

## STUDY OF MATERNAL NEAR MISS AND MATERNAL DEATHS IN A RURAL HOSPITAL: AN AUDIT

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### Abstract:

**Background:** Monitoring of maternal near miss cases are now being considered as a measure of the quality of maternal health care. The study of maternal near miss helps to identify causes of severe maternal complications and in turn implement changes in the treatment strategies and improve the obstetric care.

**Aims and objectives:** To find the incidence of maternal near miss (MNM), Maternal deaths (MD), mortality index ( $MI=MD/MNM+MD$ ). To assess the direct and underlying cause for near miss morbidity and mortality; To study the complications encountered and critical interventions needed.

**Materials and methods-**This was a prospective observational study conducted in Rural Tertiary Medical College from Jan 2021 to Jan 2022.

**Results:** There were a total of 2750 deliveries and 2725 live births during the study period, 46 cases were maternal near miss cases. There were 4 maternal deaths. Majority of patients were between 25-29 yrs. Both morbidity and mortality were higher in the multigravida patients. In our study most of the patients with life threatening conditions were in the first trimester, between the gestational age of 1-12 weeks, majority of the cases underwent laparotomy for ectopic pregnancy. Most of the near miss cases were unbooked (no antenatal visit in our hospital n=37). Haemorrhage was the leading cause of MNM cases followed by Hypertensive disorders. Majority of the cases with haemorrhage were due to ruptured ectopic followed by abruptio placentae and placenta previa. There were 46 maternal near miss cases and 4 maternal deaths.

**Conclusion:** Study of near miss cases is an important indicator of obstetric care and thus helps improve the health system by implementing changes in the treatment strategies.

**Keywords:** maternal near miss, maternal deaths, SAMM, Haemorrhage, Hypertensive disorders.

### INTRODUCTION:

Though pregnancy is a physiological process, adverse pregnancy outcomes are a major health burden because of the morbidity and mortality associated with it. Women who develop severe acute complications during pregnancy share many pathological and circumstantial factors. While some of these women die, a proportion of them narrowly escape death. By evaluating these cases with severe maternal outcomes (both “near-miss” cases and maternal

deaths), much can be learnt about the processes in place (or lack of them) for the care of pregnant women [1].

Near miss is defined as “very ill pregnant or recently delivered woman who nearly died but survived a complication during pregnancy, childbirth or within 42 days of termination of pregnancy”. SAMM (severe acute maternal morbidity) refers to a life-threatening disorder that can end up in near miss with or without residual morbidity or mortality. Maternal mortality has now been replaced with Maternal Near Miss cases (MNM)/SAMM (severe acute maternal morbidity) which is being used nowadays to audit the level of Obstetric care. These are cases who develop potentially life-threatening conditions but survive with some long-term morbidities either mentally or physically. Near miss cases and maternal deaths together are referred to as severe maternal outcome (SMO). Severe maternal complications are defined as “potentially life-threatening conditions”.[2]

India has now accomplished the National Health Policy (NHP) target for MMR of less than 100/lakh live births and is on the right track to achieve the SDG target of MMR less than 70/ lakh live births by 2030. Telangana being 43/ lakh [3].

## **AIMS AND OBJECTIVES**

### **Aim**

Our aim was to find the incidence of MNM and MD and analyse the causes and improve our obstetric care.

### **Objective**

- 1) To study the frequency and nature of MNM cases in Obstetrics in our hospital.
- 2) To study the risk factors associated with maternal near miss cases.
- 3) To analyse the causes and improve our obstetric care.

All maternal cases which required critical care

Maternal mortality index can be considered as the most reliable indicator in the assessment of maternal health

## **METHODOLOGY**

This was an prospective observational study conducted in the Department of Obstetrics and Gynaecology, KIMS Hospital, Narketpally, Telangana, India. This hospital is situated in a rural area. It caters to the rural population from the surrounding villages. This hospital is a 1050 bedded facility with ICU, HDU and 24 hour blood bank facility and 24x 7 emergency facility. The study population included all pregnant women who had life threatening complications and needed critical interventions or ICU admission in the hospital between 2021-2022.

### **Inclusion criteria**

All Obstetric cases who had life threatening complications during pregnancy who were admitted in our hospital

### **Exclusion criteria**

All gynecology cases and all obstetric cases who did not have life threatening complications in Table 1 and Table 2 during pregnancy were excluded from the study.

**Table 1. Near miss criteria based on complications and interventions during pregnancy**

Severe maternal complications	Critical interventions
Severe APH & postpartum haemorrhage	Admission to intensive care unit
Severe pre eclampsia and abruption	Interventional radiology
Eclampsia	Laparotomy (hysterectomy,excludes cesarean)
Sepsis or severe systemic infection	Use of blood products( blood > 5PRBC)
Rupture uterus	
Severe complication of abortion	
Ruptured ectopic pregnancy	

**Table 2: Near miss criteria based on organ dysfunction or failure**

Organ system dysfunction or failure	Criteria
Cardiovascular dysfunction	Shock
	Cardiac arrest and cardiopulmonary resuscitation
	Use of continuous vasoactive drugs
	Sever hypoperfusion(lactate>5mmol/Lor > 45 mg/dl)
	Severe acidosis(pH-<7.1)
Respiratory dysfunction	Acute cyanosis
	Gaspings
	Respiratory rate->40 or < 6
	Intubation or ventilation
	Severe hypoxemia( O2 saturation<90% for > 60 min or PaO2/FiO2 <200)
Renal dysfunction	Oliguria non responsive to fluids to diuretics
	Dialysis for acute renal failure
	Severe acute azotemia(creatinine > 3.5mg/dl)
Coagulation and hematological dysfunction	Severe acute thrombocytopenia(50,000)
	PT,aPTT> 1.5 times of normal
Hepatic dysfunction	Jaundice in the presence of pre eclampsia
	Severe acute hyperbilirubinemia(bilirubin>6.0mg/dl)
Neurological dysfunction	Prolonged unconsciousness (lasting >12 hrs
	Coma ( including metabolic coma)
	Stroke
	Uncontrollable fits/status epilepticus

## RESULTS

Patient characteristics like age, parity, booking status (> 3 antenatal visits to our hospital) gestational age at admission, Socioeconomic status, anemia, delay in seeking medical care, mode of delivery, cause of morbidity, ICU admission, critical intervention and duration of stay were recorded.

The following indicators were calculated: maternal near miss (MNM), Maternal deaths (MD), mortality index (MI=MD/MNM+MD)

**Table 3: Patient characteristics of near miss cases and maternal deaths**

PATIENT CHARACTERISTICS	NEAR MISS(%) (N=46)	MATERNAL DEATHS(%) (N=)	TOTAL
AGE			
<19 yr	2	0	2
20-24 yr	13	2	15
25-29 yr	23	1	24
30-34 yr	7	0	7
>35 yr	2	1	3
<b>TOTAL</b>	<b>47</b>	<b>4</b>	<b>51</b>

PATIENT CHARACTERISTICS	NEAR MISS(%) (N=47)	MATERNAL DEATHS(%) (N=)	TOTAL
<b>GRAVIDA</b>			
PRIMIGRAVIDA	10	2	12
MULTIGRAVIDA	37	2	39
<b>TOTAL</b>	<b>47</b>	<b>4</b>	<b>51</b>

PATIENT CHARACTERISTICS	NEAR MISS(%) (N=47)	MATERNAL DEATHS(%) (N=)	TOTAL
<b>GESTATIONAL AGE(WEEKS)</b>			
1-12 WEEKS	24	0	24
13-27 WEEKS	1	0	1
>28 WEEKS	22	4	26
<b>TOTAL</b>	<b>47</b>	<b>4</b>	<b>51</b>
PATIENT CHARACTERISTICS	NEAR MISS (%) (N=47)	MATERNAL DEATHS (%) (N=)	TOTAL
BOOKED	10	0	10
UNBOOKED	37	4	41
<b>TOTAL</b>	<b>47</b>	<b>4</b>	<b>51</b>

**MODE OF DELIVERY**

Pregnancy outcome	MNM	MD	TOTAL
Vaginal delivery	3	2	5
Cesarean section	16	2	18
<b>Laparotomy for ectopic</b>	<b>24</b>	<b>0</b>	<b>24</b>
<b>TOTAL</b>	<b>43</b>	<b>4</b>	<b>47</b>

**Underlying causes of maternal near miss and maternal deaths:**

Underlying disorders	Maternal near miss	maternal deaths	TOTAL
<b>Hemorrhagic</b>	<b>25</b>	<b>2</b>	<b>27</b>
Hypertensive	11	0	11
Sepsis	1	0	1
Cardiac	4	0	4
Hepatic	0	0	0
Other medical or	0	0	0

surgical causes			
<b>TOTAL</b>	41	2	43

**Types of hemorrhagic disorders:**

<b>Underlying disorders</b>	<b>Maternal near miss</b>	<b>maternal deaths</b>	<b>TOTAL</b>
PPH	2	1	3
APH	5	1	6
<b>Ruptured ectopic</b>	<b>24</b>	0	24
Ruptured uterus	0	0	0
Incomplete abortion	0	0	0
<b>TOTAL</b>	31	2	33

**TYPES OF HYPERTENSIVE DISORDERS**

<b>Underlying disorders</b>	<b>Maternal near miss</b>	<b>maternal deaths</b>	<b>TOTAL</b>
Severe preeclampsia	10	0	10
Eclampsia	3	0	3
HELLP	4	0	4
<b>TOTAL</b>	17		17

**Types of cardiac disorders**

<b>Underlying disorders</b>	<b>Maternal near miss</b>	<b>maternal deaths</b>	<b>TOTAL</b>
Valvular heart disease	0	0	0
Congenital heart disease	1	0	1
<b>Peripartum cardiomyopathy</b>	<b>2</b>	0	2
Others	0	0	0
<b>TOTAL</b>	3	0	3

**Underlying disorders**

<b>Underlying disorders</b>	<b>Maternal near miss</b>	<b>maternal deaths</b>	<b>TOTAL</b>
Cvs	2	0	2
Respiratory	0	0	0
Renal	0	0	0
Hepatic	4	0	4
<b>Hematologic/coagulation</b>	<b>7</b>	1	8
Neurological	0	0	0
Uterine	0	0	0
Multiorgan dysfunction	2	2	4
<b>TOTAL</b>	15	3	18

**Status of MNM and MD on admission to hospital:**

Status on admission	MNM	MD	TOTAL
Cases presenting with organ dysfunction on admission	35	2	37
Cases admitted with disorder and developed organ dysfunction	1	1	2
Cases admitted without disorder developed organ dysfunction	1	1	2
<b>TOTAL</b>	37	4	41

## RESULTS

There were a total of 2750 deliveries and 2725 live births during the study period, 46 cases were maternal near miss cases. There were 4 maternal deaths .Majority of patients were between 25-29 yrs . Both morbidity and mortality were higher in the multigravida patients. In our study most of the patients with life threatening conditions were in the first trimester, between the gestational age of 1-12 weeks(most of the cases were ectopic pregnancies). Most of the near miss cases were unbooked (no antenatal visit in our hospital) (n-37).

Haemorrhage was the leading cause of MNM cases followed by Hypertensive disorders. Majority of the cases with haemorrhage were due to ruptured ectopic followed by abruptio placentae and placenta previa .There were 46 maternal near miss cases and 4 maternal deaths. Maternal near miss mortality ratio is the ratio of number of near miss to number of maternal deaths.In our study the ratio was 11:1,meaning for every 11 lifethreatening condition there was 1 maternal death.

Mortality index (MI) is defined as the number of maternal deaths divided by the number of women with lifethreatening condition and is expressed as percentage.Higher Mortality index suggest low quality of care.Mortality index in our study was 8% .

There were 4 cases of mortality.One patient came with bleeding PV ,had abruption ,delivered a dead baby, went into Disseminated intravascular coagulation and died after 5 days of child birth.Second patient was a case of severe hypertension , delivered by Cesarean section ,developed pulmonary edema and died after 5 days of respiratory failure.Third patient was a primi with HTN in pregnancy ,cesarean section was done but she developed atonic PPH and she died after 16 hrs inspite of all measures taken to save her. Fourth patient was a mentally retarded lady brought from an orphanage , she underwent caesarean section at term in view of fetal distress,who later developed pulmonary oedema ,was admitted to ICU and died on Post operative day 5 due to cardiac failure.

## DISCUSSION

Study of Maternal near miss cases tells us the status of health care services and also gives an idea about what new strategies can be undertaken to improve the health care.Mortality Index in our study was 8% which was similar to studies from Nepal (9.1%),Chaudhari et al (7.7%), Roopa et al (14.9%).Lower the index suggest good quality of health services.Studies from African subcontinent showed higher Mortality index.

In our study the maternal near miss mortality ratio (MNMMR) was 11:1.Other studies like Roopa et al had 5.6:1,vinita etal had 4:1,Shrestha et al had 10:1.Higher ratio indicates better quality of care.

Comparative studies from different parts of India

Author	Year	Setting	MNM	MI	Most common causes of MNM cases
Sangeeta Gupta	2013	ESI PGIMSR,Delhi	27	22.8%	Hypertensive disorders(37.5%)
Abha Singh	2015	JNM Medical college ,Raipur	211	32.58%	Hypertensive disorders (38.8%)
Archana Rathod	2016	Medical college Aurangabad	161	29.07%	Hypertensive disorders

Roopa S	2013	Medical college	131	14.9%	Haemorrhage(44.2%)
Snehamay Chaudhuri	2019	Medical college, Midnapore	177	77.1%	Hypertensive disorders
Junnu Shreshtha	2015	Medical college, Nepal		9.1%	Hypertensive disorders(45%)
Vinita Singh	2021	TMH, Jamshedpur	153	19.9%	Haemorrhage(40.5%)

## CONCLUSION

In spite of meticulous care some complications could not be prevented. Lot of factors contribute to the mortality in near miss cases like delay in arrival to the tertiary care center, availability of transport, awareness of the public about the gravity of the situation and the need for early transfer to the healthcare facility, the condition in which they arrive and the start of treatment. Patients should be advised to have early booking and have regular antenatal checkup so that any problems can be diagnosed early and morbidities and mortality can be avoided.

Study of near miss cases is an important indicator of obstetric care and thus helps improve the health system by implementing changes in the treatment strategies. Mortality index represents the percentage of patients with lifethreatening conditions who ultimately die. Higher mortality index means that more women with lifethreatening conditions die and indicates low quality of care. Therefore it is worth having frequent audits of maternal near miss cases to improve the standard of health care.

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## Conflict of Interest

None

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