Original Article

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Severe Acute Maternal Morbidity (Near Miss) in a Tertiary Care Center in Maharashtra: A Prospective Study

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Abstract

Introduction: Maternal near miss (MNM) has emerged as an adjunct to the investigation of maternal deaths as the two represent similar pathological and circumstantial factors leading to severe maternal outcome.

Materials and Methods: A prospective observational study, conducted in Indira Gandhi Government Medical College and Hospital, a tertiary care center, from July 2014 to June 2015. The patients were classified as near miss based on disease specific, organ system dysfunction, and management criteria.

Results: The total number of near miss cases was 98. The prevalence of MNM was 2.19%. The mean ± standard deviation of age in the present study was 27.84 ± 3.43 years. Majority of cases were nullipara, i.e., 33.68%. Most of the cases were of rural area 63.26%, had received only primary education at 62.25%, were of lower socio-economic status at 66.33%, were unbooked at 80.62%, and 69 cases were referred from periphery. In the present study, out of 98 cases, 88 were antenatal, of which 52 were above 37 weeks of gestation. Majority of cases were delivered by cesarean section, i.e., 46.93%. Hypertensive disorder of pregnancy was the most common factor causing near miss at 51.02%, others were obstetric hemorrhage at 43.87%, maternal medical disease at 13.26%, and obstetric sepsis at 3.06%. Vascular and coagulation system dysfunction was the most common, i.e., 28.57% followed by cardiac, 21.42%; respiratory, 19.38%; immunological, 12.24%; hepatic, 8.16%; cerebral, 6.1%; and renal dysfunction, 5.1%. About 64.28% patients required intensive care unit admission. Multiple management strategies including platelet and blood transfusions, vasopressors, furosemide, mechanical ventilation, dialysis, and hysterectomy were required.

Conclusion: MNM is associated with low level of education, low socio-economic status, rural population, low parity, referred cases, and unbooked cases. Hypertensive disorders are still the most common cause of MNM. A multidisciplinary approach is the need of the hour to tackle the problem of MNM.

Key words: Maternal morbidity, Maternal near miss, Tertiary care center

INTRODUCTION

Maternal mortality is one of the important indicators used for the measurement of maternal health. Improvement of maternal health is one of the millennium development goals (MDG), MDG 5 with Target 5 A that calls for the reduction of maternal mortality ratio by three quarters between 1990 and 2015.[1]

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."

Maternal mortality is frequently described as "just the tip of the iceberg" indicating that there is a vast base to the iceberg in the form of MNM, i.e., maternal morbidity which has remained largely undescribed.

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MNM has emerged as an adjunct to investigation of maternal deaths as the two represent similar pathological and circumstantial factors leading to severe maternal outcome. As the number of MNM cases is more than the maternal deaths, and the cases are alive to directly inform on problems and obstacles that had to be overcome during the process of health care, they provide useful information on the quality of healthcare at all levels. Thus, there is a need for application of the maternal near miss concept for the assessment of maternal health and quality of maternal care.[2,3]

Near miss audit has been considered a better approach than maternal death audit, and can be used to identify what need to be done to improve the quality of maternal health care. Compared with maternal death review, the fear of blame and punishment is less in near miss review, so, if a near miss review is performed effectively, it can in practice more easily lead to implementation of changes that will improve the quality of services. Near miss cases generally occur more frequently than maternal deaths and therefore a more reliable quantitative analysis can be carried out, which can provide a more comprehensive profile of health system functioning.

Identification of the obstacles and gaps in the health system and a co-ordinated approach to resolve these can ultimately lead to an improved health system. Near miss cases have similar pathways as maternal deaths, with the advantages of offering a larger number of cases for analysis, greater acceptability of individuals and institutions since death did not occur, and the possibility of interviewing the woman herself.

The most vital purpose of the near miss approach is to improve clinical practice and reduce preventable morbidity and mortality through the use of best evidence-based practices.

Hence, we have undertaken this study in our institute, being a tertiary care center catering to a population of not only our district, but nearby states also.

MATERIALS AND METHODS

The present study was conducted in Indira Gandhi Government Medical College and Hospital, a tertiary care center, from July 2014 to June 2015. Permission from Institutional Ethical Committee was taken. The present study was a prospective observational study.

The total number of deliveries during this period was 4571. The total number of near miss cases in the above study period was 98. The patients were classified as near miss based on disease specific, organ system dysfunction, and management criteria mentioned below:

Case Definition

"A woman who nearly died but survived a complication that occurred during pregnancy, childbirth, or within 42 days of termination of pregnancy."

The primary obstetric and non-obstetric conditions (the initiating obstetric event): The primary obstetric factors that probably initiated the trail of events leading to near miss are:

1. Hypertension
2. Antepartum hemorrhage (APH)
3. Post-partum hemorrhage (PPH)
4. Pregnancy-related sepsis
5. Abortion-related sepsis
6. Abortion with uterine trauma
7. Ectopic pregnancy
8. Maternal medical disease
9. Anesthetic complication.

Organ dysfunction or failure (list of organ systems involved in the disease): The markers of dysfunction of each organ system are:

Patient-based

A. Cardiac dysfunction
   1. Pulmonary edema, a clinical diagnosis requiring intravenous (IV) furosemide or intubation
   2. Cardiac arrest.

B. Vascular dysfunction: Hypovolemia requiring >5 units whole blood or packed red cells for resuscitation

C. Immunological dysfunction
   1. Intensive admission for sepsis
   2. Emergency hysterectomy for sepsis.

D. Respiratory dysfunction
   1. Intubation or ventilation for >60 min for any reason other than general anesthesia
   2. Oxygen saturation on pulse oximetry <90 for >60 min
   3. PaO_2/FiO_2 <200 (partial pressure of O_2 in arterial blood to percentage O_2 in inspired air).

E. Renal dysfunction
   1. Oliguria <400 ml/h not responding to IV rehydration or attempts at using furosemide/dopamine
   2. Blood urea >15 mmol/L or of creatinine <400 mmol/L (serum creatinine 3.5 mg/dl).

F. Liver dysfunction
   1. Jaundice in the presence of pre-eclampsia (140/90 with >1 + proteinuria).

G. Metabolic dysfunction
   1. Diabetic ketoacidosis (DKA)
   2. Thyroid crisis.

H. Coagulation dysfunction: Acute thrombocytopenia requiring platelet transfusion

I. Cerebral dysfunction
   1. Coma >12 h
   2. Sub-arachnoid hemorrhage/intracranial hemorrhage.

Management-based

A. Intensive care admission; for any reason
B. Emergency hysterectomy; for any reason
C. Anesthetic accidents
D. Severe hypotension with spinal/epidural anesthesia (<90 for 60 min)
E. Failed tracheal intubation requiring anesthetic reversal.

RESULTS

The present study was conducted in a tertiary care center from July 2014 to June 2015. The total number of deliveries during this period was 4571. The total number of near miss cases in the above study period was 98. The patients were classified as near miss based on disease specific, organ system dysfunction, and management criteria. The prevalence of MNM cases reported in this study was 2.19%.

Mean ± standard deviation (SD) of age in the present study is 27.84 ± 3.43 years. Majority of the cases were nullipara, 33 cases (33.68%); 26 cases (26.54%) were primipara, followed by 39 (39.78%) cases who were multipara. Most of the cases, in this study, 62 (63.26%) were from rural area, while 36 patients (36.73%) were from urban area. In this study, majority of patients, i.e., 61 cases (62.25%) had received their primary education followed by 16 cases (16.32%) who had received secondary education, and only 4 cases (4.08%) who had received higher secondary education and above. There were 17 (17.34%) patients who were illiterate. In the present study, 36 cases (36.74%) belonged to urban area and were classified according to Kuppuswamy (1976) classification, 19 out of 36 cases who belonged to urban area were of middle socio-economic class and 17 of 36 cases belonged to lower socio-economic class. About 62 from 98 cases (63.26%) belonged to rural area and were classified according to Prasad classification. Majority of the rural population, i.e., 48 cases (48.98%) belonged to lower socio-economic class and the rest of the 14 cases (14.28%) belonged to middle socio-economic class. None of them were in upper socio-economic class. In the present study, out of 98 cases, antepartum admissions were 88 (89.8%), post-partum cases were 8 (8.16%), and post-abortion cases were 2 (2.04%). In the present study, 52 (59.09%) of 88 antenatal patients were beyond 37 weeks, 31 (35.32%) cases were between 33 and 36 weeks, 4 (4.55%) patients were between 29 and 32 weeks, while in 1 (1.14%) patient who belonged to <28 weeks group, the gestational age was 14 weeks. Majority of the cases were unbooked, 79 (80.62%) cases in the present study. Out of 98 cases, 69 cases were referred to our institute. Remaining 29 cases were admitted in our institute directly. Out of 29 cases, 28 were unbooked whereas 1 case was booked in our institute. Out of 69 referred cases, 18 cases were booked and 51 cases were unbooked. Majority of the cases, i.e., 42 (60.87%) were referred from district hospital, out of which 32 cases were unbooked amounting to 46.38%, followed by 15 cases (21.74%) which were referred from rural hospital, booked being 10 (14.49%). Next in order of frequency was referral from primary health center, i.e., 10 cases (14.5%), 7 being unbooked (10.15%). Only 2 cases (2.89%) were referred from private hospital which were unbooked. In the present study, maximum number of cases (46) was delivered by cesarean section amounting to 46.93%. Next in order of frequency were patients who delivered vaginally, that is, 44 (44.89%). 3 patients had abortion, one aborted in our institute while 2 had undergone abortion in rural health center and were referred as post-abortal sepsis. And, the remaining 5 cases were undelivered amounting to 5.12% (Table 1).

In the present study, more than two obstetric events occurred concurrently in the same patient. Hypertensive disorder of pregnancy was a major obstetric factor, that is, 50 patients (51.02%), out of these, 29 (29.59%) had severe pre-eclampsia, 16 (16.32%) had eclampsia, and 5 (5.1%) had HELLP. Next in order of frequency were cases of obstetric hemorrhage, total being 43 (43.87%), out of 43 patients, 12 had APH amounting to 12.24%, 28 (28.57%) had PPH, and 3 cases (3.06%) were of rupture uterus. There were 3 cases of obstetric sepsis. Among nonobstetric conditions, one MNM case suffered from complicated malaria. There were 2 cases of viral hepatitis with hyperbilirubinemia. There were 3 MNM cases who suffered from dengue, 3 MNM cases who had H1N1 influenza, and 4 cases of sickle-cell disease in crisis (Table 2).

In our study, majority of near miss cases, i.e., 28 of 98 (28.57%) had vascular dysfunction and coagulation dysfunction. The treatment modalities adopted for the management of vascular dysfunction were massive blood transfusion in 19 cases and obstetric hysterectomy was done in 9 cases to control the bleeding. Out of 28 cases,

25 patients required vasopressors to tide over the shock. The next organ system dysfunction was cardiac dysfunction (pulmonary edema) occurring in 21 cases of 98. The next organ system dysfunction was respiratory dysfunction, that is, 19 of 98 cases.

There were 12 cases of immunological dysfunction, out of which 3 had obstetric sepsis while 9 cases had nonobstetric source of infection. Out of 9 cases, 1 had malaria, 3 had dengue, 3 had H1N1 influenza, and 2 had viral hepatitis. There were 8 cases of hepatic dysfunction, the marker for which is jaundice in severe pre-eclampsia or acute hyperbilirubinemia. There were 6 cases of cerebral dysfunction with hypertensive disorder of pregnancy as a primary obstetric factor. Out of these, 4 had subarachnoid hemorrhage while in 2 cases coma lasting for more than 12 h (Table 3).

Table 1: Demographic parameters

Demographic parameters	Observations (%)
Total number of deliveries at tertiary care institute during the study period	4571
Total number of near miss cases	98
Prevalence	2.19 per 100 deliveries
Mean±SD of age	27.84±3.43 years
Nullipara	33 (33.68)
Primipara	26 (26.54)
Multipara	39 (39.78)
Rural	62 (63.26)
Urban	36 (36.73)
Booked	19 (19.38)
Unbooked	79 (80.62)
Illiterate	17 (17.34)
Primary school	61 (62.25)
Secondary school	16 (16.33)
Higher secondary school and above	4 (4.08)
Lower socio-economic status	Urban 17 (17.35), rural 48 (48.98)
Middle socio-economic status	Urban 19 (19.38), rural 14 (14.28)
Place of referral	
PHC	10 (14.5)
Rural hospital	15 (21.74)
District hospital	42 (60.87)
Private hospital	2 (2.89)
Pregnancy status of near miss cases	
Antepartum	88 (89.8)
Post-partum	8 (8.16)
Post-abortion	2 (2.04)
Gestational age (weeks) (*n*=88)	
<28	1 (1.14)
29-32	4 (4.55)
33-36	31 (35.32)
>37	52 (59.09)
Mode of delivery	
Vaginal	44 (44.89)
Cesarean section	46 (46.93)
Abortion	3 (3.06)
Undelivered	5 (5.12)

SD: Standard deviation, PHC: Primary health center

In the present study, multiple management measures were often required in the same patient. There were 63 cases which required intensive care unit (ICU) admissions as they could not be managed in obstetric wards and labor rooms. About 28 MNM cases required platelet transfusions due to coagulation dysfunction. About 25 MNM cases required vasopressors to tide over the shock. About 21 cases of hypertensive disorder of pregnancy and obstetric hemorrhage had cardiac dysfunction (pulmonary edema), hence were treated with IV furosemide. There were 19 cases of obstetric hemorrhage with or without severe pre-eclampsia which required massive blood transfusion. There were 13 cases of respiratory dysfunction with SpO_2 <90 for more than 60 min who were intubated and mechanically ventilated. There were 9 MNM cases who had undergone obstetric hysterectomy. Out of 9 cases, 6 cases had PPH, 1 case had APH, and 2 cases had rupture uterus as the primary obstetric event. There were 5 MNM cases with raised serum creatinine of >3.5 mg/dl who responded to renal dialysis (Table 4).

In the present study, there were 60 cases who fulfilled laboratory criteria of near miss. There were 28 cases of

Table 2: Distribution of cases according to underlying obstetric and non-obstetric conditions (*n*=98)

Primary obstetric factor	Number of cases (%)
Hypertensive disorders in pregnancy	50 (51.02)
Severe pre-eclampsia	29 (29.59)
Eclampsia	16 (16.32)
HELLP syndrome	5 (5.1)
Obstetric hemorrhage	43 (43.87)
APH	12 (12.24)
PPH	28 (28.57)
Rupture uterus	3 (3.06)
Obstetric sepsis	3 (3.06)
Maternal medical disease	13 (13.26)
Hepatitis	2 (2.04)
H1N1 influenza	3 (3.06)
Sickle-cell disease in crisis	4 (4.08)
Dengue	3 (3.06)
Malaria	1 (1.02)

APH: Antepartum hemorrhage, PPH: Post-partum hemorrhage

Table 3: Distribution of cases according to organ system dysfunction (*n*=98)

Organ system dysfunction	Number of cases (%)
Vascular	28 (28.57)
Coagulation	28 (28.57)
Cardiac	21 (21.42)
Respiratory	19 (19.38)
Immunological	12 (12.24)
Hepatic	8 (8.16)
Cerebral	6 (6.1)
Renal	5 (5.1)

coagulation dysfunction in whom platelet counts were <50,000/cumm. This was the most common laboratory criterion amounting to 46.66%. SpO_2 <90 for >60 min occurred in 19 of 98 MNM cases, they were cases of respiratory dysfunction treated in ICU. Serum bilirubin >6 mg/dl was found in 8 cases, out of them 3 cases had eclampsia as primary obstetric event, 2 cases were of viral hepatitis, one case was of complicated malaria, and 2 cases were of sickle-cell disease in crisis (Table 5).

In the present study, maximum near miss cases, 73 (74.48%) recovered in 9-14 days in our institute. The mean ± SD. hospital stay in this study was 13.44 ± 2.19 days. The range of duration of hospital stay was 8-22 days (Table 6).

In the present study, out of 98 MNM cases, 63 required ICU admission. The mean ± SD. duration of ICU stay was 5.49 ± 1.95 days. The range of ICU stay was 2-11 days. The maximum number of cases, 36 (57.14%) stayed in ICU for 5-8 days (Table 7).

DISCUSSION

The total number of deliveries during the 1 year study period in the Department of Obstetrics and Gynecology were 4571. The total number of near miss cases in the study period was 98. The patients were classified as near miss based on disease specific, organ dysfunction, and management criteria. Hence, the prevalence of MNM cases reported in this study was 2.19%. Reena *et al.*,[4] reported a prevalence of 3.4% MNM based on disease-specific criteria in a tertiary care hospital in Thrissur, Kerala. Chhabra *et al.*,[5] reported a prevalence of 3.3% in a pilot study on MNM cases in a tertiary care center in Delhi.

Near miss cases admitted in our tertiary care institute were mostly in the age group of 26-30 years, which amounts to 58.17% of the total. Mean age of patients in our study was 27.84 years, which is comparable to a study conducted by Roopa *et al.*,[6] i.e., mean ± SD of 27.3 ± 4.75 years.

In the present study, majority of MNM cases were multipara, 62.24% followed by nullipara, 33.68%, and the least being grand multipara, 4.08%, comparable to Kalra and Kachhwaha[7] (multipara, 67.8%; nullipara, 23.2%; and grand multipara, 8.92%) and Shrestha *et al.*,[8] (multipara, 66.4%; nullipara, 30.5%; and grand multipara, 2.71%).

In the present study, majority of MNM cases, i.e., 63.26% resided in rural area and the rest 36.74% in urban area similar to Litorp *et al.*,[9] (41% semiurban and 34% urban).

In the present study, majority of MNM cases, i.e., 62.25% had their primary education completed, followed by 16.33% MNM cases with their secondary education being done and 4.08% with their higher education completed. There were 17.34% MNM cases who were illiterate. Bashour *et al.*,[10] found that 80% of MNM cases in Lebanon (Rafik Hariri University Hospital) had received primary education while the rest 20% had received secondary education.

In the present study, 36 cases (36.74%) belonged to urban area and were classified according to Kuppuswamy (1976) classification, majority of MNM cases, i.e., 19.38% who belonged to urban area were of middle socio-economic class. Rest, i.e., 68 (63.26%) belonged to rural area were classified according to Prasad classification. Majority of the rural population, i.e., 48.98% belonged to lower socio-economic class. None of them were in

Table 4: Distribution of patients according to management in near miss cases

Criteria	Number of cases (%)
ICU admission	63 (64.28)
Platelet Transfusion	28 (28.57)
Use of vasopressors	25 (25.51)
IV furosemide	21 (21.42)
Massive blood transfusion	19 (19.38)
Mechanical ventilation	13 (13.26)
Obstetric hysterectomy	9 (9.18)
Need of dialysis	5 (5.1)

ICU: Intensive care unit, IV: Intravenous

Table 5: Distribution of patients fulfilling laboratory criteria of MNM cases (*n*=60)

Criteria	Number of cases (%)
Platelet counts<500,00/cumm	28 (46.66)
SpO_2<90 for more than 60 min	19 (31.66)
Serum bilirubin>6 mg/dl	8 (13.34)
Serum creatinine>3.5 mg/dl	5 (8.34)
Total	60 (100)

MNM: Maternal near miss

Table 6: Duration of hospital stay (*n*=98)

Duration (days)	Number of cases (%)
<8	1 (1.04)
9-14	73 (74.48)
>15	24 (24.48)
Total	98 (100)

Table 7: Duration of ICU stay (*n*=63)

Duration (days)	Number of cases (%)
1-4	21 (33.34)
5-8	36 (57.14)
>9	6 (9.52)
Total	63 (100)

ICU: Intensive care unit

upper socio-economic class. Reena *et al.*,[4] conducted a cross-sectional study in which the subjects were divided as below: Poverty line and above poverty line according to the ration card issued to them by the state government. The subjects with below poverty line ration cards were considered as having low income. Majority of women (53.3%) with severe obstetric morbidity came from families classified as living below poverty line.

In the present study, 80.62% of MNM cases were unbooked, which was comparable in a study conducted by Shrestha *et al.*,[8] and Roopa *et al.*,[6] in which unbooked cases were 70% and 96.18 %, respectively. In the present study, 70% cases were referral cases, which is comparable to a study conducted by Kalra and Kachhwaha[7] (64.2%) and Purandare[11] (66.9%).

In the present study, 89.8% cases were antenatal, 8.16% cases were post-natal, and the rest 2.04% were post-abortion, which were comparable to the study conducted by Purandare *et al.*,[12] (antenatal care [ANC], 665.22%; post-natal care, 24.6%; abortion, 5.3%; and post-abortion, 1.5%) and Roopa *et al.*,[6] (ANC 74.9%, rest post-natal).

In the present study, majority of near miss cases were above 37 weeks gestation, which is comparable to the study conducted by Kalra and Kachhwaha[7] (50% cases above 29 weeks) and Roopa *et al.*,[6] (81.13 % cases above 29 weeks).

In the present study, 46.93% of MNM cases had cesarean section while 44.89% delivered vaginally, which is comparable to a study done by Almerie *et al.*,[13] (lower segment cesarean section 54.3%, vaginal 45.7%).

In the present study, the major primary obstetric factor was hypertensive disorder of pregnancy amounting to 51.02%, similar to Almerie *et al.*,[13] (52%), followed by obstetric hemorrhage, which amounted to 43.87%, similar to Roopa *et al.*,[6] (44.2%), followed by maternal medical disease, 13.26% (malaria - 1.02%, H1N1 - 3.06%, hepatitis - 2.04%, dengue - 3.06%, and sickle-cell disease in crisis - 4.08%) and the least being obstetric sepsis amounting to 3.06% similar to Purandare *et al.*, (3.8%).[12]

In the present study, majority of near miss cases had vascular dysfunction and coagulation dysfunction, that is, in 28.57% similar to Shrestha *et al.*,[8] (vascular 14% and coagulation 8%), followed by cardiac in 21.42% cases similar to Mantel *et al.*,[3] (20%), respiratory dysfunction in 19.38% cases, immunological dysfunction in 12.24% cases similar to Mantel *et al.*, (18%),[3] hepatic in 8.16% cases similar to Taly *et al.*,[14] (9%), cerebral in 6.1% cases similar to Mantel *et al.*, (5%),[3] and renal in 5.1% cases similar to Shrestha *et al.*, (5%).[8]

In the present study, 64.28% of MNM cases were admitted in ICU which is comparable to a study conducted by Roopa *et al.*,[6] in which 62.6% of patients required ICU admission. In a study conducted by Lotufo *et al.*,[15] 39.6% of cases required massive blood transfusion, while in our institute, 19.38% of patients received massive blood transfusion. About 13.26% of patients required intubation with mechanical ventilation in our ICU, which is comparable to the results of Purandare *et al.*,[12] where 11.7% of MNM cases required intubation with mechanical ventilation. In the present study, 9.18% of patients required obstetric hysterectomy, while in a study conducted by Purandare *et al.*,[12] 14.8% of cases had undergone obstetric hysterectomy.

In the present study, the most common laboratory criteria identified was acute thrombocytopenia (<50,000 platelets) in 46.66 % cases, O_2 saturation <90% for more than 60 min in 31.66% cases, total serum bilirubin >6 mg/dl in 13.34% cases, and serum creatinine >3.5 mg/dl in 8.34% cases. Oliveira and da Costa[16] had 255 MNM cases in their study. They found that platelets were <50,000 in 32.5% cases, serum creatinine was >3.5 mg/dl in 16.1% cases, SpO_2 <90% was in 10.6% cases, serum bilirubin was >6 mg/dl in 7.5% cases, PaO_2/FiO_2 <200 in 7.1% cases, DKA was present in 3.1% cases, and pH was <7.1 in 2.7% cases.

In the present study, the mean duration of hospital stay was 13.44 ± 2.19 days (range 8-22 days), which was comparable to a study conducted by Souza *et al.*,[17] (mean hospital stay of 10.3 days, range: 13-24 days).

In the present study, the mean ICU stay was 5.49 ± 1.95 (range 2-11 days), which was comparable to a study conducted by Lotufo *et al.*,[15] and Almerie *et al.*[13]

CONCLUSION

This study showed that among patients with MNM, there is a high frequency of women who have a low level of education, who are primiparous and who have had cesarean section. In addition, our study revealed that hypertensive disorder of pregnancy is still the most frequent underlying condition among such cases.

Maternal death and MNM cases are the indicators of the quality of health care provided. Obstetric ICU set up with a team approach consisting of treatment by obstetricians, intensive care specialists, and anesthesiologists are essential to save a maternal life. In our study, 63 cases were managed by multidisciplinary approach. The most vital purpose of the near miss approach is to improve clinical practice and reduce preventable morbidity and mortality through the use of best evidence-based practice.

The most important factor associated with MNM found in our study was the referral status of women. All women need access to quality maternal health services that can diagnose and manage life-threatening complications. Many of the cases were unbooked, belonging to low socio-economic status. The emergency obstetric care and Janani Suraksha Yojna are already implemented, but from our study, it appears that the patients and their relatives have failed to avail them. Hence, there is a need to take steps to sensitize the population where literacy is poor and who hail from the rural areas about these facilities. It will help in improving maternal health in long run and even reduce the MNM cases.

The study has tried to understand the social causes responsible for maternal morbidity. Major initiatives are needed within the health system to improve the overall wellbeing of the community. What we need is a multi-disciplinary approach aimed at cutting each thread of the web of causation of mortality and morbidity in pregnancy among near-miss women.

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