

RESEARCH ARTICLE

A study to evaluate near miss obstetrics event and maternal deaths in tertiary care centre - Bikaner

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ABSTRACT

Objective: A study to evaluate near miss obstetrics event and maternal mortality in a tertiary care centre.

Methodology: It was a prospective observational study conducted in the Department of Obstetrics & Gynaecology, Sardar Patel Medical College and PBM hospital Bikaner from January 2016 to December 2016. All patients fulfilling the WHO criteria of maternal near miss and all maternal deaths admitted during study period were included in the study. **Result:** During the study period there were 25875 admissions and 16071 deliveries with 15587 live births. There were 239 near miss events and 47 maternal deaths. The maternal death to near miss ratio was 1:5.08. Among the near miss cases 56.9% cases were multipara, 47.3% case were in the age group of 21-25 years, and 58.6% cases belong to gestational age >28 weeks. The most common type of events in near miss was haemorrhage (51 %), severe hypertension (23%), and puerperal sepsis (7.1%). Similarly in maternal death group most common event were haemorrhage (40%), severe hypertension (25.5%) and sepsis (19.1%). Mortality index was 19.84%.

Conclusion: Despite improvements in health care, haemorrhage, PIH, eclampsia, sepsis and severe anaemia remain the leading obstetrics cause of near miss and maternal mortality.

Keywords: Maternal death, near miss, haemorrhage.

According to the latest report of the Registrar General of India's Sample Registration System (RGI-SRS; the sole source of data for fertility and mortality in India), the maternal mortality ratio (MMR) in India has registered a decline from 212 per 1, 00,000 live births in the period 2007-09 to 178 in 2010-12 ¹. It has declined further to 167 per 1,00,000 live births in the period 2011-13 ². Globally an estimated 2,87,000 maternal deaths occurred in 2010, when the global maternal mortality ratio was 210 maternal deaths per

1,00,000 live births. At the country level, India accounted for 19% (56,000 in numbers) of all global maternal deaths³. This grim state of affairs exists despite the fact that India has come a long way in reducing maternal mortality due to a range of government-led efforts.

World Health organization (WHO) defines maternal death as: "death of a women while pregnant or within 42 days of termination, irrespective of duration and site of pregnancy from any related to or aggravated by

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pregnancy or its management but not from accidental or incidental causes”⁴.

Maternal mortality in a resource poor nation has been attributed to the “3 delays”⁵ – 1) Delay in deciding to seek care, 2) Delay in reaching care in time, 2) Delay in receiving adequate treatment.

Severe acute maternal morbidity (SAMM) is superior over 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. Till recently there were no recent criteria for identification of these cases for routine implementation, and wider application of this concept was limited⁶. But in 2009, WHO has come up with clinical, laboratory and management criteria for the identification of these cases⁷.

This transition from studying death to studying maternal morbidity has followed a worldwide trend because the absolute number of deaths is relatively small as compared to number of cases of MNM which thus generate more information. Secondly data on maternal morbidity are more accessible and reliable as the woman is herself a source of information. Thirdly, near miss audit (NMA) has a greater acceptability among individuals and institutions since death did not occur. NMAs therefore provide useful information to health practitioner and policy makers about the strengths and weaknesses of the emergency obstetric care provided at a facility. This helps in formulation and revision of obstetric policies and practices in the facility⁸.

The etiological factors for both near miss and maternal death are same. Evaluation of these circumstances surrounding near miss can give us a lot of tools to know the exact etiology, treat it in its early stage and prevent death. Proper training of the health care personnel to combat these life threatening events at the grass root level and to refer it to higher centre whenever necessary is very crucial in the prevention of maternal death.

Material and Methods

This prospective hospital based study was conducted in the Department of Obstetrics and

Gynecology, P.B.M and Associated Group of Hospitals, attached to Sardar Patel Medical College, Bikaner during period of one year from Jan 2016 to Dec 2016. Ours is a tertiary hospital providing antenatal care and obstetric services for both low risk and high risk women. The near miss cases were identified by the WHO criteria 2009.

WHO Inclusion criteria

According to WHO, any of the following conditions that is/are present during their stay at the health-care facility would be eligible. Women that develop those conditions unrelated to pregnancy (i.e. not during pregnancy or 42 days after termination of pregnancy) are not eligible. Women who are already dead when they are brought to the health-care facility or those who die on arrival at the facility should be included because they are likely to represent cases involving a major delay in accessing care. The eligibility is not restricted by gestational age at which complications occurred (i.e. women having abortions or ectopic pregnancies and presenting with any of the inclusion criteria are eligible).

The conditions are as follows -

1. Severe maternal complications
 - Severe postpartum haemorrhage
 - Severe pre-eclampsia
 - Eclampsia
 - Sepsis or severe systemic infection
 - Ruptured uterus
 - Severe complications of abortion
2. Critical interventions or intensive care unit use
 - Admission to intensive care unit
 - Interventional radiology
 - Laparotomy (includes hysterectomy, excludes caesarean section)
 - Use of blood products
3. Life-threatening conditions (near-miss criteria)
 - Cardiovascular dysfunction — Shock, cardiac arrest (absence of pulse/ heart beat and loss of consciousness), use of continuous vasoactive drugs, cardiopulmonary resuscitation, severe hypoperfusion (lactate >5 mmol/l or >45 mg/dl), severe acidosis (pH <7.1)

- Respiratory dysfunction— Acute cyanosis, gasping, severe tachypnea (respiratory rate >40 breaths per minute), severe bradypnea (respiratory rate <6 breaths per minute), intubation and ventilation not related to anaesthesia, severe hypoxemia (O₂ saturation <90% for ≥60 minutes or PAO₂/FiO₂ <200)
- Renal dysfunction — Oliguria non-responsive to fluids or diuretics, dialysis for acute renal failure, severe acute azotemia (creatinine ≥300 μmol/ml or ≥3.5 mg/dl)
- Coagulation/haematological dysfunction — Failure to form clots, massive transfusion of blood or red cells (≥5 units), severe acute thrombocytopenia (<50 000 platelets/ml)
- Hepatic dysfunction — Jaundice in the presence of pre-eclampsia, severe acute hyperbilirubinemia (bilirubin >100 μmol/l or >6.0 mg/dl)
- Neurological dysfunction — Prolonged unconsciousness (lasting ≥12 hours)/coma (including metabolic coma), stroke, uncontrollable fits/status epilepticus, total paralysis
- Uterine dysfunction — Uterine haemorrhage or infection leading to hysterectomy

4. Maternal vital status - Maternal death.

The following data were collected for all the patients: age, parity, gestational age at the time of classification of near miss, previous history of morbidity, the type of delivery, antenatal booking (more than 3 antenatal visits to our hospital), the cause of morbidity, duration of ICU stay, the cause for ICU admission, use of any blood and its products and any surgical intervention to save the life of the mother. All patients fulfilling the WHO criteria of maternal near miss and all maternal deaths admitted during study period were included in the study.

The following indices will be calculated: (1) Maternal near miss incidence ratio (MNMIR) refers to the number of near miss cases per 1,000 live births (MNMIR =MNM/LB), (2)Maternal near miss to mortality ratio: Proportion of cases of near miss to maternal deaths (MNM: MD), (3) Mortality index: Number of maternal deaths divided by the total number

of women with life threatening conditions expressed as a percentage (MI = MD/ (MNM + MD) × 100), (4) Maternal mortality ratio (MMR) refers to the number of maternal deaths per 1, 00,000 live births (MMR = MD/LB).

Results

During the study period, there were 25,875 obstetric admissions, 16,071 deliveries and 15,587 live births.

Table 1: Study Profile

Period	January to December 2016
Total number of obstetric admission	25875
Total Deliveries	16071
Total Live Births	15587
Total Near Miss Cases	239
Total Maternal Deaths	47
Near miss rate (MNM/LB)	15.33/1000 Live Births
Maternal Mortality Ratio (MD/LB)	301.53/100000 Live Birth
Near Miss : Maternal Death Ratio	5.08:1
Mortality Index (MD/MNM+MD)	0.164
Severe maternal rate (MNM+MD)/LB	18.34/1000 Live Births

There were 239 near miss cases and 47 maternal deaths. Maternal mortality ratio was 301.53/100000 live births while near miss to maternal death ratio was 5.08:1. Maternal near miss ratio was 15.33/1000 live births. Mortality index was 16.4%. Most common age group affected in the near miss cases were 21-25 years (47.3%). While 103 cases (43.1%) were primipara; 136 (56.9%) cases were multipara. On the otherhand, 140cases (58.60%) were in the third trimester or intrapartum period indicating that late pregnancy and delivery is the worst affected period. In the mortality group, 42.6% cases were age group of 26-30 years. In this group, 63.8% were multipara. Similarly, third trimester of pregnancy along with labour complications occurred in 70.2% of mortality cases. The booking status showed that 42 (17.6%) near miss cases were booked, cases (82.4%) were unbooked and 90 (37.7%)

Table 2: Showing distribution of cases according to age, parity and gestational age in both the groups

Factors		Near-miss (N=239)	Maternal death(N=47)
		N (%)	N (%)
Age	<20 yrs	38(15.9%)	3(6.4%)
	21-25 yrs	113(47.3%)	18(38.3%)
	26-30 yrs	65(27.2%)	20(42.6%)
	>30 yrs	23(9.6%)	6(12.8%)
Parity	Primi	103(43.1%)	17(36.2%)
	Multi	136(56.9%)	30(63.8%)
Gestatio -nal Age	<12 wks	36(15.1%)	2(4.3%)
	12-28wks	26(10.9%)	4(8.5%)
	>28 wks	140(58.6%)	33(70.2%)
	Post-natal	37(15.5%)	8(17.0%)

cases were referred. The most common types of near miss events were haemorrhage, severe

Table 3: Showing distribution of cases according to primary obstetric event in both the groups

Primary Obstetric Event	Near Miss (n=239)		Maternal Deaths (n=47)	
	No.	%	No.	%
Severe Pre-eclampsia	13	5.4	3	6.4
Eclampsia	42	17.6	9	19.1
Ectopic	31	13.0	1	2.1
Abortion	4	1.7	1	2.1
APH	31	13.0	4	8.5
PPH	56	23.4	13	27.7
Puerperal Sepsis	57	7.1	9	19.1
Rupture Uterus	26	10.9	2	4.3
Retained Placenta	3	1.3	0	-
Placenta Accreta	2	0.8	0	-
Maternal Medical Disease	12	5.0	2	4.3
Fulminant Hepatic Failure	2	0.8	2	4.3
Uterine Inversion	0	0	1	2.1

hypertension and puerperal sepsis responsible for 51%, 23 % and 7.1 % cases respectively. Late pregnancy haemorrhage (APH and PPH) accounted for 36.4% of near miss events. These events caused cardiovascular dysfunction in 137 cases (57.3%) neurological dysfunction in 40 (16.7 %) cases, hepatic

Table 4: Showing mode of delivery/ termination of pregnancy in both the groups

Intervention	Near- miss (n=239)	Maternal death (n=47)
Undelivered/Postpartum	7(2.9%)	12(25.5%)
Vaginal delivery	75(31.4%)	13(27.7%)
LSCS	72(30.1%)	16(34%)
Laparotomy for Rupture		
Uterus	21(8.8%)	2(4.3%)
Laparotomy for Rupture		
Ectopic	31(13%)	0
Dilatation and		
Evacuation	3(1.3%)	3(6.4%)
Uterovaginal		
Exploration	30(12.6%)	1(2.1%)

dysfunction in 19 (7.9%) cases. In the mortality group, the most common complications were hemorrhage, severe hypertension and puerperal sepsis responsible for 40.4%, 25.54% and 19.1% cases respectively. Regarding mode of delivery or end of pregnancy in the near miss cases; most cases (31.4%) had vaginal delivery and 30.1% cases had LSCS. In the mortality group, 34% cases had LSCS and 31.4% cases had vaginal delivery while 25.5% cases were undelivered. In this study the most common WHO clinical criteria was shock and the laboratory criteria was acute thrombocytopenia and the management based criteria was use of vasoactive drugs in 38 cases.

Discussion

In this study, maternal near miss incidence ratio (MNMIR) was 15.33/1000 live births. A similar study in Roopa et al⁹ showed an incidence ratio of 17.8/1000 live births. High numbers imply that there are more sick mothers who survived the disaster. Prevalence of near miss cases in the neighborhood countries like Nepal was found to be 23/1000 live births¹⁰. The near miss to mortality ratio was 5.08:1, which mean for every 6 women who suffered life threatening condition, one woman died. The study by Roopa et al⁹ showed near miss mortality ratio of 5.6 : 1 whereas a study

Table 5: Comparison of various studies with present study

Indian studies	MNMR (per 1000 live birth)	Mortality Index(%)	Near miss : death ratio	Most common direct cause
Taly et al. Jaipur	-	13.79%	6.2:1	Hemorrhage(60%), hypertension(34%), sepsis(4%)
Sarma et al. Assam	42.10	20.4%	3.9:1	Hemorrhage(42%), eclampsia(39%), severe anemia(18%)
Roopa et al. Karnataka	17.80	14.9%	5.6:1	Hemorrhage(44%), hypertensive disorders(23%), sepsis(16%)
Nacharaju et al. Telangana	9.2	8.3%	11:1	Hemorrhage(31.7%), severe pre-eclampsia(18.1%)
Singh et al. Raipur	15.18	32.58%	2:1	Hypertension(38.8%) , hemorrhage (22.2%)
Present Study	15.33	16.4%	5.08:1	Hemorrhage(51%), Hypertension(23%), sepsis(7%)

conducted in Nepal showed a ratio of 7.2:1¹⁰. Studies carried out in Europe^{6,11,12} revealed a ratio of 117-223:1. Progressively increasing ratio denotes improvements in obstetric care. So instead of a single estimation, yearly estimation may help us in improving the care provided. It has been observed that 47.3% of near miss cases occurred in the age group of 21-25 years indicating that early marriage and pregnancy, lack of education, poverty are the root cause of these events. In our study, the mean age was 25.26 years and 26.74 years in MNM group and MD group respectively. Similar observation were found in study by Kalra et al¹³ in which the mean age of the near miss patients was 24 ± 3.11 years, while that of mortality group was 26 ± 2.44 years. Most of the women in both the groups never received antenatal care (82.4% patients in MNM group and 83% in MD group). This result is comparable from Kushwah et al in which 74% patients in near miss group never received ANC¹⁴. With proper antenatal care high risk pregnancy can be identified, treated or referred before they turn in to near miss condition or become maternal mortality.

Hemorrhage is the most common cause of maternal morbidity in our study contributing to 51%. Similar

observations were reported by Mustafa et al¹⁵. Hypertensive disorders of pregnancy contributing to 23% in maternal near miss and 25.5% in maternal death group. A retrospective observational study conducted by FOGSI from 2005 - 2007 in India observed hypertension as the leading cause of maternal death¹⁶. Souza et al from Brazil reported hypertensive syndromes as the most commonly associated (57%) cause for near miss cases¹⁷.

In present study the most common level of delay was identified at the patient level i.e. Type I Delay (39.7%) in near miss cases and 66% in maternal deaths. It corresponds with the study conducted by Singh et al¹⁸ in which first delay was observed as the major cause of delay (44%) in MNM groups. Thus educating just women only about importance of health care is not sufficient but it has to be done at community level.

Regarding mode of delivery or end of pregnancy most of the MNM cases delivered vaginally (31.4%), whereas in MD group most cases delivered by cesarean section (34%). Similar results were seen in study by Sarma et al¹⁹.

Conclusion

There is a high occurrence of near miss events

among pregnant women admitted at P.B.M hospital. These life threatening near miss events are mainly due to haemorrhage (APH and PPH). Near misses also occur following septic abortion, severe hypertension, puerperal sepsis and severe anaemia.

Conflict of interest: None. **Disclaimer:** Nil.

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