Maternal Near Miss-Experience At A Tertiary Care Teaching Hospital In Western India

Dr. Ami V. Mehta*, Dr. Dayna J. Shroff, Dr. Aishwarya Gupta***, Dr. Shital T. Mehta*, Dr. Sushma R. Shah****, Dr. Payal P. Panchal*****, Dr. Aastha H Patel**, Karan V. Mehta******

*Associate Professor, **2nd Year Resident, ***Senior Resident, ****Professor And Head, *****Assistant Professor, ******2nd Year MBBS Student, Department Of Obstetrics And Gynecology, Smt. NHL MMC, Ellisbridge, Ahmedabad – 380006

Abstract: Background: Pregnancy-related morbidity and mortality continue to have a huge impact on the lives of Indian women and their newborns. Any pregnant woman can develop life-threatening complications with little or no advance warning. All women need access to quality maternal health services that can detect and manage such complications[1]. Complications during pregnancy and childbirth remain a leading cause of death among women of reproductive age in India[2]. Each year in India, roughly 28 million women experience pregnancy and 26 million have a live birth. Of these estimated 67000 maternal and 10,00000 newborn deaths occur every year[3]. The maternal near-miss event was defined as "any acute obstetric complication that immediately threatens a woman's survival but does not result in her death either by chance or because of hospital care she receives during pregnancy, labor or within 6 weeks of termination of pregnancy[4]. Maternal mortality data in practical terms is the tip of an iceberg while the maternal near-miss data is invisible and which is a very important tool to reduce maternal mortality. Material And Methods: This is a retrospective observational study carried out among 80 maternal near-miss cases who were admitted in obstetric ICU fulfilling criteria for identification for maternal near-miss cases as per Maternal Near Miss Review Operational Guideline (December 2014) in the Department of Obstetrics and Gynecology, in our tertiary care teaching hospital, between October 1, 2018, to October 31,2020. Patient fulfilling criteria for identification of near-miss cases as per Maternal Near miss Review Operational Guideline (December, 2014) Minimum 3 criteria were included in the study. Result: During the study period total of 18360 obstetric patients were admitted, out of which 80 patients ended up becoming maternal near-miss cases. Among them majority of patients were in age group of 18-25 years and occurrence was high in multipara women. In many patients more than one underlying disorder was present. Hemorrhage (67.5%) followed by a hypertensive disorder of pregnancy (30.0%) was the commonest presenting disorder in near-miss cases. In spite of being highly preventable, maternal sepsis (6.2%) also contributes to being a major cause of morbidity. In our study, 15% of near-miss cases had associated medical conditions. 5 % of cases (n=4) in the present study faced acute severe respiratory depression (ARDS) after getting infected with covid-19 infection. There was need for massive blood transfusions in 63.75 %, magnesium sulfate therapy in 17.25%, use of cardiotonic /vasopressor drugs in 10.0%, obstetric hysterectomy in 23.75 % of cases. More than one management modality was followed in many patients. All the near-miss cases were covered with broad spectrum antibiotic therapy. Total 21 near-miss cases (26.25%) were identified to have delays. Delay in the decision to seek care (Delay 1) occurred in 2.5% of women. Educational backwardness, ignorance of pregnancy itself, lack of regular antenatal care, and failure to give importance to warning signals may be the contributing factors. Delay in accessing adequate care (Delay 2) was identified in 7.5% of women. Conclusion: Hemorrhage, hypertensive disorders of pregnancy, abnormalities of labor, anemia, and sepsis are still major contributing factors for maternal near-miss cases. Anticipation, early diagnosis, and prompt treatment of maternal complications can reduce maternal morbidity and mortality. Sensitization of the population for proper utilization of available maternal health care facilities is very vital for reducing maternal near-miss cases.All the maternal near-miss cases are living lessons, who despite their misery show us our deficiencies. [Mehta A Natl J Integr Res Med, 2022; 13(2): 36-42, Published on Dated:10/02/2022]

Key Words: MNM-Maternal Near Miss, SAMM-Severe Acute Maternal Morbidity , MMR-Maternal Mortality Rati

Author for correspondence: Dr. Shital T Mehta, Associate Professor, Department Of Obstetrics And Gynecology, Smt. NHL MMC, Ellisbridge, Ahmedabad – 380006 E-Mail: stmehta2022@gmail.com

Introduction: Pregnancy-related morbidity and mortality continue to have a huge impact on the lives of Indian women and their newborns. Any pregnant woman can develop life-threatening complications with little or no advance warning. All women need access to quality maternal health

services that can detect and manage such complications[1]. Complications during pregnancy and childbirth remain a leading cause of death among women of reproductive age in India[2]. Each year in India, roughly 28 million women experience pregnancy and 26 million have a live birth. Of these estimated 67000 maternal and 10,00000 newborn deaths occur every year[3].

According to WHO, Maternal mortality is defined as death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes[4].

The maternal near-miss event was defined as "any acute obstetric complication that immediately threatens a woman's survival but does not result in her death either by chance or because of hospital care she receives during pregnancy, labor or within 6 weeks of termination of pregnancy[4].

India has made significant progress in reducing the maternal mortality ratio (MMR) from 212 in 2007-09, 130 in 2014-16, 122 in 2015-17 to 113 per 100 000 live births in 2016-18. However, there is a long way to go on this journey to meet the millennium development goals[5].

Pregnant women's health status is not reflected by mortality indicators alone. Hence the concept of severe acute maternal morbidity (SAMM) is apt for the present health-providing system[6].

SAMM has been studied extensively in the recent past as a complement for maternal mortality and to evaluate the quality of obstetric care in that particular institution. This concept is superior to maternal death in drawing attention to surviving women's reproductive health and lives and is equally applicable in developing countries as well as developed countries.

In many developed countries, maternal mortality has fallen to single digits whereas near-miss cases are more and hence useful in the evaluation of the present system. Moreover, they have the advantage of not being as rare as maternal deaths for providing adequate information, as well as still being rare enough not to overload clinicians and data collection personnel within the facility[6]. Maternal mortality data in practical terms is the tip of an iceberg while the maternal near-miss data is invisible and which is a very important tool to reduce maternal mortality. A systematic review of MNM cases can help to bring forth various contributory factors and necessary corrective actions which could be taken at the state, district, or community level for a reduction in maternal morbidity and mortality.

Aims And Objectives: To study incidence of maternal near-miss cases. To study the maternal demographic variables in near-miss cases. To study various maternal criteria (clinical, laboratory, management) for the identification of near-miss cases. To study maternal and fetal outcomes in maternal near-miss cases.

Material & Methods: Subjects: This is a retrospective observational study carried out among 80 maternal near-miss cases who were admitted in obstetric ICU fulfilling criteria for identification for maternal near-miss cases as per Maternal Near Miss Review Operational Guideline (December 2014) in the Department of Obstetrics and Gynecology, in our tertiary care teaching hospital in western India, between October 1, 2018, to October 31, 2020.

Clinical Evaluation: After getting approval from Institutional Review Board and patient's, informed and written consent, the main presenting complaint in all the patients were noted and detailed clinical and general physical examination was performed.

Inclusion Criteria: Patient fulfilling criteria for identification of near-miss cases as per Maternal Near Miss Review Operational Guideline (December 2014)[7]. Minimum 3 criteria: one from each

- Clinical Findings (Sign Or Symptom)
- Investigations
- Interventions Done

Or any single criterion which signifies cardio-respiratory collapse. Patients giving consent for study were included in the study.

Results: Out of 18360 obstetrics patients admitted during the study period, 11545 deliveries were conducted with 11520 live births. As per Maternal Near Miss Review Operational Guideline (Dec 2014) criteria, 80 near miss cases were identified. There were 22 maternal deaths during the study period.

Table 1: Indicators Proposed By Who To Describe Maternal Events4

Indicators	Present study
Total Number Of Deliveries (During Study Period)	11545
The Absolute Number Of Near-Miss Cases	80
Maternal Near-Miss Rate/1000 Obstetric Admission	4.3
Maternal Near-Miss Ratio/1000 Live Births (MNMIR)	6.9
The Ratio Of Maternal Near-Miss To Maternal Death (MNM/MD)	3.6: 1
Maternal Deaths	22
Mortality Index (%)	16

Table 2: Underlying Disorders Leading To Maternal Near Miss (Diagnosis)

Disorder	Present study
Hemorrhage	54(67.5%)
1. Ectopic pregnancy	1(1.20%)
2.Abortion	1(1.25%)
3.Antepartum hemorrhage	33(38.70%)
4.Postpartum hemorrhage	18(25.0%)
Hypertensive disorder	26(30.0%)
1.Severe preeclampsia	9(11.2%)
2.Eclampsia	17(18.7%)
Sepsis	5(6.2%)
Rupture uterus	2(2.5%)
Medical causes	12(15.0%)
Severe pneumonia (covid 19 infection)	4(5.0%)

Hemorrhage (67.5%) including Rupture uterus (2.5%) followed by hypertensives disorders of pregnancy (30.0%) maternal sepsis (6.2%) were the common conditions at the time of admission in maternal near miss. 4 maternal near miss cases suffered covid-19 infection associated pneumonia at the time of admission.

Table 3: Maternal Criteria For Identification Of Near Miss Cases

Clinical Criteria (N=31)		Laboratory Criteria (N=56)		Management Criteria (N=80)	
Respiratory rate <6/min or >40/min	4 (5.0%)	Oxygen saturation <90% for >60 mins	11 (13.75%)	Massive blood transfusion (>5 units of blood products)	51 (63.75%)
Gasping	6 (7.5%)	Acute thrombocytopenia	15 (18.75%)	Magnesium sulphate therapy	17 (17.25%)
Shock	3 (3.75%)	S. bilirubin >6 mg/dl	15 (18.75%)	Use of cardiotonic/vasopressor drugs	8 (10.0%)
Clotting failure	5 (6.25%)	S. creatinine >3.5 mg/dl	7 (8.75%)	Obstetric hysterectomy	19 (23.75%)
Oliguria	3(3.75%)	pH <7.1	6 (7.5%)		
Jaundice in presence of preeclampsia	9 (11.25%)	SGPT/SGOT>70 IU/L	11 (13.75%)		

Clinical based criteria were in form jaundice in presence of preeclampsia in 11.25%, gasping in (7.5%), respiratory rate <6/min or >40/min in 5.0%, clotting failure in 6.25%, shock in 3.75% and oliguria in 3.75 % cases. Laboratory based criteria were in the form of oxygen saturation <90% for >60 minutes in (13.75%), acute thrombocytopenia in (18.75%), serum bilirubin >6mg/ dl in (21.2%), serum creatinine >3.5 mg/dl in 8.75% and pH < 7.1 in (7.5%) of cases.Management based criteria in the form of massive blood transfusion was in 63.75%,

magnesium sulphate therapy in 17.25%, use of cardiotonic/vasopressor in (10.0%) and obstetric hysterectomy in 23.75% of cases. All of near miss cases were covered under higher antibiotic therapy.

TABLE 4: SPECIFIC MANAGEMENT

Specific Management		No. Of Patients
Antihypertensive Drugs	Labetalol(parenteral)	17
	Labetalol(oral)	19
	Nifedipine(oral)	7
	Furosemide/torsemide(parenteral)	6
Anticonvulsant Drugs	Inj. Magnesium sulfate	17
	Inj. Phenytoin sodium	1
	Inj. Levetiracetam	7
Transfusion Of Blood Products	PCV	61
	PRC/SDP	40
	FFP	37
	CRYO	28

Labetalol (oral or parenteral) in 36 of cases was most commonly used antihypertensive agent followed by nifedipine in 7 cases while furosemide/torsemide in 6 cases. Magnesium sulphate was used as an anticonvulsant agent in 17 cases while in 1 case phenytoin sodium was also used. Levetiracetam was used as additional therapy in 7 cases.

Table 5: Obstetrics Outcome

Obstetric Outcome	Present Study
Normal vaginal delivery	17(18.7%)
Cesarean section	58(71.2%)
D and E	1(1.2%)
VBAC	1(1.2%)
Laparotomy	8(10.0%)
Hysterotomy	1(1.2%)

71.2% of patients underwent LSCS, 18.7% had normal vaginal delivery, 1.2% had vaginal birth after cesarean (VBAC).

Table 6: Delay Factor In The Present Study

Type Of Delay	No. of patients
Delay 1 (Decision To Seek Care)	2(2.5%)
Delay 2 (Access To Care)	6(7.5%)
Delay 3 (A Receipt Of Adequate And Appropriate Treatment)	1(1.25%)
Delay 1 And 2 Identified	3(3.75%)
Delay 1,2,3 Identified	9(11.25%)
No Delay Identified	59(73.75%)

We had identified delay 1 in (2.5%), delay 2 in (7.5%), delay 3 in (1.2%) and more than one delays in 15% of near miss cases in the present series.

Discussion: This is a retrospective observational study done at the Department of Obstetrics and Gynecology, in a tertiary care teaching hospital in Western India, between October 1, 2018 to October 31, 2020. During the study period total of 18360 obstetric patients were admitted, out of which 80 patients ended up becoming maternal near-miss cases. Among them majority of patients were in age group of 18-25 years and occurrence was high in multipara women. In many patients more than one underlying disorder was present.

Hemorrhage (67.5%) followed by a hypertensive disorder of pregnancy (30.0%) was the commonest presenting disorder in near-miss cases. Obstetrical hemorrhage continues along with hypertension and infection as one of the infamous “triad” of causes of maternal death in

both developed and underdeveloped countries. It is also a leading reason for admission of pregnant women as maternal near-miss cases to the intensive care unit (ICU)[8].

Hemorrhage resulting from either abortion, ectopic pregnancy, placenta previa or accidental hemorrhage and/or postpartum hemorrhage (atonic or traumatic) contributes significantly to maternal morbidity worldwide[9]. Preeclampsia and/ or eclampsia are associated with substantial maternal complications, both acute and long-term. Clear protocols for early detection and management of hypertension in pregnancy at all levels of health care are required for the better maternal and perinatal outcomes. This is especially important in the developing countries[8].

In spite of being highly preventable, maternal sepsis (6.2%) also contributes to being a major cause of morbidity. Delay in diagnosis of certain infections associated with the immune compromised state of pregnancy especially anemia and malnutrition may be the aggravating factors for septicemia[10].

In our study, 15% of near-miss cases had associated medical conditions such as hepatitis, gestational diabetes mellitus, gestational thrombocytopenia, dengue hemorrhagic fever, disseminated intravascular coagulopathy (DIC), HUS-TTP (hemolytic uremic syndrome-thrombotic thrombocytopenic purpura), acute pancreatitis, liver abscess, and peripartum cardiomyopathy. Around 5 % of cases (n=4) in the present study faced acute severe respiratory depression (ARDS) after getting infected with covid-19 infection. Two of them required oxygen support by High Flow Nasal Cannula (HFNC) and the other 2 required ventilatory supports.

Termination of pregnancy in all 4 of them improved the respiratory and cardiovascular functions. All patients were discharged after complete recovery.

There is the presence of more than one criterion in many patients. They were gasping in 7.5 % of patients, respiratory rate <6/min , >40/min in 5.0%, clotting failure in 6.25%, oliguria in 3.75% cases, shock in 3.75% cases, and jaundice in presence of preeclampsia in 11.25 % of cases. Oxygen saturation was <90% for >60 minutes in 13.75% cases, acute thrombocytopenia in 18.75% cases, serum bilirubin >6 mg/dl in 18.75% cases, serum creatinine >3.5 mg/dl in 8.75 % cases and pH <7.1 in 7.5 % of cases. Abnormality in SGOT and SGPT were noted in 13.75% of cases. One case had HEV infection.

Preeclampsia-related disorder and infective pathology of the liver associated with pregnancy are common contributing factors for maternal near-miss cases. There was need for massive blood transfusions in 63.75 %, magnesium sulfate therapy in 17.25%, use of cardiotonic /vasopressor drugs in 10.0%, obstetric hysterectomy in 23.75 % of cases. More than one management modality was followed in many patients. All the near-miss cases were covered with broad spectrum antibiotic therapy.

In the present study, 17 patients received Labetalol (parenteral followed by oral), 19 patients received only oral Labetalol, and 7 received Nifedipine as an antihypertensive agent. 6 patients were given Furosemide/Torsemide.

Labetalol (alpha 1 and non-selective beta-adrenergic receptor blocker) is the first-line agent in management of hypertensive disorders of pregnancy. Following oral administration, Labetalol has 3 times the beta-blocker ability; this increases to 6.9 times following intravenous administration.

Labetalol leads to sustained vasodilation over a long period without a significant decrease in cardiac output or stroke volume[11]. Oral Nifedipine (calcium channel blocker) is frequently seen as a second-line agent used for the treatment of hypertension in pregnancy. It inhibits the influx of calcium ions to vascular smooth muscles, resulting in arterial vasodilation.

With all CCBs, there is a risk of interaction with Magnesium, resulting in profound hypotension.

Parenteral Furosemide a loop diuretic drug of class Thiazide is mainly used to treat postpartum severe preeclampsia and acute pulmonary edema (lifesaving in one case). Torsemide, another drug of the same class has higher potency, cardioprotective effect, and more predictable bioavailability as compared to Furosemide. Preeclampsia related disorder and infective pathology of liver associated with pregnancy are common contributing factors for maternal near miss cases[12].

In the present study, magnesium sulfate therapy in form of Pritchard's regimen was used in 17 patients (21.25%) of eclampsia as an anticonvulsant agent while in 1 patient with convulsion having MRI finding of Posterior Reversible Encephalopathy (PRES) Syndrome was given Phenytoin sodium.

Levetiracetam was administered as a 1gram loading dose followed by 500 mg bd intravenously as additional therapy to Magnesium sulfate in 7 patients who continued to have convulsion after initial therapy.

Magnesium sulfate therapy is considered a first-line treatment for the prevention of primary and recurrent eclamptic seizures. The mechanism of action of Magnesium sulfate is competitively blocking the entry of calcium into synaptic endings, thereby altering neuromuscular transmission and also trigger cerebral vasodilation thus reducing ischemia generated by cerebral vasospasm avoiding central nervous system depression. However, the definitive treatment of eclampsia is the delivery of the fetus.

In the present study, total 62 patients (77.5%) required blood products transfusion. Most of these patients required more than one unit of more than one type of product. Transfusion of Packed cell volume in 61 patients (76.25 %), Platelet-Rich Plasma concentrate in 40 (50.0%), Fresh Frozen Plasma in 37 (46.25%), and Cryoprecipitate in 28 patients (35.0%) were required in various conditions resulting from either severe anemia or altered coagulopathy (Disseminated Intravascular Coagulopathy) Packed cell volume (PCV) is made from a unit of whole blood by centrifugation and removal of most of the plasma.

One unit of PCV increases approximately 1 gram% of hemoglobin within 24 hours of transfusion. Ventilatory support as a life-saving measure unrelated to anesthesia was needed in 23.75% of cases.

In the present study, 71.2 % of the cases underwent LSCS, 18.7% had a normal vaginal delivery, 1.2% had a vaginal birth after cesarean (VBAC). Emergency laparotomy was done in 8 patients (10.0%) of near-miss cases of which one was done for right-sided ruptured tubal ectopic pregnancy, 3 were done for obstetric hysterectomy for atonic PPH following normal vaginal delivery, 2 were for ruptured uterus following normal delivery where repair of the uterus was done, 1 for rupture uterus following Dilatation and Evacuation of incomplete abortion, repair done.

In one case laparotomy was done following cesarean section on postoperative day 7 for peritonitis. In one case dilatation and evacuation were done for septic abortion. Hysterotomy was done in one case for abruption at 20 weeks of gestation in one case.

Total 21 near-miss cases (26.25%) were identified to have delays. Delay in the decision to seek care (Delay 1) occurred in 2.5% of women. Educational backwardness, ignorance of pregnancy itself, lack of regular antenatal care, and failure to give importance to warning signals may be the contributing factors. Delay in accessing adequate care (Delay 2) was identified in 7.5% of women.

This included a delay in recognition of a potentially life-threatening condition that occurred even after reaching healthcare facilities.

There was a delay in receiving adequate and appropriate treatment after reaching the health care center (Delay 3) in 1.25% of women. Delayed recognition of a life-threatening condition or unwarranted persistence with conservative management had contributed to this[13].

These centers did not have a specialist workforce, appropriate infrastructure, and blood transfusion services. There was a perceptible delay in deciding to refer cases to a higher center.

Types of Delay were assigned by assessing the condition of patients at the time of admission to our hospital and her condition before coming to our hospital by asking their relatives and/or treatment received in previous care providing center as mentioned in the refer chit.

70 babies had low birth weight (<2.5 kg).67.1% of NICU admitted babies, (31.2%) had transient tachypnea of the newborn, (18.7%) had birth asphyxia, (14.0%) had meconium aspiration syndrome, and (3.1%) had respiratory distress.

14 babies had perinatal mortality; common causes for that are birth asphyxia, sepsis, and low birth weight[14].

Conclusion: Hemorrhage, hypertensive disorders of pregnancy, abnormalities of labor, anemia, and sepsis are still major contributing factors for maternal near-miss cases. Anticipation, early diagnosis, and prompt treatment of maternal complications can reduce maternal morbidity and mortality. Sensitization of the population for proper utilization of available maternal health care facilities is very vital for reducing maternal near-miss cases.

The need for identifying the patients' condition and deciding for the referral on the time and to the right-center is a critical step towards saving a maternal death. The core of the health system should emphasize 'when to refer' and 'where to refer' policy.

Regular audit of maternal near-miss cases should be mandatorily done by tertiary hospitals to reduce maternal mortality and training of health care workers should be done regarding the same.

Improved documentation, analysis, and interpretation of maternal near-miss cases will lead to an improvement in maternal health care and a further decline in maternal morbidity and mortality. Managing a near-miss case is teamwork. Prompt and objective intervention can avert maternal death and can bring joy to the family.

All the maternal near-miss cases are living lessons, who despite their misery show us our deficiencies.

References:

1. WHO Department of Reproductive Health and Research Training Course in Sexual and Reproductive Health Research Geneva 2011
2. Analysis of maternal near-miss at tertiary level hospitals, Ahmedabad: A valuable indicator of maternal health, ncbi.nlm.niv.gov
3. http://mohfw.nic.in/NRHM/Maternal_.htm
4. World Health Organisation. Evaluating the Quality of Care for Severe Pregnancy Complications: The WHO Near-Miss Approach for Maternal Health. Geneva, Switzerland: World Health Organisation; 2011
5. Govt. of India (2020), Special Bulletin on Maternal Mortality In india 2016-18, SRS, Jul. 2020, Office of Registrar General of India.
6. Amita Pandey, Vinita Das, Anjoo Agarwal, Smriti Agrawal, DevyaniMisra, and Noopur Jaiswal: Evaluation of Obstetric Near Miss and Maternal Deaths in a Tertiary Care Hospital in North India: Shifting Focus from Mortality to Morbidity doi: 10.1007/s13224-014-0552-1
7. Parmar NT, Parmar AG, Mazumdar VS. Incidence of maternal "Near-miss" events in a tertiary care hospital of central Gujarat, India. J ObstetGynaecol India 2016;66:315-20.
8. Williams obstetrics: Obstetrical Hemorrhage, Crozier TM, Wallace EM: Obstetric admissions to an integrated general intensive care unit in a quatemary maternal facility. Aust N Z J ObstetGynaecol5l(3):233, 2011.
9. Postpartum hemorrhage: incidence, risk factors, and outcomes in a low resourcesetting; International journal of women"s health, ncbi.nlm.n1h.Nov 2 ,2016
10. The burden of maternal morbidity and mortality : cohort study, Uganda, Annette Nakimuli, Sarah Nalcubulev, BMC pregnancy and childbirth; Article no: 205 (2016)
11. Study of Abnormal Liver Function Test during Pregnancy in a Tertiary Care Hospital in Chhattisgarh Nalini Mishra.
12. MacCarthy EP, Bloomfield SS: Lobetalol: a review of pharmacology, pharmacokinetics, clinical uses and adverse effects. Pharmacotherapy. 1983 Jul-Aug;3(4):193-219.(PubMed:6310529
13. Reena RP, Radha KR. Factors associated with maternal near miss: A study from Kerala. Indian J Public Health 2018;62:58-60.
14. Malik SJ. Perinatal mortality in high risk pregnancy: a prospective study of preventable factors.Asia Oceania J ObstetGynaecol. 1992 Mar;18(1):45-8.

Conflict of interest: None
Funding: None
Cite this Article as: Mehta A, Shroff D, Gupta A, Mehta S, Shah S, Panchal P, Patel A, Mehta K. Maternal Near Miss-Experience At A Tertiary Care Teaching Hospital In Western India. Natl J Integr Res Med 2022; Vol.13(2): 36-42