal morbidity and have a shared pathway with mortality.
Methods: This is a retrospective descriptive study carried out in department of obstetrics and gynaecology of Khaja Banda Nawaz University- Faculty of medical sciences, over six months. All women who fulfil the World Health Organisation (WHO) criteria of Maternal Near Miss (MNM) were included in the study. Relevant demographic and obstetric, further course and events leading to maternal near miss were studied. Finally, the indices like maternal near miss incidence ratio, maternal near miss: maternal mortality ratio and mortality index were calculated.
Results: Total 124 women were recognized as near-miss instances out of 812 deliveries that occurred at our institution throughout the 6 months research period. The prevalence of near-miss case was 2.56%. The maternal near-miss to death ratio was 124:2, and the maternal near-miss ratio was 155 per 1000 live births. The most frequent cause of maternal near misses was obstetric haemorrhage, which occurred in 44.1% of cases, while the most prevalent medical co-morbidity was hypertensive condition of pregnancy (60.1%). Referral cases made up the majority of the cases (79.2%).
Conclusions: Analysing maternal near-miss incidents provides valuable insight into our healthcare system. Peripheral emergency obstetric care training contributes to a decrease in maternal morbidity overall and lessens the strain on healthcare system.

Keywords: Maternal near miss, Maternal mortality, Obstetric haemorrhage

INTRODUCTION

A maternal near miss (MNM) occurs when a woman, regardless of where she is or how long she is pregnant, almost dies from a pregnancy or delivery issue within 42 days of the pregnancy ending, but is saved by the care she received or an accident.[1] An essential metric for evaluating the different services offered by medical facilities is maternal mortality. The WHO near miss strategy for maternal health was released in 2011 after the WHO initially established surveillance guidelines for tracking near misses in 2009.[2,3]

The maternal mortality ratio (MMR) has been steadily declining globally, falling from 342 in 2000 to 211 in 2017 per 100,000 live births, a 38% decrease.[4] Although the MMR in Uttar Pradesh was 216/100,000 live births in 2015-2017, it is also decreasing in India, going from 130 in 2014-2016 to 122 in 2015-2017.[5] MMR in India is well below the requirements for achieving the Sustainable Development Goals (SDGs), which nations collaborate to accomplish. The MMR must be lowered to 70 per 100,000 live births in order to meet SDG 3. The bulk of Indian states are still far from it, although many have already accomplished it.[6]

Strengthening health resources is necessary to achieve both national and global objectives. Women who had these near-death experiences went on to die, although their deaths were due to other reasons or to a delay in seeking medical help. Consequently, they have a number of traits in common, particularly risk factors. Near-miss registries offer useful information on the shortcomings in healthcare facilities for pregnant women and assist in identifying the need for improved referral facilities and various health awareness programs. This information can be used to improve the healthcare system in terms of testing facilities, equipment, and personnel. A set of local-specific expert consensus criteria was proposed by India's national technical group in 2014 in an effort to comply with the WHO mandate to start near-miss reviews in all settings in all nations.[7]

Through the proper implementation of the recommendations and the WHO's near-miss concept, we can quickly analyse high-risk pregnant women, develop and execute essential interventions for obstetrical disasters, and create awareness programs for positive outcomes.

We designed this study at our institute to determine the frequency of maternal near misses and to compare the types of near misses and maternal mortality because we are a tertiary care centre in Kalaburagi, Karnataka and receive a vast number of referral cases from most rural areas and marginal areas of other states.

METHODS

This retrospective descriptive study was conducted over a 6 months period (January 2023 to June 2024) at the obstetrics and gynecology department of Khaja Banda Nawaz University- Faculty of medical sciences. From the hospital records, pertinent information on age, parity, gestational age, hospital course, and ultimate maternal and newborn outcomes were examined. The institute's ethics board granted permission to perform this study. This study conducted at Khaja Banda Nawaz University Faculty of Medical Sciences Kalaburagi, Karnataka.

Inclusion criteria

All patients who fulfil the WHO criteria of maternal near miss were included.

Clinical criteria

Acute cyanosis, loss of consciousness lasting >12 hours, gasping, absence of pulse/heartbeat, respiratory rate >40 or <50% for >60 mins, Ph<200 mmHg, lactate >5, creatinine >300 µmol/l or >3.5 mg/dl, acute thrombocytopenia (<50000 platelets), bilirubin >100 µmol/l or >6.0 mg/dl, loss of consciousness and the presence of glucose and ketoacids in urine.

Management-based criteria

Use of continuous vasoactive drugs, intubation and ventilation for >60 mins not related to anaesthesia, hysterectomy following infection or haemorrhage, dialysis for acute renal failure, transfusion >5 U of red cell transfusion requiring cardio pulmonary resuscitation (CPR).

Identification criteria

(Identification criteria where organs/system dysfunction are life threatening condition).

Cardiovascular dysfunction: Shock, cardiac arrest, severe hypoperfusion (lactate >5 mmol/L or >45 mg/dL), severe acidosis (pH>7.1), use of continuous vasoactive drugs, cardio-pulmonary resuscitation.

Respiratory dysfunction: Acute cyanosis, gasping, severe tachypnoea (respiratory rate >40 breaths per minute), severe bradypnea (respiratory rate <6 breaths per minute), severe hypoxemia (O2 saturation <90% for >60min or PAO2/fio2>200), intubation and ventilation not related to anaesthesia.

Renal dysfunction: Oliguria non responsive to fluids or diuretics, severe acute azotemia (creatinine >300 µmol/ml or >3.5 mg/dL), dialysis for acute renal failure, coagulation dysfunction, failure to form clots, severe acute thrombocytopenia (<50,000 platelets/ml) massive transfusion of blood or red cells (>5 units).

Hepatic dysfunction: Jaundice in the presence of pre-eclampsia, severe acute hyperbilirubinemia (bilirubin >100 µmol/L or >6.0 mg/dL).

Neurologic dysfunction: Prolonged unconsciousness or coma (lasting >12 hours), stroke uncontrollable fit/status epilepticus, global paralysis.

Uterine dysfunction: Hysterectomy due to uterine infection or haemorrhage.

Definitions - MNM indicators

Maternal near-miss refers to a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy.

Maternal Death (MD) is the death of a woman while pregnant or within 42 days of termination of pregnancy or its management, but not from accidental or incidental causes.

Live Birth (LB) refers to the birth of an offspring which breathes or shows evidence of life.

Severe maternal outcome refers to a life-threatening condition (that is, organ dysfunction) including all maternal deaths and maternal near-miss cases.

Women with Life-Threatening conditions (WLTC) refers to all women who either qualified as MNM cases or those who died (that is, women presenting a severe maternal outcome). It is the sum of maternal near-miss and maternal deaths (WLTC = MNM + MD).

Severe Maternal Outcome Ratio (SMOR) refers to the number of women with life-threatening conditions (MNM + MD) per 1000 Live Births (LB). This indicator gives an estimate of the amount of care and resources that would be needed in an area or facility [SMOR = (MNM +MD)/LB].

MNM Ratio (MNMR) refers to the number of MNM cases per 1000 live births (MNMR = MNM/LB). Similar to the SMOR, this indicator gives an estimation of the amount of care and resources that would be needed in an area or facility.

Maternal near-miss mortality ratio refers to the ratio between maternal near miss cases and maternal deaths. Higher ratios indicate better care.

Mortality index 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)].

The higher the index the more women with life threatening conditions die (low quality of care), whereas the lower the index the fewer women with life-threatening conditions die (better quality of care).

The following indicators were calculated; maternal near miss, maternal mortality, SMOR, MNM Ratio, MNM: mortality ratio, mortality index.

RESULTS

During 6 months study period, we had a total of 812 deliveries out of which 124 cases fit into our inclusion criteria of maternal near miss with a prevalence rate of 2.54%.

Table 1 explains each case's age, gestational age upon presentation, and booking status. Women in their 20s are the most often impacted age group (20.1%) However, one of the mortality rates were among women under the age of 20, underscoring the fact that adolescent pregnancies are more likely to have negative outcomes. The majority of maternal miss cases (77%) in our study occurred at term, according to gestational age. We received referrals from various primary and urban health centers for the great majority of our cases (54%).

Table 1: Details of age, gestational age and booking status among cases of MNM (n=34) and maternal mortality (n=2).

Variables	MNM (n=124) (%)	Maternal mortality (n=2) (%)
Age in years		
<20	25 (20.1)	1 (50)
>20-30	88 (70.9)	1 (50)
>30	11 (8.82)	-
Gestational age term		
Term	96 (77.4)	1 (50)
28-38 weeks	17 (13.7)	1 (50)
<28 weeks	11 (8.8)	-
Booking status		
Booked	26 (20.7)	2 (100)
Referred	98 (79.2)	

Both the maternal near miss and the maternal mortality columns show this, with 94% of maternal mortality instances involving an inpatient referral for hypertension, diabetes, epilepsy, or anemia that later developed complications that resulted in a maternal near miss status. The majority of our cases (78%) required intensive care unit care and presented to us in a state of severe illness. The other of maternal miss cases were made up of women who had a low-risk pregnancy but later experienced intrapartum and postpartum problems.

Table 2 explains the underlying conditions, their difficulties, and the patients' evolution that resulted in their mother miss situation. In 76% instances, the most prevalent underlying illness was hypertensive disorder of pregnancy. Anemia, hypothyroidism, diabetes, and epilepsy were among the other medical conditions that were observed in 34% instances. The rest of the instances developed complications after being admitted without an underlying disease. Obstetric haemorrhage, which includes early pregnancy haemorrhage from incomplete and septic abortions and ruptured ectopic, antepartum haemorrhage from abruption and placenta previa, postpartum haemorrhage of atonic, traumatic, and thrombotic types, and secondary PPH due to retained tissues, was the most frequent complication that contributed to maternal near-miss states. The maternal intensive care unit was required in (78%).

Table 3 describes the fetal fate and the method of birth. The most common delivery method was caesarean section, which occurred in 60% of cases, compared to vaginal delivery in 35% of cases. Due to ruptured ectopic pregnancy, ruptured uterus, and medically uncontrolled postpartum hemorrhage, 8 patients required laparotomy; 13 of these instances required surgical management in the form of compression sutures, and 1 required obstetric hysterectomy. With 122 of live births, the fetal outcome in our study was positive.

Table 2: Underlying disorders, complications, progression and need for MICU care.

Variables	MNM (n=124)	Maternal mortality (n=2)
Hypertension		
Eclampsia	20 (16.6)	-
HELLP syndrome	2 (1.88)	-
Severe PIH	74 (59.7)	-
Obstetric haemorrhage (OH)		
Atonic PPH	22 (17.1)	1 (50)
Traumatic PPH	8 (6.4)	-
Abruption retained placenta	1 (0.9)	-
Incomplete abortion	2 (1.88)	-
Sepsis	2 (1. 88)	-
Ruptured ectopic	2 (1.88)	-
Ruptured uterus	1 (0.9)	-
Thrombosis	0	-
Medical disorders		
Anaemia	36 (29.2)	1 (50)
Hypothyroidism	12 (9.7)	
Epilepsy	0	
Cardiac disease	9 (7.2)	
Diabetes	4 (3.2)	
Progression of complications		
Shock	0	
Cardiac failure	2 (1.88)	
Respiratory failure	0	
Renal failure	1 (0.88)	
DIC	2 (1.88)	
Septic shock	0	
Embolism	0	
Need for MICU		
Yes	98	2

HELLP-Hemolysis, elevated liver enzymes, low platelet count, PIH-Pregnancy induced hypertension, PPH-Postpartum hemorrhage, DIC-Disseminated intravascular coagulation, MICU-Medical intensive care unit

Table 3: Mode of delivery (for MNM and maternal mortality).

Variables	MNM (n=124) (%)	Maternal mortality (n=2)
Normal delivery	44 (35.4)	1
Caesarean section	75 (60.8)	
Laparotomy	2 (1.88)	
Evacuation	3 (2.7)	
Baby details	Baby details MNM (n=124)	Maternal mortality (n=2)
Live	118 (95.1)	
Dead	2 (1.9)	
Neonatal death	4 (3.2)	

Table 4: Mortality indicators.

Mortality indicators	Number
WLTC	126
SMOR	152.7/1000 live births
MNMR	151.1/1000 live births
Maternal near-miss mortality ratio	124:2
Mortality index	1.58%

Table 4 gives us details about all the mortality indicators. In our study, mortality index was and maternal near miss ratio was 62:1, respectively.

DISCUSSION

This retrospective cross-sectional research of MNM was carried out utilizing the modified WHO near-miss technique and criteria in a tertiary care facility in Gulbarga. Using a variety of indices, this study illustrates the burden of severe maternal outcomes in a tertiary care facility in south India. second women died from maternal mortality throughout the six months research, which included 124 cases of women with life-threatening conditions. In our study, the incidence ratio of maternal near misses was 0.66 per 1000 live births. In contrast to a ratio of 11 per 1000 live births seen in a study carried out in Chhattisgarh by Bansal et al, this result is rather high.[8]

Our study's near miss to mortality ratio is 62:1, meaning that for every 62 near miss cases, there was one maternal death. This is high compared to values like 7.2 in other studies with similar setup.[9-11] Higher ratios indicate better and timely care. This discrepancy may be caused by a higher number of referral cases that come in severe conditions and survive because of timely management. Other studies conducted in other developing countries showed slightly higher values ranging from 18 to 25 per 1000 live births.[9,10]

The ratio recorded by high-income nations, such as Europe, is 117-223:1.8. Over time, if this ratio rises, it indicates that obstetric care has improved.[11] It's possible that these significant discrepancies result from variations in the diagnostic standards applied to find the near-miss cases. In industrialized nations, studies frequently pick cases based on ICU admission or organ-system dysfunction or failure.

We choose clinical criteria that best suited the conditions in our setting, even though organ-system-based criteria are thought to be the most specific and least susceptible to bias. There are numerous benefits to using the clinical criteria approach to characterize our near-miss situations, such as its ease of interpretation and capacity to evaluate the quality of care and complication rate of a certain illness. Similar to our study, where the majority of cases lasted longer than 28 weeks, Roopa et al found that women who experienced "near miss" outcomes at the

corresponding postnatal ages were 17 (12.9%), 6 (4.6%), 75 (57.2%), and 33 (25.1%) for gestational ages 1-12, 13-28, and >28 weeks.[6]

Another study by Shrestha et al in Kathmandu found that 11 (30.5%), 6 (16.66%), 10 (27.77%), and 9 (25%) of the pregnant women with a gestational age of 28 weeks and postpartum period fell into the near miss category.[9] Investigating the underlying causes of maternal near misses, we found that the most prevalent underlying medical condition linked to MNM in our analysis was hypertensive disorder of pregnancy, which was present in (47.1%) instances

Other research done in Nepal, Sudan, and Zealand showed similar results.[11-16]Jharkhand, Manipal, and New Compared to severe pre-eclampsia, eclampsia has a higher mortality rate, and hypertensive problems are a key cause of high morbidity. With multiple seizures that progressed to near misses and even death, the majority of eclamptic patients were either unbooked cases or late referrals. This reaffirms the need of routine prenatal care and bolstering primary health facilities.

Two deaths in all were noted during our investigation. OH secondary to PPH and anemia was the primary reason. In our configuration, the maternal MI was 0.2. Manipal's analysis reveals 5.6:1. A relatively high MI of 60:1 was found in a research conducted in Syria.[17] Women with life-threatening conditions die at a higher rate when the MI is higher (poor quality of treatment); conversely, a low index indicates higher quality of care. This suggests that in order to combat postpartum hemorrhage, efforts should be concentrated on enhancing the procedures and available resources.

In order to lower maternal mortality, resources must be directed toward preventing eclampsia and hemorrhage at the primary healthcare level and bolstering secondary and tertiary care centers' capacity to treat these conditions. Health education may significantly enhance the standard of obstetric care in addition to raising personal health awareness. In conclusion Near-miss incidents are more frequent than mortality instances and have many traits in common with maternal deaths. As a result, they can give further details on the challenges that need to be overcome and enable remedial measures to be implemented in order to lower mortality and chronic morbidity.

Since most near-miss incidents involve high-risk pregnancies, better prenatal care can aid in the early detection of pre-eclampsia and other high-risk pregnancies. Maternal outcomes can be improved by referring such situations right away. Creating standard guidelines to prevent and manage postpartum hemorrhage, emphasizing the importance of active management of the third stage of labor, is another action that can be performed. Emergency Obstetric Care (EmOC) training for basic healthcare providers can also significantly lower maternal morbidity by promptly identifying issues, offering early care, and making timely referrals. An efficient audit system is required to examine the causes and handling of near-miss and fatality occurrences.[18]

CONCLUSION

Near miss cases share many characteristics with maternal deaths and are seen more commonly than mortality cases. Thus, they can provide more information about obstacles to be crossed and allows for corrective action to be taken to reduce mortality and long-term morbidity. As a majority of the cases of near miss occur in high risks cases, improving antenatal care can help in the early identification of high risks pregnancies including pre-eclampsia. Immediate referral of such cases can improve maternal outcome. Another measure that can be taken is to develop standard protocols to prevent/manage post-partum haemorrhage, highlighting the role of active management of third stage of labour. Training primary health care professionals in Emergency Obstetric Care (EmOC) can also play a major role in reducing maternal morbidity by quick recognition of complications, provision of initial management and prompt referral on time. There is a need for an effective audit system to look into aetiology and management of near miss and mortality cases.

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