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An Observational Study on Maternal Near Miss Cases in a Tertiary Care Hospital in Kolkata Draining Howrah and Hooghly Districts Between June 2023-2024

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ABSTRACT

Maternal Near Miss (MNM) refers to women who survive life-threatening conditions during or after pregnancy, despite receiving medical intervention. Monitoring MNM is critical for assessing the quality of healthcare services and improving maternal outcomes. Although there has been a worldwide decline in Maternal Mortality Ratio (MMR), MNM still remains a significant concern, particularly in developing and under-developed countries. This study aims to explore the leading causes of MNM, evaluate the maternal near miss ratio, and assess the effectiveness of the healthcare system's response to maternal emergencies. An observational, record-based cross-sectional study was conducted at a tertiary care centre in Kolkata from June 1, 2023-30, 2024. MNM cases were identified based on the Government of India's guidelines, with data collected from various records including admission registers and treatment notes. Statistical analyses were performed using SPSS software. Out of 6582 deliveries, 234 women were identified with MNM, with a final sample size of 228. The maternal near miss ratio was 34.65 per 1000 live births (3.465%). The two leading causes of MNM were identified to be postpartum haemorrhage (31.6%) and eclampsia (13.16%). 57.9% women required admsission to Critical Care Units and 39.47% in High Dependency Units. The study highlighted that effective management protocols were already in place, but also identified gaps such as inadequate training, limited resources and deficiencies in the referral system. The study indicates that in spite of the tertiary healthcare centre having emergency protocols and resources in place, improvements are needed in terms of ongoing training, data utilization and resource availability. The maternal near miss ratio in this study is higher compared to developed countries, highlighting the challenges in managing severe maternal complications. Comparing these results with previous studies reveals variations in MNM rates, indicating the need for localized strategies and updated guidelines. MNM studies help us to understand the areas where healthcare system is lacking and also to formulate strategies to reduce maternal mortality and morbidity. Recommendations include enhancing antenatal care, improving management of severe complications and standardizing training and referral processes. A systematic approach to data collection and scope for proper utilisation, resource management and availability of psychological support for patients, is essential for improving maternal health outcomes in resource-poor countries.

INTRODUCTION

Maternal Near Miss (MNM) is defined as a woman who survives life threatening conditions during pregnancy, abortion and child birth or within 42 days of termination of pregnancy, irrespective of receiving emergency medical and/or surgical interventions[1-3]. Maternal mortality can be used as a parameter to assess the quality of health care services provided by a particular health care center. It is measured via Maternal Mortality Ratio (MMR), defined as the ratio of the number of maternal deaths per 100,000 live births[1]. MMR has shown a declining trend throughout the world in recent years. We need to achieve such decline in MMR in our country as well, to fulfil the national and international goals and targets under the National Health Mission. Incidence of Maternal near miss cases are higher than maternal deaths[1]. The major reasons are similar for both Maternal Near Misses and Maternal Deaths, hence review of Maternal Near Miss cases will provide valuable information regarding severe maternal morbidity, which could lead to death of the mother, if not intervened properly and in time. Investigating incidents of maternal morbidity may be less threatening to healthcare providers as well, because the woman survived[1]. One can learn from the women themselves since they survived and are available for interview about the care they received[1]. All near misses should be interpreted as learning opportunities to improve the health care services[1]. The current guidelines on MNM serve as an empowering tool for medical colleges, where the majority of near miss cases usually occur[1].

The maternal near miss ratio is regulated by factors such as healthcare infrastructure, access to care, and the availability of advanced medical technologies. The maternal near-miss ratio in the developed countries such as UK was reported to be around 0.7% to 1.1% of deliveries[4], while it was approximately around 0.8% to 1.0% of deliveries in the US[5]. In comparison, the maternal near miss ratio tends to be higher in developing countries than developed countries. A study published in the Journal of Obstetrics and Gynecology of India in 2021 reported a maternal near miss ratio of approximately 2.8% of deliveries[6]. Another study from The Lancet Regional Health-Southeast Asia reported a near-miss ratio of around 3.2% in various regions of India. This shows a significant burden of severe maternal morbidity and the need for ongoing improvements in health care systems[7]. The near miss ratio is still higher in under-developed countries-varying from 3.2% of deliveries in Nigeria[8] to as high as 4% of deliveries in Ethiopia[9].

The World Health Organization (WHO) Maternal Near Miss Criteria (2010) and the MNMR Operational Guidelines by the Government of India (2014) both aim to improve maternal health by identifying and investigating maternal near-miss cases. However, they have different criteria and approaches for calculating and managing near misses. Although, both guidelines are designed to identify and manage maternal near misses effectively, the WHO criteria have a more global approach while in contrast, the MNMR Operational Guidelines by the Government of India are customized for the specific healthcare environment in India, with an emphasis on practical implementation and improvement within local health systems[10].

The primary objective of this study is to identify the major causes of Maternal Near Misses in a tertiary care center. The secondary objectives are: to calculate the Maternal Near Miss Ratio per 1000 live births, to identify the health system response to maternal emergencies and to understand the gap and strengthen the corrective measures to be taken in the health care system at the tertiary center level.

MATERIALS AND METHODS

This is an observational, institutional, record based cross-sectional study conducted at a tertiary care center in Kolkata from 1st June 2023-30th-2024. Maternal Near Miss cases were identified as per the operational guidelines published in December 2014 by the Government of India for Maternal Near Miss-Review (MNM-R)[1]. For diagnosis of Near Miss, the patient should meet Minimum three criteria, one each from 1) clinical findings (either symptoms or signs), (2 investigations and 3) interventions done or any single criteria which signifies cardio-respiratory collapse.

All the records of eligible candidates such as age, parity, gestational age in weeks, resident of urban or rural area, booked case or referred case, hospital stay, CCU or HDU admission, reason for CCU or HDU stay, intraoperative or labor events, high risk events were noted in a Microsoft Excel spreadsheet (version: Office 2021, Windows 10) during the study period. Data was collected through admission register, referral sheets, treatment cards, discharge certificates, CCU and HDU notes (Table 1). Six women were excluded from the study due to incomplete data. Data thus collected were interpreted using Statistical Package for Social Sciences software (version 25). Institutional ethics approval was obtained from the institutional ethics committee (reference no.- MC/KOL/IEC/NON-SPON/2373/05/24).

RESULTS AND DISCUSSIONS

8886 women were admitted and 6582 women delivered during the study period, out of which 234 women were identified as having a near miss event as per the Maternal Near Miss Review Operational Guidelines published by the Government of India in December 2014[1]. After excluding the six women whose data was incomplete, the sample size was 228 women. As per this study, the maternal near miss to

mortality ratio was 5.43:1 and the maternal near miss ratio was 34.65 per 1000 live births or 3.465%. The median age of these women was 26.5 years out of which 47.4% were primiparas, 84.2% were booked cases and 47.4% were referred cases. Of the women with near miss events, 63.16% underwent Caesarean Section, 21.06% vaginal deliveries, 13.15% laparotomies and 2.63% had suction evacuation done (Figure 1).

15.8% had a history of previous caesarean section, 13.16% was diagnosed with Placenta Accreta Spectrum and 15.8% required hysterectomy. 31.6% had Postpartum hemorrhage, 13.16% had eclampsia, 2.63% had pre-eclampsia syndrome, 7.9% presented with jaundice and 5.3% developed Help (hemolysis, elevated liver enzymes, low platelet count) syndrome. 57.9% required Critical Care Unit (CCU) admission and 39.47% required High Dependency Unit (HDU) admission (Figure 2). 15.8% had cardiac compromise, 13.2% required ventilatory support, 13.16% required multiple blood transfusions, 7.9% went into shock and 5.26% developed acute renal failure (Table 2).

As per our study conducted at a tertiary care center in Kolkata, the health care system response to maternal emergencies was mostly effective but several areas for improvement were visible. The facility demonstrated comprehensive protocols for managing severe maternal morbidity, including: timely interventions, appropriate infrastructure and resources and optimum coordination and communication. There was prompt initiation of emergency obstetric care or EmOC for cases such as postpartum hemorrhage, eclampsia and others. The tertiary care center was well-equipped with essential medical technologies, including facilities for twenty-four hours emergency caesarean section and blood transfusion services and critical care units (CCUs). The presence of trained personnel and the availability of advanced diagnostic facilities helped in the effective management of complicated cases. A systematic approach to coordination was observed among the various departments, including obstetrics, anesthesiology and critical care teams, ensuring multidisciplinary care wherever needed. Communication protocols ensured that emergency cases were managed efficiently and intervened in a timely manner.

Despite the above-mentioned advantages, several gaps were identified in the health system response, which need addressing, in order to enhance maternal care. There was a noticeable need for regular training and capacity building among healthcare providers working at tertiary centers. While protocols were in place, some staff members lacked familiarity with the latest guidelines and emergency procedures, affecting the quality of care. The study also found that while data on maternal near misses and their outcomes were collected and analyzed, there was very limited scope for utilization of this data for quality improvement. Although the center was equipped with advanced technologies, there were instances where resource availability became the limiting factor thus impacting the management of emergencies. Above all, the referral system for cases requiring higher-level interventions showed some inefficiencies and avoidable delays. Lastly, the availability of psychological and social support for patients and their families was extremely limited.

Table 1: Distribution of the Age, Parity, Gestational Age, Booked Case and Referred Case

	Factors	Near Miss (%)(N=228)
Age (yrs)	≤20	25 (10.96%)
	21-25	74 (32.45%)
	26-30	61 (26.75%)
	31-35	49 (21.5%)
	>35	19 (8.34%)
Parity	Primi	108 (47.37%)
	Multi	120 (52.63%)
Gestational Age (weeks)	<12	22 (9.65%)
	12-28	28 (12.28%)
	>28	142 (62.28%)
	Postnatal	36 (15.79%)
Booked Case	Booked	210 (92.1%)
	Unbooked	18 (7.9%)
Referred Case	Referred	132 (37.9%)
	Not Referred	96 (42.1%)
Residence	Urban	186 (81.6%)
	Rural	42 (18.4%)

Table 2: Distribution of the Various Complications

	Complications	Near Miss Event
Hemorrhage		
	APH	5.26%
	PPH	31.6%
Severe hypertension		
	Pre-eclampsia syndrome	2.63%
	Eclampsia	13.16%
	HELP syndrome	5.26%
Jaundice in pregnancy		7.9%
Anemia and shock		7.9%

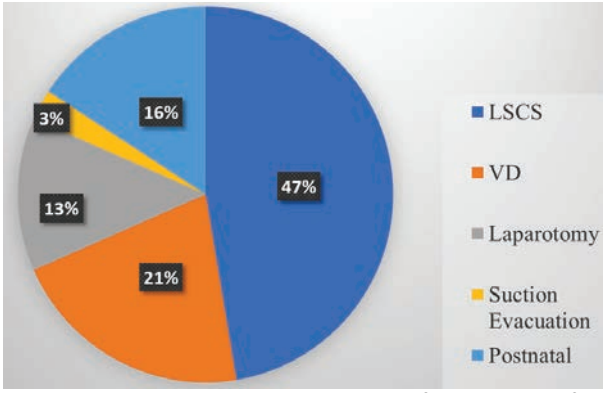

Fig. 1: Pie chart Distribution of mode of Delivery\Termination of Pregnancy

The maternal near miss ratio was 34.65/1000 live births in our study, where the near misses were defined as per the Operational Guidelines of Government of India, 2014. In comparison, a study by Shrutika[10] showed maternal near miss ratio as 16.43/1000 live births and a study by Roopa[11] showed

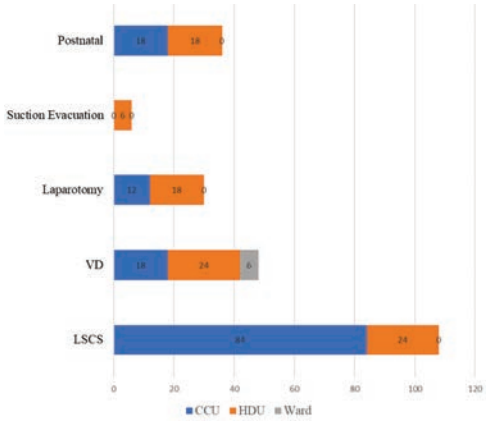

Fig. 2: Bar diagram showing distribution of CCU, HDU and ward admission among near miss cases who underwent LSCS, VD, laparotomy or suction evacuation and among postnatal patients

maternal near miss ratio as 17.8/1000 live births, where the near miss cases were defined by the WHO criteria 2010.

In our study, 31.6% had PPH and 13.2% had eclampsia which are the major causes identified. In comparison, a study by Shrutika[10] found 27% PPH and 42% eclampsia. Another study by Chhabra[12] found eclampsia 34%, hemorrhage 34%, sepsis 12%, 9.5% obstructed labour and others 14.5%. Therefore, hemorrhage and hypertensive disorders in pregnancy still remain two of the leading contributors to maternal death in developing countries like India.

In our study at the same time there were 42 maternal deaths, whereas study conducted by Shrutika[10] showed 13 maternal deaths and another study conducted by Mehata[13] showed 60 maternal deaths. These previous study results were based on the WHO criteria 2010 and need re-evaluation as per the MNM-R Operational Guidelines (GOI, 2014), because the WHO criteria underestimate maternal near miss cases in India[10], while the latter adapt principles to fit the needs and conditions of the Indian healthcare system.

CONCLUSION

Investigating maternal near-miss cases is essential for identifying and addressing deficiencies in the health care system, as well as for formulating effective strategies to reduce maternal mortality and morbidity. Maternal Near Miss studies provide certain advantages such as: MNMs are more common than Maternal Deaths, provide useful information on similar pathogenesis leading to morbidity and mortality, the patient herself is available for interview and hence a more accurate analysis of the gaps in healthcare system can be done[1]. Our findings suggest several actions that the government can consider in order to reduce maternal deaths, such as: enhanced antenatal care for early identification of high-risk pregnancies, improving the management of postpartum hemorrhage (PPH) and hypertensive disorders in pregnancy including the use of active management during the third stage of labor, providing regular health policy training and awareness for obstetric health professionals, providing basic training and knowledge for all labor personnel in the management of Postpartum Hemorrhage and Hypertensive Disorders of Pregnancy, implementing nationwide programs particularly aimed at educating the family members of expecting mothers in order to reduce Delay I, developing infrastructure at all levels to reduce the Delay II and Delay III as per the Three Delays Model[14]. There is a need for a more systematic approach to data collection, analysis and feedback to improve maternal care. Ensuring constant availability of limiting resources and technologies across all sphere is essential. Standardized referral processes and improved communications between the various health facilities can ensure the continuity of care and reduce delays in managing severe and complicated cases. Psychological support to the families of the patients could further improve overall patient care and satisfaction.

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Patient Consent: This is a record-based study hence patient consent is not applicable.

REFERENCES

1. Kamal, S., P. Roy, S. Singh and J. Minz, 2017. A study of maternal near miss cases at tertiary medical college of jharkhand, India. Int. J. Reprod., Contr, Obstet. Gynecol., 6: 2375-2380.
2. Sharma, S., R. Aherwar and S. Jawadhe, 2016. Retrospective study of maternal near misses in a tertiary care institute. Int. J. Reprod., Contr, Obstet. Gynecol., 5: 1114-1118.
3. Knight, M., *et al*., 2010. Saving Lives, Improving Mothers' Care – Lessons learned to inform future maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2006-08.

4. Deneux, T.C.,et al., 2009. Prevalence of near-miss events in the United States. American Journal of Obstetrics and Gynecology.
5. Tiwari, M.,et al., 2021. Maternal Near Miss: A Review of Trends and Clinical Implications. Journal of Obstetrics and Gynecology of India.
6. Patel, A.,et al., 2020. Maternal Near Miss and Its Relationship with Maternal Mortality: A Study from India. The Lancet Regional Health - Southeast Asia.
7. Melaku, T.,et al., 2017. Maternal near miss and mortality in Ethiopia: a review of clinical records. International Journal of Women's Health.
8. Ogu, R.N., E.O. Orji and B.B. Afolabi,et al., 2016. Maternal near miss: a multi-country analysis in Nigeria. Intern Jour Gyne Obste., 132: 68-72.
9. Shrutika, G., M. Ashalata, K. Geetanjali and R. Umesh, 2019. Maternal Near Miss: A case series study at a tertiary care Hospital in North Karnataka. Medica Innov., 8: 34-36.
10. Roopa, P.S., S. Verma, L. Rai, P. Kumar, M.V. Pai and J. Shetty, 2013. “near miss” obstetric events and maternal deaths in a tertiary care hospital: An audit. J. Pregnancy, 2013: 1-5.
11. Chhabra, P., K. Guleria, N.K. Saini, K.T. Anjur and N.B. Vaid, 2008. Pattern of severe maternal morbidity in a tertiary hospital of delhi, India: A pilot study. Trop. Doctor, 38: 201-204.
12. Mehta, M. and N. Bavarva, 2016. Facility Based Maternal Death Review at Tertiary Care Hospital: A Small Effort to Explore Hidden Facts. Appl Med Res., 1: 126-129.
13. Thaddeus, S. and D. Maine, 1994. Too far to walk: Maternal mortality in context. Social. Sci. Med., 38: 1091-1110.