



Implementing the Who Near Miss Model to Assess Quality of Obstetric Care in a Tertiary Care Hospital

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ABSTRACT

Introduction: Improving maternal mortality is major challenge in health care system. Improving maternal health is one of the eight millennium development goals. WHO is currently recommending monitoring severe acute maternal morbidity or maternal near miss as a technique to evaluate the calibre of obstetric care and deploy new tactics for enhancing maternal health.

Aim and Objectives: We aimed to assess the globally used WHO model to measure quality of maternal care at a tertiary care hospital JNMCH, AMU, Aligarh.

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 between Sep 2020 to Oct 2022.

Results: Total number of live births in hospital during study period were 15420 out of which maternal near miss (MNM) were 882 and maternal death (MD) were 88. Maternal near miss to maternal death ratio was 9.9:1 and mortality index was 9.05%.

Conclusion: MNM and MD cases have same underlying pathophysiology with completely different outcome. By monitoring large number of cases with MNM helps in understanding the various causes of maternal adverse events and finding out gaps in management protocols /strategies more efficiently than auditing only maternal deaths.

Key Words: Maternal near miss, Maternal death, Mortality index, WHO near miss model, Severe acute maternal mortality, Maternal death ratio, Obstetric care, Potentially life threatening, Maternal mortality ratio, Maternal mortality rate

INTRODUCTION

In low resources settings, maternal mortality (MM) is still at high levels. According to the World Health Organization (WHO) estimates, 287,000 maternal deaths occurred in 2010, and developing regions accounted for 85% of the global burden.^{1,2} Improving maternal mortality (MM) is a major challenge in the healthcare system. Improving maternal health is one of the eight-Millennium Development Goals (MDGs), which were adopted by the 2000 Millennium Summit. The target of the is the reduction of 75% of the maternal mortality ratio (MMR) from 1990 to 2015.³ To reach this goal countries need an accurate picture of the causes and levels of maternal deaths. Maternal mortality is still a significant public health issue in middle-income nations, while low-income countries bear the majority of the burden. In this setting, improving health systems and services is essential to offering women the best care possible during pregnancy and childbirth, especially for those who are dealing with severe

pregnancy-related problems.^{4,5}

Maternal deaths are caused by dangers associated with pregnancy and childbirth as well as by inadequate medical care.⁶ Maternal deaths are caused due to various issues such as postpartum hemorrhage, indirect causes such as anemia, malaria, and heart disease, infection, unsafe abortion, eclampsia, obstructed labor, ectopic pregnancy, embolism, and complications arising due to anesthesia.⁷ Maternal deaths tend to cluster during labour, delivery, and the first few weeks after giving birth, and they are a good indicator of how well the healthcare system is functioning.⁸ Maternal deaths are just the tip of the iceberg. The broad base of this iceberg represents many more women who may have nearly died from life-threatening conditions but survived. These are maternal near-miss cases. In developing countries like India where resources are limited, women's lifetime risk of dying during pregnancy and child birth is high compared to developed countries. WHO working group published uniform

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identification criteria for MNM cases to extend the application and the implementation of this concept. This list of criteria emphasizes the presence of organ/system dysfunction which is detected by three groups of criteria

- (I) Clinical
- (II) Laboratory and
- (III) Management

Maternal Near miss (MNM) concept has led to a more comprehensive and better assessment of effect of care on maternal health. It indicates the degree of organ function failure in the wide spectrum of severity using the MMR as an indicator of obstetrical care. Near-miss data is also a tool for policy-makers to envisage the requirements of essential and emergency obstetric care, and is helpful in designing, implementing and following up safe motherhood program. Therefore, based on the new WHO NM criteria, the current study was planned to document the frequency and nature of maternal near miss events and to find out the effectiveness of using WHO maternal near miss model to evaluate the quality of obstetric care in a population of women attending a tertiary maternity hospital.

MATERIALS AND METHODS

The hospital-based prospective observational study at the Department of Obstetrics and Gynecology, Jawaharlal Nehru Medical College, Aligarh Muslim University, Aligarh during November 2020 to October 2022. The study protocol was approved by the Institutional Ethics Committee, Faculty of Medicine, AMU. An informed written consent was obtained from the women or from her attendant, in case she was not fit to give consent for participation in the study. The study population includes all women admitted to the hospital with a potentially life-threatening condition during pregnancy, labour and the postpartum period was identified from the antenatal and postnatal wards, labour and emergency rooms and the intensive care unit (ICU) as per the operational definitions suggested by WHO, using the near-miss approach eligibility for the study was not restricted by gestational age, consequently, those who fit the criterion and had abortions or ectopic pregnancies were included. Women who experienced difficulties 42 days after their pregnancies ended were ineligible. We also collected information on total deliveries, live births and maternal deaths occurring at the facility during the study period

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 comparison with the MNMM and MD

Group I: Maternal near miss

Group II: Maternal mortality

Comparison were done in the two groups because the disorders and adverse events are the same in both categories

OBSERVATIONS AND RESULTS

Total number of women in study population was 970 out of which, maternal near miss were 882 and maternal death were 88. The maximum number of women 745(84.5%) Vs 73(83%) in both groups belonged to 21-30 years of age range while a minimum number of women 3(0.3%) were in the age of >40 years in Group I compared to 15(17%) in Group II. The Mean $\pm$ SD of age was 25.14 ± 3.85 years and 28.54 ± 6.13 years in the two groups respectively. There was highly statistically significant difference between the two groups (p value <0.001). Out of 125 booked antenatal women, 123(13.9%) were booked in Group I as compared to 2 (23%) women in Group II. There were 96(10.9%) Vs 29(33%) unbooked women in the two groups respectively. Out of 720 women in the referred category maximum number of women were in Group I compared to Group II [663 (75.2%) Vs 57(64.8%)]. There was statistically significant difference between the two groups (p value <0.001). Total number of live births in hospital during study period were 15420 out of them total number of maternal near miss were 882. Total number of maternal death were 88. Maternal near miss to maternal death ratio was 9.9:1. Mortality Index was 9.05%

DISCUSSION

The present study was conducted in the Department of Obstetrics and Gynaecology, JNMCH AMU. The introduction of the concept of maternal near miss (MNM) has led to a more comprehensive and better near miss (NM) concept has led to a more comprehensive and better assessment of the effect of care on maternal health. In other subcontinent countries, the incidence of the near-miss was 5.5, 26.8, and 7.13.^{9,10} Studies were done in different parts of India, and the near-miss ratio ranged from 120 to 10.4.^{11,12} However, all these studies have used different criteria in identifying near-miss cases and hence are not comparable.

In the present study, the mean age of near-miss cases and maternal death are comparable to study of **Kalra et al.**¹³. Our results are consistent with the study of **Vinita Singh et al.**¹⁴ who found maximum near misses in the 20-24 years of age group while the minimum number of women was in the age range of >35 years.

The maximum number of women were in unbooked and referred groups in our study. Similar results were observed by **Chandrakanta Prasad et al.**¹⁵ The higher number of un-

booked cases were seen in **Puri Alka et al.**¹⁶ and **Almeria Y et al. studies.**¹⁷ which were higher than the present study. Many cases were referred from maternity hospitals, private hospitals, and nursing homes. Many cases are being referred due to the availability of NICU, ICU, and 24 hours blood bank facility in this hospital. Thus, with the present health care system, most antenatal women are getting good antenatal care from doctors.

Maximum number of women were booked in maternal near miss compared to maternal death. It shows as high-risk cases 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.

The proportion of primigravidas was more in our study which is comparable with the results of **Gupta D et al.**¹⁸ who also found primipara women more in both near miss and maternal death groups. Our results were not comparable with the study of **Chandrakanta Prasad et al.**¹⁹ who noted among maternal near-miss, the majority of women were multiparity which is comparable to **Bansal et al.**²⁰ Our findings were similar results to **Waterstone et al.**²¹ and **Morse et al.**²² regarding the period of gestation >36 weeks in maternal near miss cases near miss

Maternal mortality ratio (MMR) has been used by healthcare planners as a yardstick to assess the quality of obstetric services in an area. Lately, the focus has shifted from maternal mortality to maternal near-miss as a more valuable indicator of maternal health. Both maternal near miss incidence ratio (MNMIR) and severe maternal outcome ratio (SMOR) give an estimate of the amount of care and resources that would be needed to improve obstetric care in that area or facility. A higher ratio indicates better care. Studies from developing countries especially in the African region have reported a high incidence of near misses when compared to the developed world. In a study conducted by **Rupa P S et al.**²³ the maternal near miss incidence ratio (MNMIR) was 17.8/1000 live births. The near miss to mortality ratio was 5.6:1, which means for every five to six life-threatening conditions there was one maternal death. The higher mortality index suggests that more women with the life-threatening condition die (low quality of care), while the low index suggests better quality of healthcare. $(MI=MD/(MNM+MD) \times 1002$.

CONCLUSION

Maternal near miss (MNM) is common at our tertiary center. 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 with the prompt institution of management strategies to prevent maternal death. Maternal healthcare indicators can be used as an audit for the efficiency of quality of healthcare.

Table 1: Distribution of women according to maternal outcome

Outcome	Number of subjects	Percentage
Maternal Near Miss	882	91.0
Maternal Death	88	9.0
Total	970	100.0

In the present study, a total of 970 women who fulfilled the inclusion criteria of WHO maternal near miss (MNM) were evaluated. Out of which 882 were MNM and 88 were maternal death.

Table 2: Distribution of women according to demographic and obstetric profile

	MNM		MD		p-value
	(N=882)	(%)	(N=88)	(%)	
Age (years) (Mean +_SD)	25.14±3.85 year	-	28.54±6.13 year	-	
<Parity	589	66.8%	53	60.2%	
Primi					
Multi	293	33.2%	35	39.8%	
Registration status					<0.001
Unbooked	96	10.9%	29	33.0%	
Booked	123	13.9%	2	2.3%	<0.001
Referred	663	75.2%	57	64.8%	<0.001
Gestational Age (Mean ± SD)	30.33 ± 11.55	-	35.21 ± 14.62	-	<0.05

The Mean±SD of age was 25.14 ± 3.85 years and 28.54 ± 6.13 years in the MNM and MD respectively. Primigravida (66.8% versus 60.2%) in groups I (MNM) and group II (MD) respectively. A higher rate of unbooked and referral was observed in Group I compared to Group II and the results were significant. The mean ± SD of gestational age was 30.33±11.55 Vs 35.21±14.62 in the two groups respectively.

Table 3: Year wise data of near miss, maternal death, and various quality indicators

Quality indicators	2020-2021	2021-2021	Total
Live birth(Hospital)	8205	7215	15420
Maternal near miss (MNM)	502	380	882
Maternal death(MD)	47	41	88
Maternal mortality ratio(MMR)	572.821	568.260	570.54
Severe maternal outcome ratio (SMOR)	118	134.1	126

Table 3: (Continued)

Quality indicators	2020-2021	2021-2021	Total
Maternal near miss: maternal death Ratio (MNM:MD)	10:1	9.2:1	9.9:1
Mortality Index (MI)	8.56%	9.7%	9.05%

Total number of live births in hospital during study period were 15420 out of them total number of maternal near miss were 882. Total number of maternal death were 88. Maternal near miss to maternal death ratio was 9.9:1. Mortality Index was 9.05%

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

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