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An Audit of Maternal Near Miss and Mortality Cases in a Tertiary Care Rural Teaching Hospital in Eastern India —A One Year Record Based Observational Study

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Abstract

OBJECTIVE: To evaluate the characteristics of near-miss obstetric cases along with maternal deaths from June 2019 to May 2020 in the Department of Obstetrics and Gynecology, Rampurhat Govt Medical College and Hospital.

STUDY DESIGN: A Record based Observational Study.

SETTING : Rampurhat Govt Medical College and Hospital, Rampurhat, Birbhum.

STUDY POPULATION: All near miss and maternal mortality cases at RGMC&H, from June 2019 - May 2020.

METHODOLOGY: All near-miss obstetric cases along with maternal deaths in the study population were evaluated with respect to various characteristics. Methods to improve the rates were suggested.

RESULTS: During the study period, there were 10,452 deliveries in our institution, 10142 live births, CCU admission rate was 21.9 per 1000 deliveries, 50 near miss cases and 25 maternal deaths. The Maternal Mortality Ratio (MMR) was 246.4, Maternal Near Miss Ratio was 0.49.

The mean age in the near miss group was 23.22 ± 4.3 years, mostly multigravidas and 23.16 ± 6.39 years in the maternal mortality group, mostly primigravidas.

Most cases were unbooked term pregnancies (94% in near miss group, 84% in the maternal mortality group) from rural side, referred from peripheral centers.

The majority of patients in the near miss group had obstetric hemorrhage (44%, mostly from ruptured uterus), followed by eclampsia and pre-eclampsia (40%), while the maternal mortality group had eclampsia and pre-eclampsia (32%) followed by pulmonary embolism (26%) and obstetric hemorrhage (20%).

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24% of the patients required inotropic support, 18% needed ventilator support, and 4% needed cardiopulmonary resuscitation in the near miss group. In the maternal mortality group, almost 100% patients were put on inotropic and ventilator support and had undergone cardiopulmonary resuscitation (CPR).

Majority in both the groups came in a very poor condition reflecting delays in seeking help, or in the referral system.

CONCLUSION: There should be strict screening protocols from the first antenatal visit itself, and faster referral systems.

Introduction

A maternal death is one of the most devastating complications in obstetrics, with wide-ranging implications for both the family and the staff involved.

A maternal death (as cited in International Classification of Disease or ICD-10, [WHO, 1992]) is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, and can stem from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

The maternal mortality ratio is calculated as:[1]

$$\frac{\text{All maternal deaths occurring within a reference period (usually 1 year)} \times 100{,}000}{\text{Total \# of live births occurring within the reference period}}$$

A woman presenting with any life threatening conditions and surviving a complication that occurred during pregnancy, childbirth, or within 42 days of termination should be considered as a near miss or severe maternal morbidity.[2]

The WHO near miss criteria includes:[16]

Clinical criteria includes: acute cyanosis, gasping, respiratory rate >40 or <6/min, shock, oliguria non responsive to fluids or diuretics, failure to form clots, loss of consciousness lasting >12 h, cardiac arrest, stroke, uncontrollable fit/total paralysis, jaundice in the presence of pre-eclampsia;

Laboratory based criteria includes : oxygen saturation <90% for ≥60 minutes, Pao2/fio2<200mm Hg, creatinine ≥300µmol/l or ≥3.5 mg/dl, bilirubin >100 µmol/l or >6.0 mg/dl, ph<7.1, lactate >5 meq/ml, acute thrombocytopenia (<50,000 platelets/ml), loss of consciousness and ketoacids in urine.

Management-based criteria includes: use of continuous vasoactive drugs, hysterectomy following infection or haemorrhage, transfusion of ≥5 units of blood, intubation and ventilation for ≥60 minutes not related to anesthesia, dialysis for acute renal failure, cardio-pulmonary resuscitation.

The maternal mortality in India is still 122 per 100000 live births despite different safe motherhood programs.

The aim of this study is to evaluate the characteristics of near-miss obstetric cases in a tertiary care hospital as near-miss patients provide first hand knowledge of remote and immediate factors that may be linked to morbidity and mortality during pregnancy or within 42 days of its termination. The near-miss concept also allows initiation of awareness-based preventive strategies to enhance the quality of maternal healthcare. Although the objective criteria for defining severe maternal morbidity vary between studies, its prevalence ranges from 0.05%-1.7% in developed countries[3,4] and 0.6%-8.5% in resource-limited countries.[5,6]

Materials and Methods

The present study is a retrospective cohort study analyzing all maternal near miss cases of a 192-bedded gynecology and obstetrics department of a peripheral government medical college and hospital over a span of 1 year (June 2019-May 2020). They are analysed along with all maternal death cases in the given time period.

Data Collection

The medical records of all obstetric patients (pregnant or within to 6 weeks postpartum) fulfilling near miss criteria along with other obstetric patients getting admitted to the critical care Unit (CCU) during the study were analyzed. The following data were recorded and analyzed for each near miss patient: age, parity, primary diagnosis (obstetric or non obstetric disease process identified to be responsible for the patient's critical illness), criteria for near miss, indication of CCU admission, obstetric interventions performed, critical care interventions performed

during CCU stay (mechanical ventilation), duration of mechanical ventilation, length of CCU stay and outcome. The following data are recorded for patients having maternal mortality: age, parity, primary diagnosis (obstetric or non obstetric disease process identified to be responsible for the patient's critical illness), obstetric interventions performed, critical care interventions performed (mechanical ventilation, inotropic support), cause of death.

Statistical Analysis

All categorical data were expressed as proportions or percentages. Statistical analysis was performed using SPSS (version 20.0, IBM Corporation, New York, USA). The categorical data analysis was done either by Fischer's exact test or Chi-square test, as applicable. The numerical data were analyzed by unpaired t-test or ANOVA for normal distribution and by Mann-Whitney U-test or Kruskal-Wallis H-test if it was not distributed normally. The statistical significance implies $P < 0.05$.

The Institutional Ethics Committee approved the study.

RESULTS

TABLE 1

Clinical Parameters	NEAR MISS	MATERNAL DEATH
Mean age in years	23.22 +-4.310831	23.16+- 6.39
Urban/Rural	90% RURAL 10% URBAN	94% RURAL 6% URBAN
Education	75% HIGH SCHOOL 25% UNEDUCATED	73% HIGH SCHOOL 27% UNEDUCATED
Primi/Multi	42% PRIMI 58% MULTI	64% PRIMI 36% MULTI
Booked/Unbooked	6% BOOKED 94% UNBOOKED	16% BOOKED 84% UNBOOKED
Referred	80% REFERRED 10% DIRECT	75% REFERRED 25% DIRECT
Preterm/Term	PRETERM=14% TERM=82% ECTOPIC=4%	PRETERM=32% TERM=68%

The mean age in the near miss group is 23.22 ± 4.3 years while in the maternal mortality group is 23.16+- 6.39 years.

The majority of women in both the groups were from rural side with high school level education well below the age of 30 years.

The near miss group mostly had multigravidas (58%), while majority were primigravidas (66%) in the maternal mortality group.

Most cases were unbooked term pregnancies (94% in near miss group, 84% in the maternal mortality group) and referred from peripheral centres in both the groups.

TABLE 2

PRIMARY DIAGNOSIS	NEAR MISS GROUP	MATERNAL MORTALITY GROUP
Repeated Eclampsia	14 (28%)	3 (12%) CVA
Left ventricular failure	6 (12%)	5 (20%)
Sepsis	3 (6%)	1 (4%)
Heart Disease	3 (6%)	1 (4%)
Renal Failure	1 (2%)	1 (4%)
Hemorrhagic Shock	22 (44%) Ectopic-2 Abruptio-3 PLC Previa-5 PPH-4 Rupture Uterus-7 UT Perforation-1	5 (20%) PPH-Primary-1 2 Dary-1 Uterine Inversion-1 Ectopic-1 APH Abruptio-1
Pulmonary Embolism	1 (2%)	6 (24%)
COPD		1 (4%)
Jaundice		1 (4%)
Cardiogenic Shock		1 (4%)

TABLE 3: Near Miss Criteria

CLINICAL CRITERIA	SHOCK	21(42%)
	Oliguria non responsive to fluids or diuretics	1 (2%)
	Uncontrolled fist/total paralysis	14 (28%)
	Gasping	1 (2%)
	Respiratory rate >40 or <6/min	10 (20%)
LABORATORY-BASED CRITERIA	Oxygen saturation <90% for ≥60 minutes	10 (20%)
MANAGEMENT-BASED CRITERIA	Use of continuous vasoactive drugs	12 (24%)
	Hysterectomy following infection or hemorrhage	15 (30%)
	Transfusion of ≥5 units of blood	6 (12%)
	Intubation and ventilation for ≥60 minutes not related to anaesthesia	9 (18%)
	Cardio-pulmonary resuscitation	2 (4%)

TABLE 4

MATERNAL MORTALITY GROUP	YES	NO
CPR	100%	0%
Inotropic Support	100%	0%
Ventilator Support	100%	0%

Shock, mostly from obstetric hemorrhage, was also the most common criteria for near miss as per our study, followed by obstetric hysterectomy and uncontrolled eclampsia. In our study, 24% of the patients required inotropic support, 18% of the patients needed ventilator support, and 4% of the patients needed cardiopulmonary resuscitation in the near miss group. In the maternal mortality group, almost 100% patients were put on inotropic and ventilator support and had undergone CPR.

TABLE 5

INTERVENTION	NEAR MISS	MATERNAL MORTALITY GROUP
Vaginal delivery	13 (26%)	7 (28%)
Cesarean section	23 (46%)	11 (44%)
Laparotomy for ectopic	2 (4%)	1 (4%)
Hysterectomy	15 (30%)	3 (25%)
Undelivered		3 (12%)
Patient (%) who had come in bad condition	68%	87%

Most of the patients in the near miss group (68%), and the maternal mortality group (87%) came in a very poor condition reflecting delays either in the patients seeking help, or delays in the referral system.

Discussion

During the study period (June 2019 to may 2020), there were 10,452 deliveries in our institution, 10142 live births. The CCU admission rate was 21.9 per 1000 deliveries. There were 50 near miss cases during this time and 25maternal deaths. The Maternal Mortality Ratio (MMR) during this time was 246.4. The current MMR for 2015-2017 in India is 122 per 1 lakh live births as per the recently released Sample Registration System (SRS) 2015-2017 bulletin for MMR.[7] The sustainable development goals: Goal 3 (Target 3.1) has set a global target to reduce MMR to < 70/lakh live births by 2030.[8] Thus the rate is pretty high in our Institute and a scrutiny into the various near miss and mortality cases will help us to improve our performances and find out any drawbacks in our current management.

The Maternal Near Miss Ratio which is the number of maternal near miss cases per 1000 live births was 0.49 in our institute. The Maternal Near Miss Mortality Ratio which is the ratio between maternal near miss cases and maternal deaths. A higher ratio indicates better care.[9]

The mean age in the near miss group is 23.22 ± 4.3 years while in the maternal mortality group is 23.16+-6.39.

This is similar to other Indian studies[10,11] and to other studies[12,13] in developing countries.

The majority of women in both the groups were from rural side with high school level education which might contribute to the high incidence of severe maternal morbidity cases in patients well below the age of 30 years.

The near miss group mostly had multigravidas (58%), while majority were primigravidas (66%) in the maternal mortality group. There is high incidence of PPH in the near miss group and high incidence of hypertensive disorders in the maternal mortality group.

Most cases were unbooked term pregnancies (94% in near miss group, 84% in the maternal mortality group) and referred from peripheral centres in both the groups.

The study from Sudan[14] by Alemu et al showed more cases in the urban side, mostly among uneducated or with primary level school education, multiparous women who were self referred. The study from Zimbabwe by Chikadaya et al[13] also showed mostly multiparous women, most with high school level education, referred from private clinics. Majority of near miss cases were among preterm patients in a study by Lotufo et al while other studies mostly showed term pregnancies.[12,13,14]

Indian studies revealed more near miss cases in both the primigravida group and in multigravida group.[10,15] The majority of patients in the near miss group in our study had a primary diagnosis of obstetric hemorrhage (44%) followed by eclampsia and pre-eclampsia cases (40%), while in the maternal mortality group was eclampsia and pre-eclampsia cases (32%) followed by pulmonary embolism (26%) and obstetric hemorrhage (20%). This is similar to the study by Rathode et al[9] and Chikadaya et al[12] except for the incidence of pulmonary embolism in post operative patients which was unusually high in our institution. Other Indian[11,15] and International studies[9,12,14] mostly revealed obstetric hemorrhages followed by hypertensive disorders to be most common cause of both maternal near miss and maternal mortality.

A categorisation of the obstetric hemorrhage cases in the near miss group shows maximum incidence of the ruptured uterus cases unlike the study by Purandare et al[11] where most cases were in postpartum patients (31%). One case was an in house rupture uterus following a trial of labor in a post CS pregnancy which finally expired of pulmonary embolism, the rest were referred following trial of labor in multigravida women outside. In the maternal mortality group, majority were primary PPH cases (40%).

Shock, mostly from obstetric hemorrhage, was also the most common criteria for near miss as per our study, followed by obstetric hysterectomy and uncontrolled eclampsia. Use of vasoactive agents, obstetric hysterectomy, 5 or more units of PRBC transfusion and use of mechanical ventilation was the leading causes for near miss as per the study by Lotufo et al.[12]

In our study, 24% of the patients required inotropic support, 18% of the patients needed ventilator support, and 4% of the patients needed cardiopulmonary resuscitation in the near miss group. In the maternal mortality group, almost 100% patients were put on inotropic and ventilator support and had undergone CPR.

This is much lower as compared to the study in Brazil by Lotufo et al,[12] but similar to Indian studies by Purandare et al.[11]

Most of the patients in the near miss group (68%), and the maternal mortality group (87%) came in a very poor condition reflecting delays either in the patients seeking help or delays in the referral system. This is primarily due to lack of awareness among the patients of this area about the importance of timely and adequate antenatal checkups, availability of facilities existing at tertiary level centers, existence of different incentives by the government after hospital delivery. Better mobilisation of the population to hospitals by ANM and ASHA workers can reduce this delay. There has been a delay in referral in few cases from the peripheral health care centers like most cases of postpartum hemorrhage following prolonged labor which could have been managed better had they been referred earlier. The study by Purandare et al[11] in India also reflected the delay in the referral system. In fact in the near miss group, only the patients with recurrent convulsions and in the maternal mortality group, the patients with pulmonary embolism deteriorated in the institution, despite management. There was also a case of eclampsia which developed cerebrovascular accident (CVA) two days postoperatively where the high blood pressure could have been managed better. The rest of the cases were admitted in very poor condition. Two of the cases had to be referred out due to lack of dialysis facility in a case of renal failure and lack of FFP in a case of jaundice and expired at the referred centre.

Conclusion

Maternal health being a priority of any nation, a careful scrutiny into the causes of near miss and maternal mortality will help us to correct any defects in the existing practice. As we see from our study, since most women had very poor education status, improving the educational status of the population in general should be first priority.

The most common cause of near miss is obstetric haemorrhage, mostly from rupture uterus cases. Better management of labour in the peripheral referral centres, timely referral, maintaining partograph and improving the Hb status of women can be done to improve the scenario. The residents should also be well trained in systemic devascularisation procedures, internal iliac ligations and obstetric hysterectomies.

Since most cases in the maternal mortality group were among the hypertensive disorders in pregnancy, strict antenatal follow up, blood pressure monitoring, proper intake of medications, and timely referral to higher centers should be ensured by ASHA, ANM workers and doctors at peripheral referral centers.

The second most common cause of maternal mortality being pulmonary embolism at our institution, early mobilisation of post operative patients and use of thromboprophylaxis where indicated should be ensured.

Proper HDU, CCU and blood bank facilities should be available.

Thus in conclusion we would like to say that there should be strict screening protocols from the first antenatal visit itself, and a multidisciplinary team should be set alert in tertiary care centers in order to initiate treatment without delay once such critical cases are admitted.

List of Abbreviations: CPR - Cardiopulmonary Resuscitation; VD - Vaginal Delivery; CS - Cesarean Section; COPD - Chronic Obstructive Pulmonary Disease; LVF - Left Ventricular Failure; HDU - High Dependency Unit; CCU - Critical Care Unit; FFP - Fresh Frozen Plasma; PPH - Post Partum Hemorrhage.

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