



Research article

A comprehensive study of maternal near-miss and maternal mortality at a rural tertiary care centre in north India

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ABSTRACT

Proper monitoring of maternal near miss as proposed by World Health Organisation provides a good opportunity for checking the quality of obstetric care and forming new strategies for the improvement of maternal health across the globe. The objective of present study was to assess and analyse the incidence of Maternal Near Miss and maternal mortality by using evaluation criteria of World Health Organisation. The present study was prospective observational study conducted at SHKM Government Medical College, Nalhar (Mewat), Haryana from the time period of January 2019 to December 2020. The study population included all the pregnant females who fulfilled the World Health Organisation criteria of maternal near miss were enrolled; their clinical and investigation parameters were recorded. In the present study, a total 7691 obstetric cases were admitted and 7219 were live births. The Maternal Near Miss cases were 292, and 48 were maternal deaths. Majority of patients were post natal and underwent vaginal delivery. The leading cause of near miss in current study was Post Partum Hemorrhage, followed by severe pre-eclampsia/eclampsia. Maternal Near Miss and Maternal Death cases have common pathology with a different outcome. So, monitoring a larger volume of Maternal Near Miss cases helps in identifying the causes of maternal adverse events and finding out the gaps in the management more effectively than auditing only the maternal deaths. This approach helps to overcome this issue and ultimately lead to an improved health system, thus decreasing maternal mortality rate.

Keywords: Maternal near miss, Maternal death, Obstetrics care, severe morbidity

Received - 03-06-2022, Accepted- 10-09-2022

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INTRODUCTION

Maternal mortality refers to deaths due to complications from pregnancy or child-birth. It has been used as a key indicator to evaluate the quality of maternal health care services provided in many countries [1]. From last few decades, Maternal Mortality Rate (MMR) has been significantly declined but many Asian and African countries has limited resources because of which risk of maternal mortality continues as compared to developed countries. However, spectrum of maternal morbidities varies from mild to severe [2]. In this regard, the World Health Organization (WHO) defines the criterion of severe maternal morbidity or Maternal Near Miss (MNM) as a woman who survive life-threatening conditions arising from complications occurred in pregnancy and childbirth, have many common aspects with those who die of such complications. MNM cases are more common as compared to maternal deaths (MD) [3]. Moreover, the main reasons and causes are same for both the conditions, so well planned review of MNM cases is likely to help to get valuable information regarding severe morbidity, which, if

remains untreated may lead to maternal mortality. There is need to start reviewing near miss cases as an effective audit of maternal care because of Variations in the prevalence of MNM cases in India. Near miss data is also an effective tool to design, implementing and following up safe motherhood programs [4]. Looking at the scenario, the Ministry of Health and Family Welfare, Government of India (GOI), in December 2014 released Maternal Near Miss guidelines. So, this study was planned to determine the frequency of MNM and identify the risk factors of MNM.

MATERIALS AND METHODS

This study was a prospective observational study carried out in the Department of Obstetrics and Gynaecology, SHKM Government Medical College & Hospital, Nalhar (Mewat), Haryana, India. It is a 550 Bedded hospital with 40 bedded Intensive Care unit and has 24 hours blood bank facility. It is a referral hospital for both public and private hospitals in Mewat and other surrounding areas of district Mewat like Palwal, Alwar, Sohna etc.

Our department has a 25 bedded labour room that works round-the-clock for emergency obstetric service for both low and high risk pregnant women.

The study population included all the pregnant women admitted to Department of Obstetrics and Gynaecology, SHKM Government Medical College & Hospital, Nalhar (Mewat), Haryana from January 2019 to December 2020.

Data Collection

All Important data for study was taken directly from patients and entered into a study proforma. Individual participants of the study were interviewed, so all information was directly obtained from the patients. Patient confidentiality regarding identity, hospital registration number, date of admission and treatment received was kept undisclosed. We act in accordance with WHO near-miss approach for maternal health for the present study.

WHO Inclusion Criteria

As per the WHO guidelines, any of the following conditions that is/are present during the stay of the patient in the hospital would be eligible for the study. Women who develop those conditions not related to pregnancy and after 6weeks postpartum are excluded from the study. Brought dead women or those who die on arrival at the hospital should be included because they are likely to represent cases involving a major delay in accessing care. All the cases were included irrespective of the gestational age at the time of complication (i.e. women having ectopic pregnancies or abortions and presenting with any of the inclusion criteria are eligible) [3].

The conditions are as follows

Severe Maternal Complications

Severe postpartum haemorrhage
Severe pre-eclampsia and Eclampsia
Sepsis or severe systemic infection
Ruptured uterus
Severe complications of abortion

Critical Interventions

ICU Admissions
Interventional radiology
Laparotomy for caesarean hysterectomy & ruptured ectopic excluding caesarean section)
Use of blood products

Life-Threatening Conditions for Near-Miss Criteria

Cardiovascular dysfunction

Shock, cardiac arrest (absence of pulse/ heart beat and loss of consciousness), use of continuous ionotropic and vasoactive drugs, CPR, severe hypoperfusion.

Neurological dysfunction

Extended unconsciousness (lasting ≥ 12 hours)/coma (including metabolic coma), stroke, uncontrollable fits/status

epilepticus

Uterine dysfunction

Uterine haemorrhage (antepartum or postpartum) or infection leading to hysterectomy.

Maternal Vital Status

Maternal near- miss and maternal mortality cases were identified among women with pregnancy related complications whose diagnosis met the above mentioned criteria and who were admitted in our hospital . All baseline investigations were done including investigations for anaemia, septicaemia, eclampsia and for organ system dysfunction/ failure.

Exclusion Criteria

Exclusion criteria of the present study exclude

Women who develop near miss status unrelated to pregnancy (i.e. not in the course of gestation or within six weeks of termination of pregnancy).

Critically ill women brought during pregnancy, labour or within 42 days of delivery or abortion who are mentally not sound to give consent for participation in the study at the time of admission will be excluded from the present study.

Patients who are not willing to participate in the present study.

Unconscious patients whose attendants do not want to get enrolled in the present study.

Data was collected and patient was categorised according to the nature of obstetric complication, timing of near miss cases with respect to admission and presence of organ system dysfunction.

Fetal outcome and mode of delivery was also noted. Comprehensive data of maternal mortalities for the underlying cause was noted and the detailed descriptive analysis was done. The final results were calculated in percentages. The incidence of near miss cases and maternal death to near miss ratio was calculated.

Various indices related to maternal health were calculated

Maternal near miss incidence ratio per 1000 live births.

Maternal near miss and mortality ratio

$$\text{Mortality index} = \text{MD}/(\text{MNM} + \text{MD}) \times 100$$

Maternal Mortality rate

RESULTS AND DISCUSSION

In the present study, a total 7691 obstetric cases were admitted, out of which 3090 were institutional deliveries at our hospital and rest 4601 were postpartum cases admitted with us as PPH, Ruptured uterus, abortions, ectopic pregnancies etc. and 7219 were live births including both institutional deliveries at our hospital and outside deliveries at private centres and home deliveries. Maternal near miss cases were 292 and 48 maternal deaths

Table 1: Distribution of cases on basis of age, parity, gestational age, modes of termination and status of antenatal booking

Categories	Sub- categories	Maternal Near Miss Cases (N=292) N (%)	Maternal Death (N=48) N (%)
Age of Patients (years)	18-22	92 (31.5%)	18 (37.5%)
	23-28	126(43.1%)	09 (18.7%)
	29-34	61(20.8%)	08 (16.7%)
	>35	23 (7.87%)	13(27.1%)
Parity	Primi	176 (60.2%)	31(64.5%)
	Multi	116(39.7%)	17 (35.4%)
Gestational age (weeks)	<12 weeks	44 (15%)	03(6.2%)
	12-28 weeks	30 (10.2%)	05(10.4%)
	>28 weeks	62(21.2%)	17(35.4%)
	Post natal	156(53.4%)	23 (47.9%)
Modes of termination	Vaginal deliveries	131(44.8%)	32(66.7%)
	LSCS	91(31.1%)	02 (4.16%)
	Laparotomy for ruptured ectopic	25(8.5%)	02(4.16%)
	Dilatation and Evacuation	19 (6.5%)	0
	Cesarean Hysterectomy for severe PPH	15(5.1%)	07 (14.5%)
	Laparotomy for ruptured uterus	11(3.7%)	05(10.4%)
Status of Antenatal booking (booked/unbooked)	Booked	41(14%)	11(22.9%)
	Unbooked	251(85.9%)	37(77.1%)

As per Table 1 majority of near miss cases (31.5%) were observed in 18-22 years of age group whereas 37.5 % cases of maternal death were found in same age group. On the basis of parity, Primipara cases were higher in both near miss (60.2 %) and maternal death group (64.5 %) in comparison to multipara group. Majority of patients were post natal in near miss group (53.4%) as well as maternal death group (47.9 %). Most of the patients of both groups were underwent vaginal delivery 44.8% in near miss and 66.7 % in maternal death group respectively.

Table 2: Distribution of cases on the basis of causes

Causes	Near Miss N (292) (N %)	Maternal Death N (48) (N %)
PPH with haemorrhagic Shock	156 (53.4%)	22 (45.8%)
Severe Pre-eclampsia/ Eclampsia	58 (19.8%)	15(31.2%)
Sepsis	42 (14.3%)	03(6.25%)
Ruptured Ectopic	25(8.56%)	02(4.16%)
Ruptured uterus	11(3.76%)	06 (12.5%)

Table 2 shows the distribution of near miss and maternal death cases on the basis of causes. The major causes of near miss cases were PPH with haemorrhagic shock (53.4%), followed by Severe preeclampsia/ eclampsia (19.8 %) and sepsis (14.3 %). In maternal death group, PPH with haemorrhagic shock (45.8%) were the leading causes followed by severe pre eclampsia/ eclampsia (45.8 %) and sepsis (31.2 %).

Out of 156 PPH cases, 27 had PPH after institutional delivery at our hospital; rest 129 cases had deliveries at some private centres or home deliveries. Out of 42 sepsis cases 19 were of septic abortions and 23 of puerperal sepsis.

Table 3 summarizes the near miss cases incidence ratio per 1000 live births and mortality index on the basis of causes. Our study shows that mortality index is very high in our hospital with highest for patients came with ruptured uterus (35.29 %) followed by Severe

Pre-eclampsia/Eclampsia (20.54).

Table 3: Maternal near miss incidence ratio per 1000 live birth and mortality index

Causes	Total NM cases	NM cases in 1000 live birth	Causes Mortality index= MD / (MNM+MD) × 100
PPH with haemorrhagic Shock	156	21.60	12.35
Severe Pre-eclampsia/ Eclampsia	58	8.03	20.54
Sepsis	42	5.81	6.67
Ruptured Ectopic	25	3.46	7.40
Ruptured Uterus	11	1.52	35.29

Maternal mortality and near miss cases are continuously increasing despite of the therapeutic advances in medical science. Cases of near miss are more common than maternal death hence to overcome this challenge reliable and well planned quantitative analysis can be carried out, which can give more comprehensive profile of obstetric care system functioning [5]. It is very important to identify gaps in the healthcare system and need of well co-ordinated approaches and strategies to resolve them which ultimately helps to achieve the goal of improved maternal health [6]. Many studies of developing and developed countries have reported prevalence of near miss about 10.1 % and 8.2 % respectively [7].

Our study is first attempt to document both maternal near miss and maternal mortality in our hospital which is based in rural area of Haryana. It is important to note that most of the women who experienced maternal near miss were admitted as unbooked emergencies in our hospital. The maternal near miss incidence ratio (MNM) was 40.45/1000 live birth in our hospital. Many studies of developing countries show the similar trend which varies from 15-40/1000 live births. In the present study high maternal near miss cases were observed which clearly indicates that our hospital receives

critical ill patients from all the surrounding areas and nearby districts. Most of the patients are referred in terminal stage. Other main reason is lack of education and awareness of patients as our hospital situated in the most backward district of India. In the present study a total 7691 deliveries were observed, in which 7219 were live births, 292 were near miss cases and 48 maternal deaths.

In our study majority of near miss (31.5%) and maternal death (37.5%) cases are of 18-22 years of age group which is similar to many Indian studies [8]. Various studies conducted in developing countries shows preeclampsia was the leading cause in maternal near miss [9, 10]. PPH with haemorrhagic Shock (53.4%) followed by Severe Pre-eclampsia/Eclampsia 58 (19.8%) were the main causes of maternal near miss cases in our study which coincides with the studies of Deepti Gupta *et.al.* and Singh *et.al.* [11, 12]. Total 48 Maternal deaths were observed in our study and leading cause was PPH with haemorrhagic Shock (45.8%) followed by Severe Pre-eclampsia (31.2%). Most of the patient of maternal death group came to our hospital at critical ill stage and died within 24-48 hrs. Maternal mortality index in our hospital is 14.12. This is very high. Near miss to mortality ratio was 6.08:1 which means for every 6 life threatening conditions there was one maternal death. African countries also show similar near miss to mortality ratio, where the range is 5-12:1. It clearly indicates that higher the mortality index, more the patient with the life threatening conditions dies. Improvement at community level is needed specially awareness regarding antenatal visits among the public Proper trainings should be arranged for health care workers working in primary health centres and community health centres for management of maternal complications [13].

CONCLUSION

The cases of maternal near miss and maternal deaths that occur in our tertiary care centre is high because of unbooked emergencies and most of the referred patients are in terminal stage. Our finding also suggests that comprehensive framework should also be developed for complicated cases to prevent maternal mortality. Monthly audit of maternal near miss and maternal death cases should be mandatorily done to strengthen the obstetric care. Proper documentation, analysis and interpretation of maternal near miss and maternal death cases will help in improvement of maternal health.

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How to cite this article

Vishal Sharma, Shipra Misra, Ravi Dutt Wadhwa, 2022. A comprehensive study of maternal near-miss and maternal mortality at a rural tertiary care centre in north India. *Journal of medical pharmaceutical and allied sciences*, V 11 - I 5, Pages - 5217 – 5220. Doi: 10.55522/jmpas.V11I5.3791.