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Research Article

STUDY OF MATERNAL NEAR MISS CASES- "A NEW ROAD TO BE TAKEN TO DECREASE MATERNAL MORTALITY"

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ABSTRACT
While in developed countries VTE and heart disease have taken over primary obstetrical cause of maternal mortality and morbidity, in our country still major causes are haemorrhage followed by sepsis and pre-eclampsia, which could be easily identified and managed. Due to small number of cases of mortality, the evaluation of its preceding events has become really difficult. By studying the near miss case we can easily judge both flaws and positive elements in our obstetric services. A retrospective study was done from May 2014 –April 2015 in NDMC medical college & Hindu Rao Hospital, Delhi. Among all obstetrical admissions those with life threatening conditions were classified under criteria of identifying maternal near miss cases (WHO, 2009). Various factors responsible for mortality and morbidity during that period were studied. Total 148 obstetrical cases with life threatening situation were analysed. Out of these 19 were maternal deaths and 129 were maternal near miss cases. Major organ system dysfunction leading to maternal morbidity is cardiovascular (CVS) (50%), but it has low fatality of 9.8%. Renal disease though less common (20%) has high case fatality of 19.3. Hemorrhage (47%) and sepsis (21%) were the major factors for maternal mortality. WHO working group recommends that maternal near miss approach be considered in national plans. A review of near miss cases helps to delineate the continuing threats to maternal health and type of support service required.

Keywords: *Maternal Near Misses, Maternal Morbidity, Maternal Mortality*

INTRODUCTION
As we have moved in 2016 we have realized that our goal 5 of MDG (millennium development goal) i.e. reducing maternal mortality rate by 75% has fallen far below (Nielsen and Eggbo, 2012). Presently worst performing health indicator in a resource poor setting in our country is “MMR” (maternal mortality rate). Two countries in the world accounted for one third of all global maternal deaths: India at 15% (45,000) and Nigeria at 19% (58,000) (WHO *et al.,* 2015). While in developed countries VTE (Venous thromboembolism) and heart disease have taken over primary obstetrical cause of maternal mortality (WHO *et al.,* 2015), in our country still major cause are haemorrhage followed by sepsis and pre-eclampsia, conditions which could be easily identified and managed. According to Annual Health Survey (AHS) (2011), institutional delivery is less than 60% in India. Many deliveries occurred at home without skilled attendance and ended in complications as a result of poor resources.

Due to small number of cases of mortality, the evaluation of its preceding events has become really difficult. In any setting, women who develop severe acute morbidity during pregnancy share many pathological and circumstantial factors related to their condition. While some of these women die, a proportion of them narrowly escape death, which constitutes “maternal near miss case”. It is defined by WHO as "women who nearly died but survived a complication that occurred during pregnancy, child birth or within 42 day of delivery” (Say *et al.,* 2009). By evaluating these cases (both “near-miss” cases and maternal deaths), one can learn how to deal with maternal morbidities and judge both flaws and positive elements in the obstetric services.

The concept of near miss is not a new one and it has been used since 20 years by the name of “severe acute maternal morbidity” (SAMM). Due to lack of uniform identification criteria, the concept of SAMM was not routinely implemented. In 2009 WHO came up with a uniform set of criteria aiming its universal application for monitoring and improving quality of obstetric care in order to reduce maternal deaths and

improve maternal health (Say *et al.,* 2009). A list of identification criteria was proposed together with one single definition.WHO has included Mantel's and Waterson's criteria so that chance of missing any case of morbidity is minimized. According to Mantel's criteria a 'near-miss' is described on the basis of an acute organ system dysfunction, which if not treated appropriately, could result in death of the mother (Mantel *et al.,* 1998) while Waterson's criteria included clinical and laboratory criteria (Waterstone *et al.,* 2001).

MATERIALS AND METHODS

A retrospective study was done from May 2014 –April 2015 in NDMC medical college & Hindu Rao Hospital, Delhi. Among all obstetrical admissions life threatening conditions were identified and the cases were classified under criteria of identifying maternal near miss cases (WHO, 2009) as shown in table no. 1 (Say *et al.,* 2009). Any woman who was pregnant, in labour, or who delivered or aborted or had ectopic pregnancy up to 42 days ago and presented at the health-care facility with any of the conditions as listed in the table 1 was included in the study. Women who were already dead when brought to the hospital or those who died on arrival at the hospital were also included as they represent cases involving a major delay in accessing health care facility. Various factors responsible for mortality and morbidity during that period were studied.

Table 1: WHO Maternal near Miss Identification Criteria

Dysfunctional System	Clinical Criteria	Laboratory Markers	Management Based Proxy
Cardiovascular	Shock Cardiac arrest	Severe hypo perfusion (lactate>5mmol) Severe acidosis (ph < 7.1)	Use of continuous vasoactive agents Cardiopulmonary resuscitation
Respiratory	Acute cyanosis Gasping Severe tachypnoea (RR > 40 bpm) Severe bradypnoea (RR < 6 bpm)	Severe hypoxemia (oxygen saturation < 90% for ≥ 60 min)	Intubation and ventilation not related to anesthesia
Renal	Oliguria non responsive to fluids or diuretics	Severe acute azotemia (creatinine ≥ 3.5 mg/dl)	Dialysis for acute renal failure
Haematolagical/ coagulation	Failure to form clots	Severe thrombocytopenia (platelet <50,000)	Massive transfusion of blood/red cells (≥5 units)
Hepatic	Jaundice in presence of preeclampsia	Severe acute hyperbilirubinemia (bilirubin > 6mg/dl)	
Neurological	Prolonged unconsciousness lasting >12hr Stroke Status epilepticus Global paralysis		
Alternative severity proxy			Hysterectomy due to hemorrhage or infection

RESULTS AND DISCUSSION

Results

Total 148 obstetrical cases with life threatening situation were analysed. Out of these 19 were maternal deaths and 129 were maternal near miss cases. Maximum complications were seen in age group of 20 to 25years (52%) and among nulli para (30%) and primi para (31%) [Table 2]. 55% patients were from lower socioeconomic status [Table 3]. The major organ system dysfunction leading to maternal morbidity was cardiovascular system (50%), but it had low fatality rate **(**9.8%**)** compared to other systems. Renal disease though less common (20%) but case fatality rate with it was the highest (19.3%) followed by hepatic dysfunction (14.2%) [Table 4]. On distributing the cases according to primary causes of maternal mortality and morbidity, it was found that hemorrhage (47%) and sepsis (21%) were the major causes for maternal death. Though pre-eclampsia and ectopic shared a bigger percentage in maternal near miss cases (25% and 21% respectively) but they were less important cause of maternal mortality (15.7% and 10.5%) in comparison to sepsis which was second only to hemorrhage in mortality causes due to its high fatality of 14.2% [Table 5].

Table 2: Distribution of Cases According to Age and Parity

Age / Parity	Nulli	Primi	Second	Third	Fourth
<19yr	2	2			
20-25yr	30	20	10	14	3
26-30yr	10	20	13	8	4
31-35yr	3	3	2	2	1
>35yr		1			

Table 3: Distribution of Cases According to Socioeconomic Status

Socioeconomic Group	Higher	Middle	Lower
Maternal death	1	7	11
Maternal near miss	17	42	70

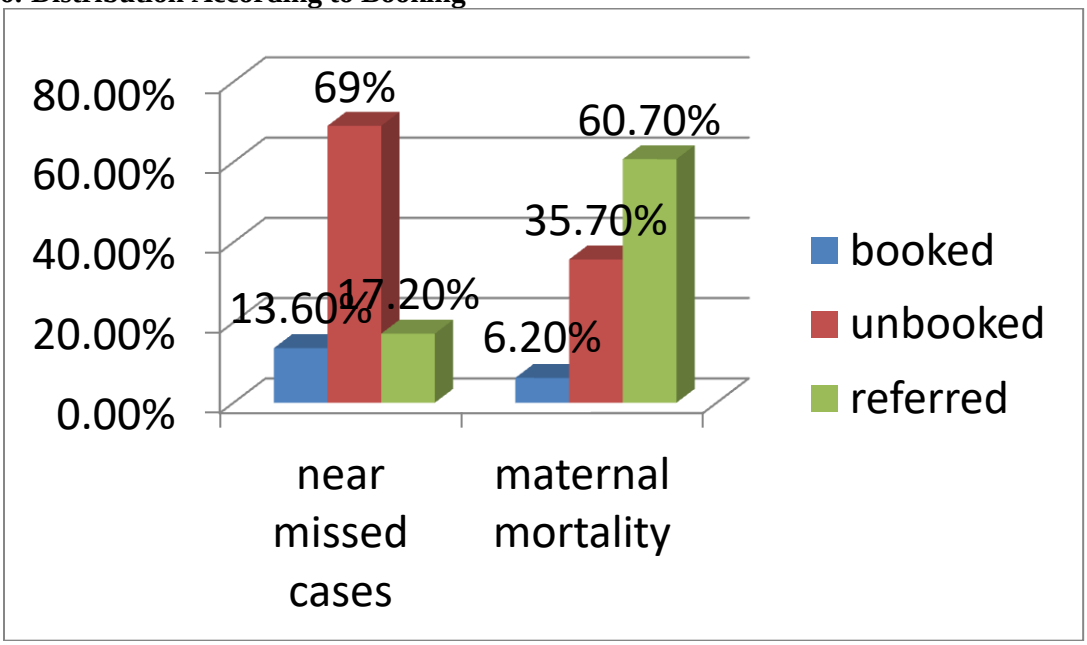
Table 4: Distribution of Maternal near Miss and Maternal Death According to Major Organ Dysfunction

Organ Dysfunction	Near Miss	Mortality	Case Fatality
Cardio Vascular System	64 (50%)	7(35%)	9.8%
Renal	25 (20%)	6(31.5%)	19.3%
Respiratory System	18 (14%)	3(16.6%)	14%
Coagulation	15 (12%)	2(9.4%)	11.7%
Hepatic	6 (4.5%)	1(6.8%)	14.2%
Central Nervous System	1(1.2%)	0	

Table 5: Distribution of Patients According to the Primary Cause of Maternal Morbidity and Mortality

Primary Complications of Pregnancy	Total Cases (148)	Maternal near Miss Cases (129)	Maternal Death (19)	Case Fatality (%)
Haemorrhage	54 (36.5%)	45 (34%)	9(47%)	16.6
Pre-eclampsia	36 (24%)	33(25%)	3(15.7%)	8.3
Ectopic	29 (19.6%)	27(21%)	2(10.5%)	6.8
Sepsis	28 (19%)	24 (18.6%)	4(21%)	14.2
Medical disorder	5 (3.4%)	4 (3%)	1(5.2%)	
Molar pregnancy	2 (1.3%)	2 (1.5%)	0	
Retained placenta	2 (1.3%)	2 (1.5%)	0	

Table 6: Distribution According to Booking



The major toll of cases in near miss category was unbooked (69%) but among maternal mortality major group was that of referred one (60.7%) [Table 6]. Duration of ICU stay was one hour to 5 days in the mortality group while in maternal near miss group it was 36 hours to 19 days [Table 7].

Table 7: Distribution According to Duration of ICU Stay

Group	Minimum	Maximum
Near Miss	1.5days	19days
Mortality	1hr	5days

Discussion

Although maternal mortality remains a significant public health problem, maternal deaths are rare in absolute numbers especially within a community, so that assessment of effects of care is difficult. To overcome this challenge, notion of severe acute maternal morbidity (SAMM) and near miss event was introduced which was later modified (Koblinsky, 1995).

Present study was conducted on 148 patients out of whom 129 were near miss. In our hospital ratio of near miss to mortality was 7:1, far away from countries like Syria which have ratio of 60:1 (Almerie *et al.*, 2010) and European countries with ratio of 117-223:1 (Roosmalen and Zwart, 2009). If ratio increases over time it reflects advancement in obstetric care. One of the primary reasons for improvement in maternal mortality rates in these countries has been an understanding of the aetiology of maternal death. Maternal near miss incidence ratio to live birth in our hospital was 15/1000. Studies in other developing countries have shown similar trend with ratio ranging from 15-40/1000 live births (Say *et al.*, 2009).

CVS complications accounted for 50% of morbidity but case fatality associated with it was 9.8% in our study, thus, implying that we have better control over CVS complications which included shock, hypo perfusion or acidosis. On the other side renal disease was responsible for 20% of all near miss cases but case fatality was high (19.5%), which shows the deficiency in the better treatment of such cases. There is non availability of dialysis at most of the centres.

Kalra and Kachhwaha, (2014) found hemorrhage (56% cases) and hypertension (17.8% cases) as major causes for near miss obstetric morbidity. Our study showed that the major cause of near miss was hemorrhage (36.6%) with high case fatality (16.6%). Majority of the women experiencing near miss

events were in critical condition upon arrival in hospital. Thus, establishment of a 24 hour working blood bank in all tertiary centers is important along with basic training in PPH management of every health worker is indispensable.

Hypertensive disorders were also a major cause of maternal near miss (23%) but its case fatality was low due to awareness regarding disease among patients and health workers. Sepsis though a major cause of maternal morbidity (18.6%) but had highest mortality ratio (21%). So, availability of all broad spectrum antibiotics as well as training on its early identification and early referral is a major step to be taken to improve our maternal health services.

Transfer to ICU is an important criterion in identification of near miss case. In a study by Say *et al.,* (2009) duration of ICU stay in critically ill patients ranged from 10 min to 16 days, while in our study it ranged from 1.5 days to 19 days.

In our study, 69% cases were unbooked in the near miss category while 60.7% were referred and 35.7% were unbooked in the maternal mortality group which may be due to lack of awareness, illiteracy, non availability of nearby health facility and delay in seeking medical help. It is despite all international and national efforts stressing the importance of antenatal booking. Thus, the patients lacking the much required antenatal visits during their pregnancy are the ones landing into complications due to delay in diagnosis of developing pathology which later leads to dreadful results.

Maternal mortality in resource-poor nations has been attributed to the "3 delays": delay in deciding to seek care, delay in reaching care in time, and delay in receiving adequate treatment (Maternal United Nations Population Fund (UNFPA), 2003).

Majority of maternal near miss cases in our study were being referred from maternity centre or private hospitals. The "first delay" which is described as failure of recognition that a serious complication has occurred is an important avoidable barrier. Delay in decision to seek medical help on part of women and family and traditional birth attendants are an important pre hospital barrier. Ours is a tertiary care centre catering population of surrounding area and gets referral from all primary health centers and surrounding district hospitals.

Not only the delay in patient identifying its health problem and seeking medical help late is a major cause of poor health status but also delayed referral in already a moribund state when pathology has reached to an irreversible state is a major cause for critical illness of the women in our study. Major advantage of studying near miss cases is that patient is alive and one can interview regarding the missed opportunities at both administrative and patient level.

Conclusion

Obstetric death may represent quality of maternal health care but in present scenario does not reflect complete status of a health service. Hence, a 'near miss' criterion takes over maternal mortality. A review of near miss cases helps to delineate the continuing threats to maternal health and type of support service required. It is recommended that maternal near miss approach be considered in national plans.

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