A Review of Maternal Near Miss Cases in Selected Hospitals in North-East India

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Abstract

Background: The major causes of maternal near miss (MNM) and maternal death (MD) are similar, so review of MNM cases is likely to yield valuable information regarding severe morbidity, which, if untreated may lead to maternal mortality. Objectives: The objective is to determine frequency of near miss cases and identify the risk factors associated with MNM. Materials and Methods: A cross-sectional study was done from June 2015 to October 2017 in three hospitals in Manipur and Nagaland. All cases of MNM, which occurred during this period, were included and were reviewed using their records. Family members and health care providers of 9 recent cases were interviewed. Data collected were coded and relevant themes were identified. Results: There were 32,110 deliveries, 147 near miss cases and 12 MDs, resulting in maternal mortality ratio of 38/100,000 live birth (LB), severe maternal outcome ratio of 5/1000 LB and MNM ratio of 4.6/1000 LB. MNM to mortality ratio was 12.2:1 and mortality index was 7.5%. 83% of the cases of MNM were pregnancy related while 15.6% were related to preexisting disorders. The three delays remain the decisive factors in maternal mortality. Conclusion: 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.

Keywords: Delays, maternal death, maternal near miss, mortality index, North-East India, severe maternal outcome ratio

INTRODUCTION

Maternal mortality has been used to evaluate and improve the quality of maternal health care in many countries. Since 1990, MMR has declined by 45% worldwide, and most of the reduction has occurred since 2000.[1] At the country level, in India, the MMR status is at 130 (2014-2016) a decline from 437/100,000 live birth (LBs) in 1990.[2] Despite the global progress made, India (17%) and Nigeria (14%) accounted for one third of global maternal deaths (MDs) and missed the target set by MDG 5, i.e., MMR <150/lakh LBs.[3] The global MDG targets thus not achieved, now the task has been taken over by sustainable development goals, Goal 3 (Target 3.1) which has set a global target to reduce MMR to <70/lakh LBs by 2030.[4]

Women who survive life-threatening conditions arising from complications related to pregnancy and childbirth have many common aspects with those who die of such complications and this similarity led to the development of the near-miss concept in maternal health. Hence, the notion of maternal near miss review was introduced in maternal health care to complement information obtained with review of MDs.[5] Near miss cases are more common than MDs.[6] Moreover, the major reasons and causes are same for both, so review of MNM cases is likely to yield valuable information regarding severe morbidity, which, if untreated may lead to maternal mortality. Thus, this study was planned to determine the frequency of MNM and identify the risk factors of MNM.

MATERIALS AND METHODS

A cross-sectional study was conducted from June 2015 to October 2017 in two tertiary teaching hospital in Manipur and one hospital in Nagaland, catering to patients coming...
with serious complications in almost all of Manipur and Nagaland, respectively. The study population were MNM cases identified from the records. Cases were those who met minimum 3 criteria– one from clinical findings (either signs or symptoms), investigations and interventions done or any single criterion, which signifies cardio respiratory collapse, according to the National Health Mission MNM-Review Operational Guidelines 2014.[7]

Sample size and sampling
All cases of Near-Miss which occurred in the 1½-year period were included for calculating frequency of MNM. Nine cases were identified and interviewed face to face for more details considering the different geographical spread of the states – Urban, Rural, and Hill area. Interview was conducted at the time of discharge of the women. The questions explored were: efforts to seek care, accessibility of health services and problems encountered during the management of cases. Any unclear information was clarified with the respondents.

Data handling and analysis
A data abstraction form was used. Information included socio-demographic background, reproductive characteristics and maternal outcome. Collected data were entered into IBM SPSS Statistics for Windows, Version 21.0.IBM Corp. Armonk, NY). For quantitative analysis, descriptive statistics such as mean, standard deviation, and percentages were used. For Qualitative analysis data collected were coded and relevant themes were identified.

Ethical approval
Ethical approval was obtained from the Institutional ethics committee in RIMS, Imphal. Permission for the study in Jawaharlal Nehru Institute of Medical Sciences, Imphal and Naga Hospital Authority, Kohima, before the beginning of the study, were obtained from the concerned authority.

Results
Overall Maternal Mortality Ratio across the three hospitals was 38/100,000 LB. Maternal Near Miss indicators were as shown in Table 1. The mean age of the cases was 28.98 ± 6.04 years Obstetric characteristics and underlying causes of near miss cases were as shown in Tables 2 and 3 respectively.

Nine recent cases were identified and interviewed for more details considering the different geographical spread of the cases.

The three delays remain the main decisive factors in maternal mortality

Delay in seeking health care
Only in two cases decision to seek care was taken by the cases themselves. For the rest of the cases, the decision to visit the health facility was taken by the husband along with the relatives.

A 33-year-old case described:
“I looked very pale, my legs and body was swollen. I was having difficulty sleeping and I preferred to sit. But I just thought these things are normal, but my husband decided that I better go to the hospital.”

One 37-year-old case explained the lack of people to help out at home was the reason for delay in seeking health care.

“My first child is very young and there is no one to take care of her. Our ASHA visited sometimes and brings me medicines so I thought that is enough, so I didn’t go to hospital.”

One 26-year-old case gave lack of resources in terms of finance and thus their preference of home delivery.

“We wanted to deliver at home. We don’t have enough money to go to the hospital.”

Lack of information and knowledge about the complications of pregnancy was also elicited from a 45-year-old case.

“Previously, all the deliveries were done at home in the village. We didn’t think there will be any problems this time.”

Delay in reaching health care
Most of the cases reached the hospital by public transport. Only one case reached the health care facility by private car and another by ambulance provided by the hospital from where they were referred.

“We requested our neighbour to arrange for auto the next morning” (husband of 38-year-old case).

“The doctor from previous hospital arranged ambulance to bring us here” (husband of 33-year-old case).

“It was already 2 days she was in labour, but it is impossible to get any transportation at night in our village. So we had to catch taxi next morning only” (husband of 48-year-old near miss case).

Delay in receiving health care
In half of the cases, there was a delay in referring the patients from peripheral health care center. Most of the responses from health care providers dwelt on the lack of trained personnel in the peripheral centers leading to delay in the management of the cases.

“If the hospital which referred her had been equipped for caesarean section operation, early intervention would have avoided further deterioration of the patient.” (Health care worker attending the case).

“Peripheral hospitals should be better equipped with health care facilities and trained staffs” (Health care worker attending the case).

Discussion
The incidence of MNM described in the literature varies widely due to variations in criteria used to identify MNM cases. With the standardization of MNM criteria proposed by the WHO in 2009, the chances of missing a case was minimized as it considered all clinical, laboratory and management-based criteria. This study uses a criteria for Indian set-up, which was developed by Ministry of Health and Family Welfare, India in 2014.[7]
The MNM incidence ratio (MNMR) is 4.6/1000 LBs in this study, comparable to study done by Lotufo et al.\[13\] and Baral et al.\[19\] in Nepal with near miss ratio of 4.4 and 4.5 cases per 1000 LBs respectively. On the other hand, the incidence ratio was comparatively higher in some studies.\[14‑16\] In this study, SMOR is 5 per 1000 LB which is similar to studies done by Jabir et al.\[17\] and Ranatunga et al.\[19\] Other study by David et al.\[19\] and Amin et al.\[20\] had a much higher SMOR. As both these indicators, i.e., MNMR and SMOR give an estimate of the amount of care and resources that would be needed in an area or facility this probably reflects the reasonably good facilities and resources.

In this study, MNM mortality ratio is 12.2:1. This indicates that for every 12–13 women who survived life-threatening complications, there is one death. Other studies found that the MD to near-miss ratio was 1:7, 1:5, and 1:3, respectively.\[9,21,22\] This ratio is indicative of the standard of obstetrical care the unit offers. This is in contrast to what is observed in developed countries of the world. Studies carried out in Europe\[10,25,24\] revealed a ratio of 1:117–223. If this ratio increases over a period of time, it reflects the improvement achieved in the obstetric care. So instead of a single estimation, yearly estimation may help us in improving the care provided.

The overall MI in this study is 7.5%. Studies conducted at Brazil and Iraq shows similar findings with MI of 11.03% and 10.4%, respectively.\[12,17\]

Our study shows a low MI, which indicates the adequate quality of obstetric care for the severe cases. This may be due to the fact that the hospitals in the study are tertiary hospitals and there are sufficient resources for obstetric care, such as blood bank and operation room.

In this study, direct obstetric cause for near miss case accounts for 83% of the cases. Similar finding was found in a study done by Prual et al. (92.9%).\[25\]

Majority of the underlying cause of near miss case in this study was due to obstetrical hemorrhage (48.3%), followed by hypertension (32%) and pre-existing cardiac dysfunction which was aggravated by pregnancy in 9.5% of the cases. These findings are similar to studies done by Yasmin et al.\[16\] Kamal et al.\[26\] and Doreswamy et al.\[27\] 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. MD 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. 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.\[28,29\]

A qualitative approach was done to explore the risk factors in maternal mortality. In this study most of the near miss cases

### Table 1: Maternal near miss indicators at three tertiary care centres

| MNM indicators | Total |
|----------------|-------|
| Number of deliveries | 32,110 |
| Number of live births | 31,762 |
| Number of near-miss cases | 147 |
| Number of maternal deaths | 12 |
| SMOR ([MNM+MD]/1000 LB) | 5.0 |
| MNM (MNM/1000 LB) | 4.6 |
| MNM-MR (MNM: 1 MD) | 12.2:1 |
| MI (MD/[MNM+MD]) | 7.5% |

MNM: Maternal near miss, SMOR: Severe maternal outcome ratio, MNMR: MNM ratio, MNM-MR: MNM to mortality ratio, MD: Maternal death, LB: Live birth, MI: Mortality index

### Table 2: Obstetric characteristics of maternal near miss cases in three tertiary care centres

| Characteristics | Total (n=147), n (%) |
|-----------------|---------------------|
| Age (years), mean±SD | 28.98±6.04 |
| Parity (n=147) | |
| Primipara | 44 (29.9) |
| Multipara | 91 (61.9) |
| Grand multipara | 12 (8.2) |
| ANC (n=147) | |
| Received | 61 (41.5) |
| Not received | 86 (58.5) |
| Total number of ANC received (n=61) | |
| <4 | 34 (55.7) |
| ≥4 | 27 (44.3) |

SD: Standard deviation, ANC: Antenatal care

### Table 3: Underlying causes of near miss cases in three tertiary care centre (n=147)

| Cause of MNM | Underlying cause | n (%) |
|--------------|-----------------|-------|
| Pregnancy specific obstetric and medical disorders | Haemorrhage | 71 (48.3) |
| | Hypertension | 47 (32) |
| | Sepsis | 3 (2) |
| | Postpartum collapse | 1 (0.7) |
| Preexisting disorders aggravated during pregnancy | Cardiac dysfunction | 14 (9.5) |
| | Anaemia | 4 (2.7) |
| | Hepatic dysfunction | 4 (2.7) |
| | Renal dysfunction | 1 (0.7) |
| Incidental and accidental causes in pregnancy | Infections | 2 (1.4) |

MNM: Maternal near miss

In this study, 41.5% of the cases received antenatal check-up, out of which 44.3% of them had adequate number of ANC. Majority of the cases, i.e., 68.7% were unbooked cases reflecting that the community is still unaware of the complications of pregnancy. Other studies done by Naz et al.\[9\] and Oladapo et al.\[29\] also has similar findings.

A wide range is reported for MNM ratio from studies of other developing countries (12.3–82.3/1000 deliveries).\[10,11\] The disparity in prevalence of near-miss cases is possibly due to difference in definition and identification of cases.
experienced either phase one (delay in seeking health care) and phase two delays (delay in reaching health facility) which resulted from underestimating the severity of various pregnancy-related conditions, lack of available transport particularly for problems occurring in the night as well as first seeking care from a facility that is ill-equipped to provide emergency obstetric care. Poor knowledge of risk associated with various pregnancy-warning signs as well as the failure of peripheral health facilities to provide emergency obstetric services played a major part in the delay of management.

**CONCLUSION**

The three 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 play 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.

**RECOMMENDATIONS**

Along with increased awareness of one’s own health, health education may go a long way in improving the quality of obstetric care. The near miss to mortality ratio is an indicator of quality of obstetric care. If this ratio increases over a period of time, it will reflect on the improvement achieved in obstetric care. So we recommend yearly estimation of this ratio instead of a single estimation, which may help us in improving the care provided.

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**Conflicts of interest**

There are no conflicts of interest.

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