

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20231547>

Original Research Article

Maternal near miss: a surrogate indicator of obstetrics care

Anita Thakur, Madhu Jain, Lavanya Anuranjani, Yashi Srivastava*,
Gopika Ambat, Prerna Priya

Department of Obstetrics and Gynecology, Heritage Institute of Medical Sciences, Varanasi, Uttar Pradesh, India

Received: 05 April 2023

Revised: 05 May 2023

Accepted: 06 May 2023

***Correspondence:**

Dr. Yashi Srivastava,

E-mail: yashi123srivastava@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: A maternal near miss (MNM) is an event in which a pregnant woman is on the verge of dying but doesn't die. Despite the fact that most maternal deaths can be avoided, efforts to reduce maternal mortality have not always been successful. This study aimed to identify and analyze the frequency of maternal near-misses (MNM) cases and causes of maternal near miss due to severe obstetric complications.

Methods: A retrospective observational study was carried out at Department of Obstetrics and Gynecology, Heritage Institute of Medical Sciences, Varanasi. The study duration was from January 2021-June 2022. Purposive sampling was used to collect the total of 2053 samples.

Results: The study involved in total of 56 maternal near miss cases which includes total of ten maternal deaths. The majority of the respondents have more than 20 years of the age (82.1%) where near miss cases were higher in multiparous women (73.2%). First delays (delay in women seeking help) were almost a third in numbers to affect the maternal mortality and morbidity. Hypertension (32%), hemorrhage (20%) and anemia (14%) were the major leading cause of obstetrical complications. About 66% of the maternal near miss cases needed the interventional management that was ICU admission, mechanical ventilation (41.1%) and blood transfusion (32.1%).

Conclusions: Pregnancy hypertension, postpartum hemorrhage, and severe anemia continue to be important determinants of maternal morbidity. First-referral unit facilities and training should be improved so that they can better respond to basic obstetric emergencies such as hypertension, anemia and hemorrhage.

Keywords: Hemorrhage, Hypertension, Maternal mortality ratio, Maternal near-miss, Obstetric care

INTRODUCTION

According to the definition of a maternal near-miss (MNM) case, "a woman who almost died but survived a complication(s) that occurred within 42 days of the pregnancy's termination or during childbirth or pregnancy".¹ The most important millennium development goal for maternal mortality has made slow progress in most countries with high maternal mortality ratios, and solutions to this global issue are urgently needed.² Although the number of maternal deaths has significantly decreased, the rate of decline is less than half of what is required to meet the MDG target.³ WHO have

instructed that all deliveries be attended by a qualified healthcare professional so that efficient interventions can be managed to prevent and treat any complications that might occur during childbirth.² Every year, nearly 5,29,000 women worldwide die as a result of pregnancy-related causes. Nearly 118 women are severely affected and suffered from life-threatening situations.⁴ In order to track progress toward the Millennium Development Goal (MDG 5), the goal of achieving universal access to reproductive health by 2015, the two targets are the maternal mortality ratio (MMR) reduction by 75 percent and improving maternal health between 1990 and 2015.^{5,6} Near-miss incidents occur more frequently than maternal

deaths and may generate more data because the woman herself can be a source of data.⁷ Since 2013, MMR in India has decreased by 26.9%. From 2011 to 2013 it was 167; from 2014 to 2016 it was 130; and from 2015 to 2017, it was 122 which shows the declining pattern of maternal mortality rate.⁸ The majority of maternal near miss cases are the result of a chain of events that includes not only medical factors but also many social and cultural factors. Every near miss should be seen as a chance to learn valuable lessons and to enhance the level of service being provided. Keeping all these things in mind, maternal near miss pregnancy has highly affected the maternal population to take corrective actions for identifying problems and thus, reducing maternal mortality and long term morbidity and opportunities to inspect and improve health care provision is highly essential. So, this study aimed to identify and analyze the frequency of maternal near-misses (MNM) cases and causes of maternal near miss due to severe obstetric complications.

METHODS

A retrospective observational study was conducted and the study was led in Department of Obstetrics and Gynecology, Heritage institute of medical sciences, Varanasi. The study duration was from January 2021 - June 2022. Purposive sampling was used to collect the samples due to the limitation of the study. Sample collection was done from delivery registered in labor ward, intensive care unit (ICU), operation theater and medical records of patients in records department. The respondents involved in this study were critically ill pregnant, laboring, post-partum and post-aborted women. Women that developed life threatening conditions unrelated to pregnancy i.e. not during pregnancy or 42 days after termination of pregnancy were excluded. Women

following inclusion criteria were categorized as per laboratory, clinical, and management-based criteria laid down by WHO. The data was recorded and analyzed. All analysis was done using SPSS version 23. The statistical calculation was done by applying the ANOVA (Analysis of Variance) test and calculating p-value where p-value of <0.05 deemed as statistically significant. The clinical findings, investigations and interventions were broadly divided in 3 categories which included: pregnancy specific obstetric and medical disorders, pre-existing disorders aggravated during pregnancy, accidental and incidental causes in pregnancy.

A set of parameters were used in the study that are maternal near miss (MNM) case, maternal death (MD), MNM ratio (MNMR), maternal mortality ratio (MMR), maternal mortality rate, maternal mortality near miss ratio (MNM:MD), mortality index referring to the number of maternal deaths divided by the number of woman with life-threatening conditions expressed as a percentage [$MI=MD/(MNM+MD)$] and delays which was recognized as first delay-delay in deciding to seek care, second delay-delay in reaching an appropriate health facility and the third delay- delay in receiving quality obstetric care at health facility level.

RESULTS

A total number of 2053 deliveries were performed during the case investigation from January 2021-June 2022. The Maternal Near Miss Ratio (MNMR) tends to be 27.5 per thousand live birth and Maternal Near Miss Mortality Ratio [MNM:1MD] was 5.6:1 and Mortality Index was 15.15% which shows the total number of maternal near miss case were 56 and total number of maternal deaths were 10 (Table 1).

Table 1: Variables depicting the maternal outcomes of the cases investigated.

Total numbers of deliveries	Total numbers of live births	Total number of maternal near miss cases	Total number of maternal deaths
2053	2034	56	10

Table 2: Distribution based on demographic variables. (n=56).

Characteristics	Number of cases (n=56)	Percentage (%)	Study group (2053)	P-value
Age	<20	10	17.8	>0.00001*
	>20	46	82.1	
Literacy	Illiterate	30	53.57	>0.00001*
	Literate	26	46.42	
Residential areas	Rural	37	66.07	>0.00001*
	Urban	19	33.9	
Booked/Unbooked	Booked	11	19.64	0.250
	Unbooked	45	80.35	
Parity	Primiparous	15	26.78	0.016*
	Multiparous	41	73.2	

*:Statistical significance at 95% CI

Out of 56 maternal near miss cases, 82.1% cases were more than 20 years of age group. Distribution on demographic variables showed that illiterate educational status was seen higher that is 53.57% followed by rural residential area 66.7%, the status of antenatal booking refers un-booked cases 80.35% and majority of the respondents were multiparous i.e. around 73%. The table two highlights the demographic variables cross tabulated with the number of maternal near miss pregnancy namely with age, literacy status, residential areas and parity (Table 2).

Table 3 shows the types of delays affecting the maternal morbidities and mortalities, where first delay (Delay in women seeking help) tends to seem highly identified in 32 % of cases. Second delay (Logistic) identified in 23% of cases. Third delay (facility level) and unidentified delay shows to be in 9 % of cases. 27% of cases have more than one delay identified (Table 3).

Table 3: Distribution of patients based on types of delays affecting maternal morbidities and mortalities (n=159).

Delays	No. of cases (n=56)	Percentage
Frist delay	18	32
Second delay	13	23
Third delay	5	9
More than one delay	15	27
Delays unidentified	5	9

The Figure 1 shows the distribution of patient based on obstetrical complications where the rate of the hypertension is higher rate 32% followed by haemorrhage 20%, anemia 14%, sepsis 9%, renal dysfunction 7%, uterine rupture 4%, jaundice 9% and heart disease 5%.

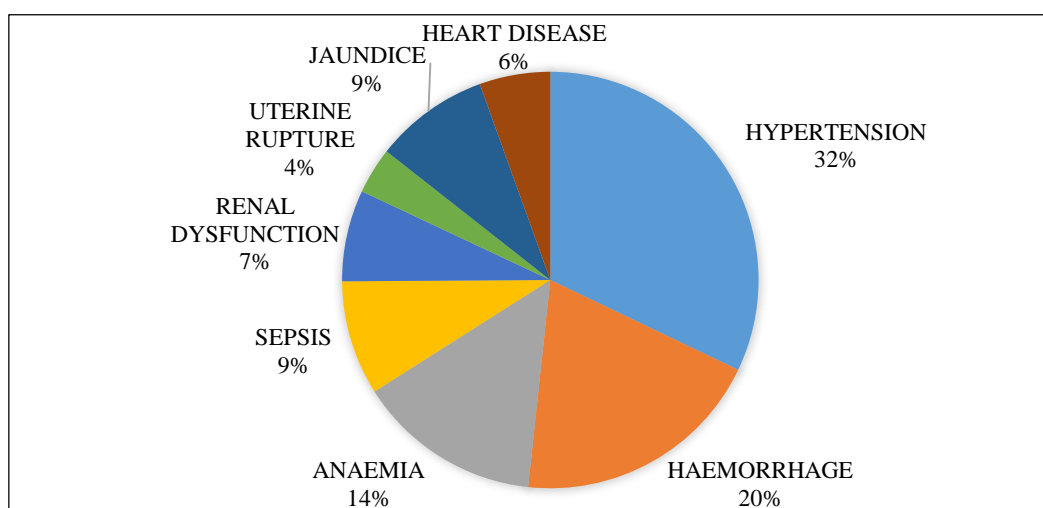


Figure 1: Distribution of patient based on obstetrical complications (n=56).

Table 4: Intervention needed in the management of maternal near miss cases. (n=56).

Intervention needed	Number of cases (n=56)	Percentage%
ICU admissions	37	66%
Cardiopulmonary resuscitation	5	8.90%
Mechanical ventilation	23	41.10%
Blood/blood product transfusion	18	32.10%
Renal or peritoneal dialysis	6	10.70%
Laparotomy	11	19.60%

Interventional need in the management of maternal near miss case revealed that 66% of the maternal near miss cases need ICU admission where least cases required cardiopulmonary resuscitation 8.2%. Other interventions like mechanical ventilation, blood transfusion, renal or peritoneal dialysis and laparotomy were 41.10%, 32.10%, 10.70% and 19.60% respectively.

DISCUSSION

In developing nations, maternal near-miss continues to be a serious problem for public health. The purpose of the study was to analyze the nature and cause of maternal near-miss events. Healthcare planners has used MMR as the benchmark to evaluate the caliber of obstetric services in an area. Maternal near-misses have recently gained

attention as a more useful indicator of maternal health, replacing maternal mortality.⁴ The majority of potentially fatal pregnancy complications can be avoided by providing good prenatal care and necessary obstetric care during labor and delivery. But given the frequency of near-miss incidents, it appears that these facilities are not offering enough preventive maternity services.¹ In this present study, there were 2053 deliveries overall during the study period, along with 56 near-miss incidents. Reticence to seek assistance is influenced by social and educational delay.⁹ This study represents more than half of the respondents encounter the maternal near miss cases have low literacy rate, which is one of two equals nearly similar to the study done at Shivapuri India.¹⁰ The near miss cases are depicted with the age more than 20 years (82.1%) near about identical to the study done at Brazil (83.9%).¹¹ This findings may point to the demographic distribution of the area where rural residential areas shows the majority of the percentage (66.07) as compared to the urban residential area. Similarly the status of antenatal booking were higher in un-booked sector (80.35%) as compared to the study performed at North East India (62.5%) which shows lacking of pregnancy preparation in present study.¹² Previous study done at tertiary care hospital, India with the parity cases of multiparous seems to be (64.76%) in compare to this study (73.2%) it highlights maternal near miss were higher in the respondents who have one or more than one children.⁸

MNM ratio (MNMR) incidence in current study was 27.5 per thousand live birth which is very high as compared to previous study performed that showed 9.02/1000 live births also study showed this 15/1000 live births and lastly other study showed 11.9/1000 live births.^{8,11,13} Present study showed 5.6:1 Maternal Near Miss to Mortality Ratio [MNM:1MD] and mortality index of 15.5% where a previous study shows 17.5:1 [MNM:1MD] and mortality index 5.7%.⁵ MNM is a more accurate way to evaluate the level of services a healthcare system offers, and it aids in identifying and fixing problems with the health care system that relate to obstetric care.¹⁴ The additional benefit of reviewing near-miss cases for understanding health-seeking behaviour is having first-hand knowledge from women who have survived.¹⁵ As the maternal near miss high ratio reflects the inequalities in assessing the quality health services and highlights the gap in between rich and poor. Current study focus on the need of the family planning, preconception care, prenatal care and lastly postnatal care to improve the maternal health.

Regarding to the delay model, the lack of adequate obstetric emergency care in the Indian system is thought to be caused by three delays that have been identified. The first delay is due to a lack of knowledge, which causes a delay in accessing medical facilities. The second delay is the inability to access medical care because of a lack of transportation, high costs, or socioeconomic problems. The third delay is connected to inadequate care being provided at the medical facility because of a delay in the diagnosis of serious conditions, decision-making, or the

lack of resources or qualified medical personnel. The study shows that the first delay in seeking help ought to be 32%, second delay (logistic) as 23% and third delay (facility level) 9% and more than one delay was 27% where the similar kind of previous studies were performed which first delay range from 20-55% moving over second delay 25-60% and lastly third delay ranges from 10-30%.^{10,17,16} The importance of the first two delays is highlighted by the fact that in developing countries, about 75% of women with severe obstetric morbidity arrive in a critical condition.¹⁵ Rural residency and educational status are the contributors to delays in the maternal near miss which can be prevented by disseminating the awareness to limit the rate of delays.

Out of total maternal near miss pregnancy majority of the respondents have hypertension (32%) followed by the hemorrhage (20%), anemia (14%), sepsis and jaundice (9%), renal dysfunction (7%), heart disease (5%) and uterine rupture (4%). Comparing the previous study vast difference was seen in near miss event hypertension which ranges from (40-90%).^{11,18,19} A study conducted in East India shows the comparable results with hemorrhage being (18.10%).¹⁹ The present study shows hypertension and hemorrhage are the major obstetrical complications linked to the maternal near miss. Ten maternal deaths are encounter in this study. This is a result of the unsatisfactory care and unacceptably high maternal mortality rate in this area. The main causes of maternal mortality and morbidity in the current study were hypertensive disorders and hemorrhage. This indicates inadequate systemic response to address these obstetric complications or perhaps poorly performing care. These results might be improved and ultimately altered by training these service providers and by system management at all levels. An abundance of potentially fatal obstetric situations were encountered by the medical professionals in this situation.

Moving forward to the present study, the intervention needed for the total 56 maternal near miss cases were ICU admission. Around two-third of the maternal near miss requires the ICU admission which have almost contrast findings with study done at Karnataka with (62.6%) and showed dissimilar findings as contrast to the retrospective study at tertiary care institute where all the maternal near miss requires ICU admission.^{20,5} In other hand, mechanical ventilation was required by two-fifth percentage of the respondents followed by almost a third by blood transfusion, 10.7 percent seeks to the renal or peritoneal dialysis, 19.6% needed the laparotomy and lastly one-tenth of the cases seek the cardiopulmonary resuscitation. Like most of the Indian studies, the presence of life-threatening complications during maternal near miss interventions needed were ICU admissions, mechanical ventilation and blood transfusion.^{5,8,17,20}

Considering the limitations in health care found in present study area, there is a need to enhance community resources and most importantly, public awareness of antenatal visits. In order to effectively manage maternal complications,

healthcare professionals working in primary health centers (PHC) and community health centers (CHC) may require training. Additionally, the government should take steps to improve the system for sending sick patients to more advanced facilities.

CONCLUSION

The near miss method has been proposed as a way to assess and enhance the level of care that health system offers. Reviewing near-miss incidents allows us to gain knowledge about the procedures used to care for pregnant women and their shortcomings. Majority of the near miss cases doesn't have antenatal booking and almost three-quarters of the maternal near miss cases were related to the multiparous. A delay in women seeking help has seen higher where hypertension and hemorrhage were the major obstetrical conditions in near miss cases. For the management of the maternal near cases the most needed interventions were ICU admission, mechanical ventilation and blood transfusion. Based on our study, we conclude that successful antenatal care, trained health care professionals, accessible health care services and integrated referral system along with well-developed infrastructure can be the corrective actions that should be taken to reduce the maternal near miss.

ACKNOWLEDGMENTS

Authors would like to thank Mr. Raju Kumar Chaudhary for their support during this period of research.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

- Gebremariam TB, Demie TG, Derseh BT, Mruts KB. Trends of and factors associated with maternal near-miss in selected hospitals in North Shewa Zone, Central Ethiopia. *J Pregnancy.* 2022;2022:2023652.
- WHO. The WHO Near-Miss approach for Maternal Health. World Heal Organ, 2011. Available at: www.who.int/reproductivehealth%0Ahttp://apps.who.int/iris/bitstream/10665/44692/1/9. Accessed on 02 February 2023.
- Singh V, Barik A. Maternal near-miss as a surrogate indicator of the quality of obstetric care: a study in a tertiary care hospital in Eastern India. *Cureus.* 2021;13(1):1-11.
- Upadhyaya I, Chaudhary P. Severe acute maternal morbidity and intensive care in paropakar maternity and women's hospital. *Nepal J Obstet Gynaecol.* 2014;8(2):38-41.
- Sharma S, Aherwar R, Jawadhe S. Retrospective study of maternal near misses in a tertiary care institute. *Int J Reprod Contracept Obstet Gynecol.* 2016;5(4):1114-8.
- Sajedinejad S, Majdzadeh R, Vedadhir AA, Tabatabaei MG, Mohammad K. Maternal mortality: A cross-sectional study in global health. *Global Health.* 2015;11(1):1-13.
- Shretha N.S., Saha R., Karki C. Near miss maternal morbidity and maternal mortality at Kathmandu Medical College Teaching Hospital. *Kathmandu Univ Med J.* 2010;8(30):222-6.
- Ingole SJ, Chaudhary SN. Maternal near miss events in tertiary care hospital: a retrospective observational study. *J Clin Diagnostic Res.* 2021;15(4):15-8.
- Reinke E, Supriyatningsih, Haier J. Maternal mortality as a millennium development goal of the United Nations: a systematic assessment and analysis of available data in threshold countries using Indonesia as example. *J Glob Health.* 2017;7(1):010406.
- Jain U. A study on maternal near miss cases in Government Medical College Shivpuri, India. *Inter J Reprod Contra Obstet Gynecol.* 2019;8(8):3047-56.
- Moraes APP, Barreto SM, Passos VMA, Golino PS, Costa JA, Vasconcelos MX. Incidence and main causes of severe maternal morbidity in são luís, maranhão, Brazil: A longitudinal study. *Sao Paulo Med J.* 2011;129(3):146-52.
- Sarkar P, Baidya JL, Rakshit AK. A study to assess proportion of the maternal near miss to maternal death in a tertiary care teaching hospital of North East India. *Int J Reprod Contraception, Obstet Gynecol.* 2020;9(6):2486.
- Bansal M, Lagoo J, Pujari K. Study of near miss cases in obstetrics and maternal mortality in Bastar, Chhattisgarh, India. *Int J Reprod Contraception, Obstet Gynecol.* 2016;5(3):620-3.
- Mohan Kumar M, Naik G. Maternal near miss: reaching the last mile. *J Obstet Gynaecol.* 2021;41(5):675-83.
- Chhabra P. Maternal near miss: An indicator for maternal health and maternal care. *Indian J Community Med.* 2014;39(3):132-7.
- Purandare C, Bhardwaj A, Malhotra M, Bhushan H, Chhabra S, Shivkumar P. Maternal near-miss reviews: lessons from a pilot programme in India. *BJOG.* 2014;121(4):105-11.
- Reena RP, Radha KR. Factors associated with maternal near miss: A study from Kerala. *Indian J Public Health.* 2018;62(1):58-60.
- Kulkarni R, Chauhan S, Daver R, Nandanwar Y. Prospective observational study of near-miss obstetric events at two tertiary hospitals in Mumbai, Maharashtra, India. *Int J Gynecol Obstet.* 2016;132(2):170-3.
- Naik SS, Ghosh S. Comparison of near miss obstetric events and maternal deaths in a tertiary care teaching hospital from Eastern India. 2018;7(9):3619-24.
- Ps R, Verma S, Rai L, Kumar P, Pai MV, Shetty J. "Near miss" obstetric events and maternal deaths in a tertiary care hospital: an audit. *J Preg.* 2013;2013:393758.

Cite this article as: Thakur A, Jain M, Anuranjani L, Srivastava Y, Ambat G, Priya P. Maternal near miss: a surrogate indicator of obstetrics care. *Int J Reprod Contracept Obstet Gynecol* 2023;12:1744-8.