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Research Article

Comparison of Causes of Maternal Near Miss and Maternal Mortality in a Tertiary Care Hospital: A Prospective Study

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Abstract:

The Maternal Near miss (MNM) concept has led to a more comprehensive and better assessment of the effect of care on maternal health. Investigating severe life-threatening pregnancy complications that women encounter and maternal morbidities (near misses) may help evaluate the quality of care in health facilities and recommend ways to improve maternal survival, especially in poor resource settings.

Aim

This study aimed to identify causes, classify, and determine the nature of complications in maternal near misses and in maternal death.

Material and Methods

The hospital-based prospective cohort study was conducted in the Department of Obstetrics and Gynecology, Jawaharlal Nehru Medical College, Aligarh Muslim University of Aligarh from 2020 to 2022. The study was approved by the Institutional Ethics Committee and informed written consent was obtained from the study participants. The outcome measures included causes, organ dysfunction, complications, maternal morbidities, and neonatal outcome.

Results: Higher rate of unbooked referrals was observed in our study. Hemorrhage was 42.9%, followed by 39.1% hypertensive disorders, 8.6% sepsis in the maternal near miss group while in the maternal mortality group, 26.1% had hypertensive disorders followed by 23.8% women had hemorrhagic disorders, and 20.4% had sepsis. There was a significant difference in HDU, ICU Hospital stay and IUDs in the maternal mortality group compared to the maternal near-miss group.

Conclusion

The WHO near-miss approach was found to represent a feasible strategy in low-resource settings each Near Miss should be evaluated in detail to diagnose underlying pathology, correct and timely detection of complications, prompt referral and early institution of essential and comprehensive obstetrics care are important for maternal and infant survival.

Keywords: maternal near miss; maternal death; who quality care; severe life-threatening complications

Introduction

According to estimates from the World Health Organization (WHO), 287.000 maternal fatalities occurred in 2010 with developing regions bearing 85% of the global burden[1,2]. One of the eight Millennium Development Goals (MDGs) and a significant challenge for the healthcare system is reducing maternal mortality (MM).The goal is to reduce the maternal mortality ratio (MMR) by 75% between 1990 and 2015[3]. Countries require a precise picture of the causes and prevalence of maternal deaths in order to accomplish this goal. The majority of maternal deaths are not the whole story. The broad base of this iceberg reflects a lot more women who may have survived potentially fatal illnesses. These are cases of maternal close calls. Recent systematic analyses have revealed several discrepancies in the classification of maternal deaths and a lack of accepted definitions and standards for detecting severe maternal morbidity and near-miss instances. [4,5] The WHO technical working group advises that the new maternal death classification system be adopted by all nations and that national initiatives for improving maternal health should take into account maternal near-miss cases. a woman who almost avoided death but pulled through during pregnancy, childbirth, or within 42 days of termination of pregnancy [6]. To

broaden the use and implementation of this idea, the WHO working group published uniform identifying criteria for MNM patients. The inclusion of an organ or system is highlighted in this list of criteria. The emphasis of this list of requirements is on the existence of organ/system dysfunction, which is identified by three sets of requirements (clinical, laboratory, and management) [7,8]. The Maternal Near miss (MNM) idea has resulted in a more thorough and three criterion groups have been used to detect it. As a result, the current study was designed to document the frequency and nature of maternal near miss events and determine the efficacy of using the WHO maternal near miss model to assess the quality of obstetric care in a population of women attending a tertiary maternity hospital. This was done based on the new WHO MNM criteria.

Material and Methods

The hospital-based prospective cohort study of pregnancy-related complications in the facility in line with the WHO definition of maternal near miss and mortality criteria was conducted in the Department of Obstetrics and Gynecology, Jawaharlal Nehru Medical College, Aligarh Muslim University of Aligarh during 2020 to 2022. The study was approved by the Institutional Ethics Committee, Faculty of Medicine, written informed consent was obtained from the woman and her attendant, in case she was not fit to give consent and data was collected according to the structured performa developed for the purpose of the study. After detailed history and examination the demographic profiles like age, parity, booking status, gestational age, life threatening condition at arrival or became so later on, h/o previous LSCS, adverse events, disorders, organ system dysfunction were noted. Any underlying medical disorder in these patients such as anemia, diabetes, hypertension was included to study their possible contributory role in the near miss situation. Those who fulfill the WHO criteria for maternal near miss were included in our study groups Those who survived were included in this study as maternal near miss. Those who did not survive were also included for comparision with the MNMM and MD because the disorders and adverse events are the same in both categories

Group I: Maternal near miss

Group II: Maternal mortality

Information on demographic characteristics, maternal and perinatal information, process indicators, and near-miss screening were abstracted from patient files daily on the maternity wards. The data were entered into an electronic data entry platform every day and shared with the study primary investigators every week. On-site data quality checks were conducted daily and analyzed by SPSS latest version.

Results:

A total of 970 maternal near misses were enrolled in this study after fulfilling the inclusion and exclusion criteria. There were 88 maternal deaths registered during the study period. The study groups allocated are as follows

Group I: Maternal near miss (n= 882)

Group II: Maternal Death (n=88)

Characteristics		Group I (MNM) n % N =882	Group II (MD)n% N=88	p-value
Age (Mean±SD) (years)		25.14 ± 3.85	28.54± 6.13	<0.001
Gravidity	Primi	66.8	33.2	>0.10
	Multi	60.2	39.8	>0.10
Residency Status	Urban	35.9	33.0	<0.10
	Rural	63.4	67.0	<0.10
Registration Status	Booked	13.9	2.3	<0.001
	Uncooked	10.9	33.0	<0.001
	Referred	75.2	64.8	<0.001
Gestational Age (weeks)	(Mean±SD)	30.33 ± 11.55	35.21 ± 14.62	<0.05

Table 1: Women characteristics of near-miss cases and maternal death

Underlying Disorders	Group I (MNM) N=882		Group II (MD) N=88	
	No	%	No	%
Hemorrhagic disorders	375	42.9	21	23.8
Hypertensive disorders	345	39.1	23	26.13
Sepsis or severe systemic infections	76	8.6	18	20.4
Heart disease	32	3.6	8	9.0
MODS	21	1.4	6	6.8
Hepatic disorders	13	1.4	3	3.4
Dengue shock syndrome	04	0.45	6	6.8
Other medical or surgical conditions	12	1.3	2	2.27

Table 2: Underlying disorders in Group 1 and Group 2

(NOTE- A patient can have more than one diagnosis at the time of admission. Percentage is calculated out of 882 cases in group I and 88 cases in group II)

Hemorrhagic disorders (42.9%) were the leading cause of near- miss followed by hypertensive disorders of pregnancy (39.1%), sepsis (8.6%), cardiac illness (1.4%), and Hepatic disorder (1.4%). Hypertensive disorders of preg nancy (26.13%) Hemorrhage (23.8%) and sepsis (20.4%) constituted the leading causes of mortality.

Hypertensive Disorder	Group I (MNM)		Group II (MD)		Ch^2- Value	p- Value
	No	(%)	No	(%)		
Severe Preeclampsia	234	26.5	22	25.0	23.007	<0.001
Antepartum Eclampsia	119	13.5	29	33.0		
HELLP Syndrome	31	3.5	02	2.3		
Chronic Hypertension	21	2.4	00	0.0		
Postpartum Eclampsia	109	12.4	31	35.2		
PRES Syndrome	8	0.9	02	2.3		

Table 3- Types of hypertensive disorder in Group 1 and Group 2

Among hypertensive disorders in near miss women, 234 women (26.5%) had severe pre-eclampsia followed by antepartum eclampsia 119 (13.5%), postpartum eclampsia, HELLP syndrome 31 (3.5%), chronic hypertension 21(2.4%) and 8 women (0.9%) were diagnosed with PRES syndrome whereas among women who had a maternal death 31 women (35.2%) had post-partum pre-eclampsia followed by antepartum eclampsia 29 (33%), severe pre-eclampsia, 22(25%), HELLP syndrome and PRES syndrome 2 (2.3.%). So both groups statistically significant differences (p-value < 0.001)

Infection	Group I (MNM)		Group II (MD)		Ch^2 - Value	p- Value
	No	(%)	No	(%)		
Puerperal Sepsis	23	2.6	31	35.2	18.173	<0.01
Pyoperitoneum	12	1.4	0	0.0		
Septic Abortion	5	0.6	1	1.1		
UterinePerforation with Peritonitis	9	1.0	2	2.3		
DIC	9	1.0	7	8.0		

Table 4: Distributon of infection in Group 1 and Group 2

Among 58 women with near-miss with infection, 23 (2.6%) had puerperal sepsis, 12 (1.4%) had pyoperitoneum, 5 (0.6%) had and 9 (1%) had both uterine perforations with peritonitis and DIC due to puerperal sepsis, whereas among 41 women who had a maternal death, 31 women (35.2%) had sepsis followed by 7 (8%) with septic DIC, 2(2.3%) uterine perforation with peritonitis and 1 (1.1%). So both groups had statistically significant differences (p-value > 0.001)

Discussion

The introduction of the maternal near miss (MNM) concept has resulted in a more thorough and accurate assessment of the impact of care on maternal health than was previously possible.

Comparability difficulties should be taken into account, especially in low-income countries, when adopting the standard WHO criterion [10].

There should therefore be MNM criteria that are appropriate and can be applied consistently.

[11The focus has now shifted from the investigation of maternal mortality conditions in retrospect to the early detection and prompt care of pregnancy-related problems that can put a woman at risk for serious maternal outcomes.

[12] There were 882 identified maternal near-miss mothers in all.

The number of maternal deaths during the study period was 88. The high prevalence of MNM in our study was also reported in studies from other low-income countries, which used similar near-miss criteria [13,14,15]

The mean age of nearmiss cases in the current study was 25.10 3.85 years, and the mean age of maternal deaths was 28.54 6.13 years. These results are similar to those of Kalra et al. [16] and Vinita Singh et al. [17]. According to our findings, there were 10.9% vs. 29.3% vs. 33.3% unbooked ladies in each group. In the referenced categories, there were the most women. The same outcomes were noted by Chandrakanta P[18]. Because this hospital has a NICU, ICU, and 24hour blood bank facility, many cases are being directed there. In the current study, 13.9% of women were scheduled in MNM, compared to 2.3% in the MD group in this institution, which is less than Almeria et al. [19]'s figure of 36.4%. They manifest as high-risk cases and are being supervised with better facilities in the hospital to provide better antenatal care and regular follow-up as it is a tertiary care hospital.

Our study population contributed more from the rural area as compared to urban settings with was comparable with the study of Hana et al [20]

The proportion of primigravidas was more in our study which is comparable with the results of Gupta D et al [21] who also found primipara women more in both near misses (60.8 %) and maternal death groups (60.0 %) Our results were not comparable with the study of Chandrakanta Prasad et al[18] Waterstone et al. [22] and Morse et al. [23] to the present study regarding the period of gestation >36 weeks (35.80%) near miss.

In most of the Indian studies, hemorrhage (42.9%) accounted for the leading cause of maternal morbidity followed by hypertensive disorders (39.1.%) disorders. Similar to the majority of studies conducted in India, haemorrhage (42.9%) was the top cause of maternal morbidity, followed by hypertension disorders (39.1%), but in our study, haemorrhage (23.8%) and hypertensive disorders (26.13%) were the two largest causes of maternal death. Twenty-four percent of the causes were due to sepsis. Pregnancy-related eclampsia and hypertension were the leading causes of maternal fatalities. If antihypertensive medications, injection of MgSO4, diligent blood pressure monitoring, and an early pregnancy termination choice are made, these women may be saved. Haemorrhage, or PPH, was the second leading cause of maternal death (postpartum haemorrhage). APH brought on by abruptio placentae, placenta previa, placenta accrete, and percreta was actively controlled by the use of LSCS. When intra-operative blood loss could not be stopped with the use of platelet, PRBC, and FFP transfusions and other precautionary measures, a caesarean hysterectomy was ultimately necessary.

Author	Year	Setting	Criteria fornear-miss	Near miss conditions
PS [24]	2013	Tertiary carehospital, Manipal	Disease- specific management based	Haemorrhage (44.2), hypertension (23.6), sepsis
Pandey [25]	2014	Medical college, Lucknow	Management based	Haemorrhage (45.7), hypertension (23.6)
Bakshi [26]	2015	Multicentre trial, Dehradun	Disease-specific	Sepsis (58.8),hemorrhage (37.2), hypertension (23.5)
Singh [27]	2016	Tertiarycare hospital, Raipur	Disease- specific management-based organ dysfunction	Hypertension (38.8), haemorrhage (22.2)
Parmar [28]	2016	rtiary care hospital,	Disease-specific	
		Vadodara	management based laboratory criteria	
Rathod [29]	2016	Tertiary carehospital, Yavatmal	Organ dysfunction	Haemorrhage (26.7), anemia (24.8), hepatitis (16.7)
Sinha [30]	2016	Medical college, Bareilly	Management based (ICU admission)	Hypertension (22.2)
Ray [31]	2016	Tertiary care hospital, Karad	Disease-specific	Hypertension (56), haemorrhage (11)
Chandak [32]	2017	Medical college, Nagpur	Disease- specific management-based organ dysfunction	Hypertension, haemorrhage
Tallapureddy [33]	2017	Medical college, Hyderabad	Disease- specific management based	Haemorrhage (43.7%), hypertension (31.2%)
Gupta [34]	2018	Medical college, Indore	Disease- specific management-based organ dysfunction	Haemorrhage (40.5), hypertension (24.3), sepsis (13.5)
Mansuri [35]	2019	Four tertiary care hospitals,Ahmedabad	Organ dysfunction	Hypertension, haemorrhage
Verma [36]	2020	Tertiary care hospital, Etowah	Disease-specific	Hypertension (45.7), hemorrhage (23.5)
andrakantaPrasad [37]	2022	l College,Delhi	WHO criteriafor maternal near miss	Haemorrhage and Hypertension leading cause ofmaternaldeath
Vinita Singh [37]	2021	ata MainHospital	WHO criteriafor maternal near miss	Hemorrhagic (40.5%) hypertensive disorders (25.5%) and cardiacdiseases (14.4%).
Present Study	21-22	Tertiary carehospital, Aligarh	WHO criteriafor maternal near miss	Haemorrhage (42.9%), hypertension (39.1%.), sepsis (8.6%)

Table 5: List of studies on maternal near-miss done in different parts of India for comparison with our study

Several initiatives have been undertaken in our hospital to improve our response to obstetric emergencies over the last few years. An obstetric high dependency unit (HDU/ICU) has been established. Fast-tracking of blood and blood components available from the blood bank has been streamlined. Monthly audit of mortality women to identify preventable factors and implement protocols adhering to National Guidelines and current evidence-based practices. However, the impact of these quality initiatives on obstetric care needs to be quantitatively assessed by a future study.

Conclusion

At our tertiary centre, maternal near misses (MNM) are frequent.

In low-resource situations. The WHO near-miss approach was found to represent a feasible workable strategy in low resource settings. Maternal near miss (MNM) is common at our tertiary center. Haemorrhage was a leading cause of maternal near misses while hypertensive disorders are the main cause of maternal death in our study.

Limitation

The main limitation of the current study was its duration and sample size. More data collection over a few years with a large sample size will provide better and more comprehensive information about maternal health status.

Ethical Approval: All procedures performed in studies involving human participants were following the ethical standards of the institution.

Informed Consent: Informed consent was obtained from all the individual participants included in the study.

Conflict of interest: Nil

Funding Agency: None

Author's contribution: Data collection and data analyzed by Hina Samreen. the manuscript was written by Nasreen Noor. Proofreading and editing are done by Nishat Akhtar and Shazia Parveen

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