MED-PHOENIX: JOURNAL OF NATIONAL MEDICAL COLLEGE

ORIGINAL ARTICLE

OBSTETRIC NEAR MISS EVENTS AT A TERTIARY CARE CENTRE, BIRGUNJ

Pravin Shah, [1]* Ravi Kumar Shah, [1] Sana Ansari, [1] Rehana Mushtaq, [1] Ruby Shrestha [1]

[1] Department of Obstetrics and Gynaecology, National Medical College and Teaching Hospital, Birgunj, Parsa, Nepal

Date of Submission : Oct 06, 2023
Date of Acceptance : Oct 30, 2023
Date of Publication : Jan 15, 2024

Correspondence to:
Dr.Pravin Shah, Department of Obstetrics and Gynaecology, National Medical College Teaching Hospital, Birgunj, Parsa, Nepal.
Email : pshah4247@gmail.com,
Phone: +977-9804355954

Citation:
Shah P, Shah RK, Ansari S, Mushtaq R, Shrestha R. Obstetric Near Miss Events at a Tertiary Care Centre, Birgunj. Medphoenix. 2023;8(2):24-28

DOI:https://doi.org/10.3126/medphoenix.v8i2.60636

Conflict of interest: None, ***Funding:*** None

Publisher: *National Medical College Pvt. Ltd.*
MedPhoenix - Journal of National Medical College (JNMC); 2023,8(2), available at www.jnmc.com.np

ISSN:2631-1992 (Online); ISSN:2392-425X (Print)

ABSTRACT

Introduction: *Near miss cases are the ones who nearly died but survived a complication that occurred during pregnancy, childbirth, or within 42 days of termination of pregnancy. Near-miss is recognized as the predictor of the level of care and maternal deathand thereforea review of near-miss obstetric eventsis useful to investigate maternal mortality. The study was meant to determine the ratio and nature of near-miss obstetric cases and associated factors.*

Materials and Methods: *This was a prospective observational study done in the Department of Obstetrics and Gynaecology at National Medical College and Teaching Hospital from 1st February 2022 to 31st January 2023. Ethical approval was obtained from IRC (Ref. F-NMC/537/077-078).The near-miss cases were identified among the admitted obstetric cases using the five-factor scoring system and followed till their discharge or death.The assessment of the causes of near-miss cases was done.*

Results: *During the study period, 1163 live births, 33 near-miss cases, and5 maternal mortalities were recorded. The incidence of near-miss was 28.37 per 1000 live births, the mortality index was 13.16% and the near-miss to maternal mortality ratio was 6.6: 1. Haemorrhage (39.39%) was the most common event responsible for near-miss, followed by hypertensive disorders (24.24%). Similarly, cardiovascular (78.79%) was the most common organ dysfunction recorded, followed by hepatic (33.33%).*

Conclusion: *Haemorrhage and hypertensive disorders are the major causes of near-miss events. Identification and evaluation of the factors of near-miss cases can reduce maternal morbidity and mortality, as special preventive actions for the management of its complications can be planned. It is also worth presenting near-miss cases in national indices.*

Keywords: *Five-factor scoring system, Maternal mortality, Maternal near-miss*

INTRODUCTION

Obstetric near-miss is being increasingly recognized as one of the indicators of the quality of obstetric care following maternal mortality statistics.[1] Worldwide, more than half a million women between the ages of 15-49 die each year from the complication of pregnancy and childbirth.[2] Developing countries disproportionately bear this burden despite intensive global attention and efforts.[3] Every effort has been implemented to reduce the maternal mortality rate (MMR) globally. Maternal deaths alone are not adequate to evaluate interventions aimed at improving maternal outcomes; therefore, the World Health Organization (WHO) has developed the concept of Maternal Near Miss (MNM) to fortify maternal mortality data. An MNM case is defined as " a woman who nearly died but survived a complication that occurred during pregnancy, childbirth, or within 42 days of termination pregnancy".[4] The patient survived either by chance or because of the hospital care she received.

In many developed countries, maternal mortality has fallen to single digits. Near-miss cases occur more often than maternal deaths and may generate more information because the woman, herself, is the source of data.[5] Therefore, evaluation of the causes of the near-miss is beneficial in the rapid and precise detection of flawsin women's healthcare facilities. This, in turn, helps in identifying the potential areas that need to be addressed, particularly in low and middle-income countries.[3,6] This is why, the WHO recommends the MNM approach to be considered in national health plans so that maternal health care can be improved.[1]

Hence, this study was conducted to evaluate the associated risk factors and determinants of near-miss obstetric cases at National Medical College and Teaching Hospital and to provide insight into the problem of maternal near-miss and mortality.

MATERIALS & METHODS

This was a prospective observational study done for

twelve months from 1st February 2022 to 31st January 2023in the Department of Obstetrics and Gynaecology at National Medical College and Teaching Hospital (NMCTH), a tertiary care hospital in Province 2, Birgunj, Nepal.

Among the obstetric patients admitted under the care of the Department of Obstetrics and Gynecology, potentially all life-threatening conditions were assessed, and those cases were scored as per the five-factor scoring system and scores equal to or more than 8 were enrolled in the study. The sample was taken based on fulfillment of thecriteria listed in Table 1.

Table 1: Five-factor scoring system

Factors	Score
Organsystem failure	5
ICU admission	4
Transfusion>3 units	3
Extended intubation (>12 hours)	2
Surgical intervention (hysterectomy, re-lapa-rotomy)	1

A score of: ≥ 8 were enrolled in the study

<8 were excluded from the study

Women with complications beyond 42 days of childbirth and non-pregnant women with complications were excluded. The study was conducted only after approval by the Institutional Review Committee of NMCTH (regd no. F-NMC/537/077-078). Informed consent was taken from the participants.

Data Analysis:

Data were collected and entered in SPSS version 20 for analysis. Results were presented as frequencies, percentages, and descriptive statistics using Microsoft Excel 2021. The following near-miss indices were calculated.

- MNM incidence ratio = maternal near-miss cases per 1000 livebirths (LB). MNMIR = MNM/LB
- Maternal near-miss: mortality ratio = Proportion between maternal near-miss cases and maternal deaths. A higher ratio indicates better care.
- Mortality index = Number of maternal deaths divided by the number of women with life-threatening conditions, expressed as a percentage.
- Severe maternal outcome ratio (SMOR) = The number of women with life-threatening conditions (MNM + MD) per 1000 live births (LB).

RESULTS

As shown in Table 2, out of 1699 obstetrics patients admitted to the department during the study period, 1219 patientswere delivered and the remaining were admitted as antepartum or postpartum cases. Among the delivered patients, 1163 resulted in live deliveries. Similarly, 33 near-miss cases and 5 maternal deaths were recorded during this period.

Table 2: Frequency of near-miss cases and maternal deaths

	Total
Total Obstetric Admissions	1699
Total Births	1219
Total Live Births	1163
The absolute number of near-miss cases	33
Maternal Deaths	5

Table 3 shows various indicators proposed by WHO to describe maternal events. Based on the criteria used, the severe maternal outcome ratio and the incidence of maternal near-miss were found to be 32.67 and 28.37 per 1000 live births respectively. Similarly, the maternal near-miss rate and maternal mortality rate were 19.42 and 2.94 per 1000 obstetric admissions respectively. The maternal mortality ratio came out to be 429.92 per 100000 live births. The ratio of maternal death tomaternal near-miss events was 1: 6.6 and the overall mortality index was 13.16%.

Table 3: Indicators proposed by WHO to describe maternal events

Maternal near-miss rate/1000 obstetric admission	19.42
Maternal near-miss ratio/1000 live births (Incidence of near miss/1000 live births)	28.37
Maternal near-miss: Mortality ratio	6.6: 1
Mortality index (%)[a]	13.16
Maternal mortality rate/1000 obstetric admission	2.94
Maternal mortality ratio/1,00,000 live births	429.92
Severe Maternal Outcome Ratio [b]	32.67

[a] Mortality index (MI): Maternal Death/ (Maternal Death + Near-miss) X 100(%)

[b] Severe Maternal Outcome Ratio (SMOR): (Maternal Death + Near-miss)/Live Births X 1000

The demographic characteristics of the women classified as near-miss is shown in Table 4. Amajority of the cases belonged to the first trimester and the third trimester, i.e., 33.33% and 42.42% respectively. Similarly, post-partum cases contributed to 15.15% and the least belonged to the second trimester, i.e., 9.09%. Also, 33.33% of the

patients were of parity 1, followed by 27.27% of them being nulliparous.

Table 4: Demographic characteristics of women with near-miss morbidity and maternal death

	Near-miss		Maternal Death	
	No. of cases	Percentage	No. of cases	Percentage
Parity				
0	9	27.27%	1	20%
1	11	33.33%	2	40%
2	7	21.21%	2	40%
3	3	9.09%	-	-
4	2	6.06%	-	-
≥5	1	3.03%	-	-
Gestational Age				
<13	11	33.33%	-	-
13-28	3	9.09%	-	-
>28	14	42.42%	5	100%
Post-partum	5	15.15%	-	-

Table 5 demonstrates the prevalence of various risk factors among the near-miss cases. It is obvious that in many individuals, multiple risk factors were present at a time. Haemorrhage (39.39%) was found to be the most frequently occurring event responsible for the near-miss to occur. Out of the 13 cases of haemorrhage, 4(30.77%) had a history of antepartum haemorrhage and the remaining 9(69.23%) were cases of postpartum haemorrhage. Placenta previa in 3 and abruptio placenta in 1 patient were the causes of antepartum haemorrhage. On the other hand, the atonic uterus was the most common cause of postpartum haemorrhage. However, 2 cases of postpartum haemorrhage had a history of retained placenta.

Hypertensive disorders of pregnancy were found to be the second most common risk factor associated with near-miss and the total number of cases was 8(24.24%). Two of them were identified as severe preeclampsia and the remaining six were those with the diagnosis of eclampsia. One of the severe preeclampsia cases, additionally, was complicated by HELLP (Hemolysis, Elevated Liver Enzyme and Low Platelets) syndrome. Cases of eclampsia received magnesium sulphate as an anticonvulsant and were admitted to ICU for the need of critical care.

Similarly, abortion (21.21%), sepsis or severe systemic infection (18.18%), ectopic pregnancy (15.15%),and ruptured uterus (9.09%) were other risk factors. Five out of seven abortion cases were incomplete abortions with a history of massive per-vaginal bleeding. The remaining one was a complete abortion with severe anaemia in shock following profuse bleeding per-vaginum and the other one was a case of septic abortion.

There were six cases identified as sepsis or severe systemic infection. All of them were referred from other centers. Three out of six cases had puerperal sepsis. One case witha history of the caesarean section had developed pyo-peritoneum and had to undergo exploratory laparotomy. Similarly, one case presented in post-abortion status with septic shock, and the remaining one was an antepartum case with acute pyelonephritis with septic shock.

All three cases of the ruptured uterus had a history of previous caesarean section with delayed presentation to the institute. However, the uterus could be preserved in all three cases and none had to undergo a hysterectomy.

Table 5: Diagnosis distribution of near-miss cases and maternal deaths

	Near-miss		Maternal Death	
	No. of cases	Per-centage	No. of cases	Per-cent-age
Risk Factors				
Abortion	7	21.21%	-	
Ectopic	5	15.15%	-	
Hypertension	8	24.24%	3	60%
Severe Preeclampsia	2	-	3	-
Eclampsia	6	-	-	-
Sepsis or Severe Systemic Infec-tion	6	18.18%	1	20%
Ruptured Uterus	3	9.09%	-	-
Haemorrhage	13	39.39%	3	60%
Antepartum Haemorrhage	4	-	1	-
Post-partum Haemorrhage	9	-	2	-

Table 6 shows different frequencies of organ system failures in near-miss cases. The most common organ system failure was cardiovascular dysfunction (78.79%). It was followed by hepatic dysfunction (33.33%), respiratory dysfunction (27.27%), neurological dysfunction (21.21%), renal dysfunction (15.15%) and coagulation dysfunction (3.03%). It is evident that in some instances more than one organ system failure was present at a time.

Out of 33 near-miss cases, 5(15.15%) had either delivered or undergone some formof surgical interventionbefore they arrivedat this institute. Similarly, 8(24.24%) cases had to undergo emergency laparotomy within 3 hours of arrival at this institute. It was done in cases of either ectopic pregnancies or cases of previous caesarean sections with the ruptured uterus at the time of presentation. 51.52% of the cases were referred to our institute from the other centers in critical states.Similarly, blood transfusion with

various blood products was done in 81.82% of the near-miss cases. 69.70% of the candidates had to be admitted to the ICU for critical monitoring. Two cases underwent dialysis for renal dysfunction.

Table 6: Organ system failure, condition and critical intervention to near-miss cases

	No. of cases	Percentage
Type of organ system failure		
Cardiovascular dysfunction	26	78.79%
Respiratory dysfunction	9	27.27%
Renal dysfunction	5	15.15%
Hepatic dysfunction	11	33.33%
Neurological dysfunction	7	21.21%
Coagulation dysfunction	1	3.03%
Determinants		
Delivery or surgical intervention occurred before arrival	5	15.15%
Laparotomy within 3 hours of arrival	8	24.24%
Women referred from another health facility	17	51.52%
Self	16	48.48%
Intensive care		
Use of blood products	27	81.82%
Dialysis	2	6.06%
Laparotomy	8	24.24%
Admission to ICU	23	69.70%

DISCUSSION

The study depicts maternal near-miss events in this hospital during the study period. As per the result, the maternal near-miss incidence was found to be 28.37/1000 live births, which is within the range of ratios (12.3-82.3 per 1000 deliveries) reported in various studies.[7,8] However, this differs from the range of 3-15/1000 live births as shown by the review of WHO.[4]Similarly, the overall observed ratio of maternal death to maternal near-miss events was 1: 6.6. This means for every six to seven life-threatening conditions there was one maternal mortality. This ratio is similar to the results of various studies where the range is 1: 5-12.[9] These facts vary to a great extent from studies of Western Europe that reported a ratio of 1: 117-223.[10]

These large disparities may be either due to differences in diagnostic criteria used to identify the near-miss cases or due to referral biases because patients who are likely to be near-miss or potential maternal mortality are preferentially referred to tertiary care hospitals.

The mortality index was 13.16% which is comparable to the studies from African countries (10.6%-14%).[11] The maternal mortality ratio at this institute was 430/100000 live births. The studies from different developing countries showed maternal mortality ratios between 423/100000 live births to 313/100000 live births.[12,13] However, the Brazilian study showed a mortality rate of 260/100000 live births.[14]

Hemorrhage (39.39%, n=13), hypertensive disorders of pregnancy (24.24%, n=8),and abortion and its complications (21.21%, n=7) were the major causes of life-threatening conditions as well as the common presentations to characterize the near miss in this study. These three conditions are the leading cause of maternal morbidity and mortality in Nepal.[15] Studies and reviews of near misses in different centers of Nepal and India and other developing countries like Syria, Iraq, Indonesia, sub-Saharan Africa, Nigeria, and Pakistan also yielded similar results.[12,13,16–20] Sepsis (18.18%), ectopic pregnancy (15.15%), and ruptured uterus (9.09%) were other contributing factors for near-miss cases. Priyanka et al. from India reported infections (5.35%), ruptured uterus (8.92%), and medical complications (11.6%) as other complications contributing to near-miss cases.[21]

Cardiovascular dysfunction (78.79%) was the leading life-threatening condition among near-miss cases and this is in accordance with the study conducted by Khadka et al. (48.8%).[22] However, multicenter surveillance in Kathmandu found uterine dysfunction (27%) as the leading organ dysfunction.[23] Similarly, respiratory dysfunction (27.27%) contributed as the second leading factor which is in contrast to the study of Khadka et al. that showed coagulation dysfunction (27.2%) as the second most common life-threatening condition.[22]

The majority of the near-miss cases presented or were referred to this institute in an already moribund state. Delayed diagnosis, inappropriate transfer, and inadequate utilization of resources might have been the cause of maternal morbidities and mortalities in our study.

The limitation of the study is that the study is a prospective observational study, and the determinants of the near-miss events could not be evaluated with controls. Also, it is a single audit done over a short time frame. Hence, data collection spanning over a few years would give a true picture of improvement in obstetric care.

CONCLUSION

In this study, obstetric hemorrhage is the most common serious obstetric complication leading to near-miss events, followed by hypertension during pregnancy. A life-threatening condition may develop in any obstetric case even if there are little or no risks. Identification of preventable factors and special preventive actions

should be taken for the management of complications in such near-miss cases. Hence, all women need access to quality maternal health services so that such conditions can be timely diagnosed and managed.With decreasing maternal deaths in many places around the world, maternal near-missidentification and maternal near-miss audit are becoming more useful methods to review the quality of care provided.

REFERENCES

1. Ahmed SM, Rawal LB, Chowdhury SA, Murray J, Arscott-Mills S, Jack S, et al. Cross-country analysis of strategies for achieving progress towards global goals for women's and children's health. Bull World Health Organ. 2016;94(5):351–61.
2. AbouZahr C. Global burden of maternal death and disability. Br Med Bull. 2003;67:1–11.
3. Say L, Souza JP, Pattinson RC. Maternal near miss - towards a standard tool for monitoring quality of maternal health care. Best Pract Res Clin Obstet Gynaecol. 2009 Jun 1;23(3):287–96.
4. WHO. The WHO Near-Miss approach for Maternal Health. Who. 2011;1–34.
5. Stones W, Lim W, Al-Azzawi F, Kelly M. An investigation of maternal morbidity with identification of life-threatening "near miss" episodes. Health Trends. 1991;23(1):13–5.
6. Filippi V, Brugha R, Browne E, Gohou V, Bacci A, De Brouwere V, et al. Obstetric audit in resource-poor settings: Lessons from a multi-country project auditing "near miss" obstetrical emergencies. Health Policy Plan. 2004;19(1):57–66.
7. Say L, Pattinson RC, Gülmezoglu AM. WHO systematic review of maternal morbidity and mortality: The prevalence of severe acute maternal morbidity (near miss). Reprod Health. 2004;1:1–5.
8. Oppong SA, Bakari A, Bell AJ, Bockarie Y, Adu JA, Turpin CA, et al. Morbidity : a multi-centre cross-sectional study. 2020;126(January 2015):755–62.
9. Kassebaum NJ, Bertozzi-Villa A, Coggeshall MS, Shackelford KA, Steiner C, Heuton KR, et al. Global, regional, and national levels and causes of maternal mortality during 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet (London, England). 2014 Sep 22;384(9947):980–1004.
10. M W, S B, C W. Incidence and predictors of severe obstetric morbidity: case-control study. BMJ. 2001 May 5;322(7294):1089–94.
11. Soma-Pillay P, Pattinson RC, Langa-Mlambo L, Nkosi BSS, Macdonald AP. Maternal near miss and maternal death in the Pretoria Academic Complex, South Africa: A population-based study. S Afr Med J. 2015 Jul 1;105(7):578–83.
12. Almerie Y, Almerie MQ, Matar HE, Shahrour Y, Abo A, Chamat A. Obstetric near-miss and maternal mortality in maternity university hospital , Damascus , Syria : a retrospective study. BMC Pregnancy and Childbirth. 2010;10:65
13. Ps R, Verma S, Rai L, Kumar P, Pai M V., Shetty J. "Near miss" obstetric events and maternal deaths in a tertiary care hospital: an audit. J Pregnancy. 2013; Article ID 393758:1-5.
14. Souza JP, Cecatti JG, Parpinelli MA, Serruya SJ, Amaral E. Appropriate criteria for identification of near-miss maternal morbidity in tertiary care facilities: A cross sectional study. BMC Pregnancy Childbirth. 2007;7:1–8.
15. Suvedi B, Krishna A, Pradhan S, Barnett M, Puri SR, Chitrakar P, et al. Nepal Maternal Mortality and Morbidity Study, 2008/09. 2009;
16. Oladapo OT, Sule-Odu AO, Olatunji AO, Daniel OJ. "Near-miss" obstetric events and maternal deaths in Sagamu, Nigeria: a retrospective study. Reprod Health [Internet]. 2005 Nov 1;2(1):9.
17. Division P, Health M, Era N, International ICF. Nepal. 2011;
18. Jabir M, Abdul-Salam I, Suheil DM, Al-Hilli W, Abul-Hassan S, Al-Zuheiri A, et al. Maternal near miss and quality of maternal health care in Baghdad, Iraq. BMC Pregnancy Childbirth. 2013 Jan 16;13(1):11.
19. Adisasmita A, Deviany PE, Nandiaty F, Stanton C, Ronsmans C. Obstetric near miss and deaths in public and private hospitals in Indonesia. BMC Pregnancy Childbirth 2008 81. 2008 Mar 12;8(1):1–9.
20. Adeoye IA, Onayade AA, Fatusi AO. Incidence, determinants and perinatal outcomes of near miss maternal morbidity in Ile-Ife Nigeria: A prospective case control study. BMC Pregnancy Childbirth. 2013 Apr 15;13(1):93.
21. Kalra P, Kachhwaha CP. Obstetric near miss morbidity and maternal mortality in a Tertiary Care Centre in Western Rajasthan. Indian J Public Health. 2014;58(3):199–201.
22. Khadka M, Uprety DK, Rai R. Evaluation of associated risk factors of near miss obstetrics cases at B.P. Koirala Institute of Health Sciences, Dharan, Nepal. Int J Reprod Contraception, Obstet Gynecol. 2018;7(2):408.
23. Rana A, Baral G, Dangal G. Maternal near-miss: A multicenter surveillance in Kathmandu valley. J Nepal Med Assoc. 2013;52(6):299–304.