https://doi.org/10.37939/jrmc.v28i4.1925

The Frequency Of Maternal Near Misses At Benazir Bhutto Hospital- Using The WHO Standard Tool, A Cross-Sectional Study

Humaira Masood[1], Tallat Farkhanda[2], Sadia Khan[3], Ismat Batool[4], Nighat Naheed[5], Hina Gul[6]

Abstract

Objective: To analyse maternal near-miss frequency and causes on WHO-based tools at a government hospital.
Methods: This cross-sectional study was conducted at the Obstetric and Gynaecology Department of Benazir Bhutto Hospital Rawalpindi from January to December 2019. All maternal near-miss cases admitted to the hospital were included in the study. Patients were identified according to the WHO maternal near-miss tool. The number of maternal near-miss cases per 1000 live births occurring during the same year was calculated to determine the incidence of maternal near-miss. Causes of maternal near-miss were also documented.
Results: During the study period, 8909 deliveries were recorded. Among these, life-threatening conditions developed in 122 (1.36%) patients out of which near-miss patients were 84 (0.94%). The incidence ratio of near-miss cases was 9.43 / 1000 live births. The major causes of maternal near-miss (MNM) were postpartum haemorrhage n=25 (29.7 %), followed by hypertensive disorders n=23 (27.3%). At the same time, sepsis and hypertension were the main reasons for maternal death. Anaemia was an important contributing factor for both maternal outcomes.
Conclusion: This study shows that haemorrhage and Hypertension are the main causes of maternal near-miss.
Keywords: cross-sectional study, morbidity, post partum haemorrhage.

[1,4,6] Senior Registrar, BBH, RMU; [2] Professor/Dean, HFH, RMU; [3] Associate Professor, BBH, RMU; [5] Assistant Professor, BBH, RMU.
Correspondence: Dr. Humaira Masood, Senior Registrar, Benazir Bhutto Hospital, Rawalpindi Medical University. **Email:** khakwani786@gmail.com
Cite this Article: Masood H, Farkhanda T, Khan S, Batool I, Naheed N, Gul H. The Frequency Of Maternal Near Misses At Benazir Bhutto Hospital- Using The WHO Standard Tool, A Cross-Sectional Study. JRMC. 2024 Dec. 31;28(4). 546-549. https://doi.org/10.37939/jrmc.v28i4.1925.
Received January 19, 2023; accepted December 31, 2024; published online December 31, 2024

1. Introduction

Maternal mortality in a certain area can determine the standard of maternal health. A considerable number of women die each day due to pregnancy-related complications, with most of these deaths occurring in developing countries.[1] Maternal mortality has been reduced with health care and awareness improvements, but we failed to achieve the Millennium development goal. [2,3] Now the aim of the United Nations according to the sustainable development goals is to decrease maternal mortality to 70 per 100,000 live births by 2030.[4,5]

The maternal mortality ratio in Pakistan has been reduced to 186 per 100,000 live births in 2017 compared to 276 per 100,000 live births in 2014 according to the Pakistan Maternal Mortality Survey (PMMS).[6]

In addition to maternal mortality, serious maternal morbidity can also be taken as a standard of quality of the health care system.[7] In pregnancy, a life-threatening condition is the first step of more severe complications, which will deserve special attention. Women who develop serious morbidity while pregnant, have many pathologies that lead to maternal death. The women who survived near-death complications are called maternal near-miss cases. According to WHO, "a maternal near-miss (MNM) is defined as a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy."[8] Severe maternal outcomes (SMO) include cases of maternal deaths as well as near-miss cases.

Different criteria have been used to classify maternal near-miss cases but there is a lack of consistency for its identification. In 2009 WHO developed a tool for uniform data collection so that causes and frequency of MNM can be compared between different centers and countries.[9,10]

Three main categories have been described in a review conducted by WHO which includes clinical criteria associated with different diseases, criteria consisting of admission to intensive care unit as well as the requirement for massive blood transfusion and the third criteria includes all organ failure-based situations. [11,12] The organ involvement-based criteria are recommended by WHO for diagnosing near-miss cases as the most reproducible one. Prevalence rates of near-miss as calculated in the study were between 0.14% and 0.92% for organ system dysfunction criteria, between 0.04 and 4.54% for management-based criteria 0.60% and 14.98 % for disease-specific

criteria.[13,14] Given these differences, the WHO near-miss criteria have been proposed to diagnose the near-miss cases. This study determines the frequency and causes of maternal near-miss cases by utilizing the near-miss criteria set by the WHO.

2. Materials & Methods

This cross-sectional study was carried out at Benazir Bhutto Hospital affiliated with Rawalpindi Medical University, which provides emergency obstetric care 24 hours a day. Data collection was done over one year and supervised by the principal investigator. Women included in the study were those admitted to the hospital during the study period and were either pregnant, had delivered or within 42 days of termination of pregnancy. In addition, they had to satisfy at least one of the conditions present in WHO criteria for maternal near-miss. Patients were eligible according to the clinical criteria including severe post-partum haemorrhage (PPH), severe pre-eclampsia (requiring termination of pregnancy), eclampsia, sepsis, ruptured uterus and severe complications of abortion.

Interventional criteria included laparotomy (includes hysterectomy, excludes caesarean section), blood transfusions (more than 5 units) and involvement in the intensive care unit.

Organ dysfunction was categorized by WHO as "Cardiovascular dysfunction – Shock, cardiac arrest (absence of pulse/heart beat and loss of consciousness), use of continuous vasoactive drugs, cardiopulmonary resuscitation, severe hypoperfusion (lactate >5 mmol/l or >45 mg/dl),severe acidosis (pH< 7.1) , Respiratory dysfunction – Acute cyanosis, gasping, severe tachypnea (respiratory rate >40 breaths per minute), severe bradypnea (respiratory rate < 6 breaths/min), intubation and ventilation not related to anaesthesia , Renal dysfunction – Oliguria non-responsive to fluids or diuretics, dialysis for acute renal failure, severe acute azotemia (creatinine ≥300 µmol/ml or ≥3.5 mg/dl), Hepatic dysfunction Jaundice in the presence of pre-eclampsia, severe acute hyperbilirubinemia (bilirubin >100 µmol/l or >6.0 mg/dl) ,Coagulation/haematological dysfunction – Failure to form clots, massive transfusion of whole blood or red cells (≥5 units), severe acute thrombocytopenia (<50 00 platelets/ml), Neurological dysfunction – Prolonged unconsciousness (lasting ≥12 hours)/coma (including metabolic coma), stroke, uncontrollable fits/status epilepticus, total paralysis, Uterine dysfunction – Uterine hemorrhage or infection leading to hysterectomy."

Women presenting with these complications were excluded from the study if they were not pregnant or within 42 days of termination of pregnancy.

Data was collected by the designated doctors through a pre-formed proforma from various locations in the hospital including the labour room, intensive care unit and the gynae emergency. Each patient was categorized into a single cause of near-miss according to the above-mentioned WHO near-miss criteria. Data extracted from the pre-formed proforma was entered and processed in SPSS version 22. Frequencies and percentages were calculated for categorical variables.

3. Results

There were a total of 9147 patients, who delivered at this hospital in the study year, out of which 238 were stillbirths A total of 8909 live births were registered. Life-threatening conditions were diagnosed in 122 patients according to eligibility criteria of which 105 had severe maternal outcomes 84 women were diagnosed as cases of near-miss based on organ dysfunction and 21 were total maternal deaths. This resulted in a near-miss incidence ratio of 9.43/1000 live births. The maternal near-miss to mortality ratio was 4:1 and MMR/ 100,000 live births was 229.

Table 1: Maternal Health Outcomes and Disease Distribution at Benazir Bhutto Hospital

Disease	Life-threatening conditions (n=122)	Maternal near miss (n= 84)	Maternal deaths (n=21)
Severe PPH	33 (27.04%)	25 (29.76%)	2 (9.5%)
Severe pre-eclampsia	14 (11.4%)	7 (8.33%)	2 (9.5%)
Eclampsia	34 (27.8%)	16 (19.04%)	4 (19.04%)
Sepsis	14 (11.4%)	13 (15.47%)	5 (23.8%)
Ruptured uterus	9 (7.3%)	7 (8.33%)	1 (4.76%)

Demographic characteristics show that 82.78% of patients are in the age group of 21-35 years with 11.38% (n=13) being older than 35 years of age and 6.5% (n = 8) being less than 20 years old.

Term deliveries occurred in 54.09% (n=66), preterm deliveries in 36.06% (n=44) and very preterm < 28 weeks were 9.8% (n=12). As Benazir Bhutto Hospital is a tertiary referral hospital, the majority of the patients included in our study were referred, making a total of

69.6% (n=85) of patients, non-booked patients were 16.39% (n=20) and booked patients were 14.7% (n=18). referred patients made the majority of maternal near-miss patients.(Table 1)

Table 2: Frequencies of organ system dysfunction in near-miss cases

Organ dysfunction	Number of near-miss cases	Incidence of MNM*/1000 Livebirths
Cardiovascular	41	48.8%
Haematology	33	39.2%
Uterine	23	27.3%
Respiratory	21	25%
Neurological	12	14.2%
Renal	6	7.1%

***MNM- Maternal Near Miss**

The results indicate that the commonest reason for near-miss was postpartum haemorrhage (29.76%) comprising 25 out of 33 patients followed by hypertensive disorders (27.3%) consisting of 23 of 48 patients. Sepsis contributes to 15.47% (n=14) of near-miss cases. The major contributor to maternal death was sepsis. Five out of fourteen (35.71%) patients diagnosed with sepsis died during our study. Interventions done on patients presenting with life-threatening conditions were 42.6% (n=52) who had Intensive care unit admissions. Massive blood transfusion was done in 61.4% (n=75) of patients. Peripartum hysterectomies were done in 23 patients out of 33 patients with severe PPH and 9 patients underwent laparotomies due to ruptured uterus. The near-miss cases with organ involvement were 84 out of which 44 patients (52%) had multi-organ failure.(Table 2)

4. Discussion

The maternal near-miss calculated ratio was 11.66/1000 live births in our hospital during the one year. This is different to the study done in India which showed an incidence of 45.

2 /1000 live births and the incidence was 36/1000 live births in the study conducted in middle-income countries.[15] The other study in India showed an MNM ratio of 8.4/1000 live births which is consistent with this study.[16] These different ratios reflect the different inclusion criteria of the studies. we used the WHO near-miss tool which is a validated standard collection criterion of near-miss cases. It enables uniform data collection and decreases the rate of bias.

Near- miss mortality ratio was calculated as 4:1 which is comparable to the studies conducted in developing countries.[17] This ratio is in contrast to studies in developed countries which showed a range of 117-123 :1 which is much increased. The increased ratios indicate good quality of health care.

In this study, 85 (69.6%) of critical patients were referred from the periphery and private clinics where limited facilities were available. This caused a delay in their presentation and they were given treatment in moribund states which increased the maternal mortality rate.

The major reason for maternal near misses in this study was haemorrhage (29.76%) and hypertension (27.37%). A systematic review showed the near-miss ratio for postpartum haemorrhage was 3/1000 live births in developing countries.[18] However, concerning mortality rate, we recorded the highest mortality ratio in hypertensive (28.57%) and septic (23.8%) patients. A (worldwide) systematic review in 2004 conducted by WHO showed haemorrhage was the major cause of maternal death in Africa (33.9%), Asia (30.8%) and Latin America, hypertensive disorders were responsible for 25% of deaths.[19] This is different from several other studies where ruptured uterus had the highest case fatality mortality index In our study 100% of patients with eclampsia and pre-eclampsia received Magso4 therapy but increased mortality was due to delay in referral.

Anaemia was the major contributing factor in this study. WHO review showed anaemia was found to be an important factor in low-income countries that is 3.7% of deaths in Africa and 12.8% of deaths in Asia were due to anaemia.[20] In our study 60.9% of patients received massive blood transfusions, this showed that the majority of Pakistani women are anaemic and cannot tolerate any amount of blood loss so this factor should be taken into consideration by the provider to ensure that no woman should be anaemic at the time of delivery.

This study has many strengths. We used the WHO-defined near-miss criteria. The use of this tool ensures that the results are comparable worldwide. This study provides insight into maternal health challenges faced in the country. The study has also certain limitations. As 69.6% of patients are referred, we did not differentiate whether they were referred from private hospitals or government setups in the periphery.

5. Conclusion

Hemorrhage and hypertension are the most important causes of maternal near-miss but sepsis and hypertension

are major contributors to maternal death. Anaemia is the most common contributing factor. As the majority of the patients were referred, therefore proper training at the primary level and timely referral to a tertiary care hospital is very important in preventing maternal death.

Institutional Review Board Approval
Obs/Gynae-1/HFH/RMU/1004
22-06-2024
Holy Family Hospital

CONFLICTS OF INTEREST- None

Financial support: None to report.
Potential competing interests: None to report
Contributions:
H.M, T.F, S.K, I.B, N.N, H.G - Conception of study
H.M, T.F, S.K, I.B, N.N, H.G - Experimentation/Study Conduction
H.M, T.F, S.K, I.B, N.N, H.G - Analysis/Interpretation/Discussion
H.M, T.F, S.K, I.B, N.N, H.G - Manuscript Writing
H.M, T.F, S.K, I.B, N.N, H.G - Critical Review
H.M, T.F, S.K, I.B, N.N, H.G - Facilitation and Material analysis

All authors approved the final version to be published & agreed to be accountable for all aspects of the work.

References

1. Bauserman M, Thorsten VR, Nolen TL, Patterson J, Lokangaka A, Tshefu A, Patel AB, Hibberd PL, Garces AL, Figueroa L, Krebs NF. Maternal mortality in six low and lower-middle income countries from 2010 to 2018: risk factors and trends. Reproductive health. 2020 Dec;17:10. https://doi.org/10.1186/s12978-020-00990-z
2. UNDP Pakistan Annual Report 2018 | United Nations Development Programme.
3. Ishaq M, Saleem Z. A Pakistan and Millennium Development Goals: An In-Depth Study. Kashmir Journal Of Education. 2019;1(I):1-4.
4. Kumar N, Singh U. SDG3, Good Health and Well–Being: Status, Achievement, and Yoga Strategies. InSDGs in the Asia and Pacific Region 2024 Sep 1 (pp. 1209-1241). Cham: Springer International Publishing.https://doi.org/10.1007/978-3-031-17463-6_21
5. McArthur JW, Rasmussen K, Yamey G. How many lives are at stake? Assessing 2030 sustainable development goal trajectories for maternal and child health. Bmj. 2018 Feb 15;360.https://doi.org/10.1136/bmj.k373
6. Mahmood A, Sultan M. National Institute of Population Studies (NIPS)(Pakistan), and Macro International Inc. Pakistan Demographic and Health Survey. 2006 Jun;7:123-45.
7. Naik G. Maternal near miss: reaching the last mile. Journal of obstetrics and gynaecology: the journal of the Institute of Obstetrics and Gynaecology. 2021 Jul;41(5):675-83.https://doi.org/10.1080/01443615.2020.1820467
8. Basnet T, Sitaula S, Sah MK, Yadav P. Analysis of Causes and Contributory Factors for Maternal Mortality during Covid-19 Lockdown. International Research Journal of Multidisciplinary Scope. 2022(3):22-8. https://doi.org/0.47857/irjms.2022.v03i02.075
9. Firoz T, Romero CL, Leung C, Souza JP, Tunçalp Ö. Global and regional estimates of maternal near miss: a systematic review, meta-analysis and experiences with application. BMJ Global Health. 2022 Apr 1;7(4):e007077.
10. Shaeen SK, Tharwani ZH, Bilal W, Islam Z, Essar MY. Maternal mortality in Pakistan: challenges, efforts, and recommendations. Annals of Medicine and Surgery. 2022 Sep 1;81. https://doi.org/10.1016/j.amsu.2022.104380
11. Herklots T, van Acht L, Khamis RS, Meguid T, Franx A, Jacod B. Validity of WHO's near-miss approach in a high maternal mortality setting. PLoS One. 2019 May 16;14(5):e0217135. https://doi.org/10.1371/journal.pone.0217135
12. Habte A, Bizuayehu HM, Lemma L, Sisay Y. Road to maternal death: the pooled estimate of maternal near-miss, its primary causes and determinants in Africa: a systematic review and meta-analysis. BMC Pregnancy and Childbirth. 2024 Feb 17;24(1):144. https://doi.org/10.1186/s12884-024-06325-1
13. Gon G, Leite A, Calvert C, Woodd S, Graham WJ, Filippi V. The frequency of maternal morbidity: A systematic review of systematic reviews. International Journal of Gynecology & Obstetrics. 2018 May;141:20-38.https://doi.org/10.1002/ijgo.12468
14. Mu Y, Wang X, Li X, Liu Z, Li M, Wang Y, Li Q, Deng K, Zhu J, Liang J. The national maternal near miss surveillance in China: A facility-based surveillance system covered 30 provinces. Medicine. 2019 Nov 1;98(44):e17679. https://doi.org/10.1097/MD.0000000000017679
15. Heitkamp A, Meulenbroek A, van Roosmalen J, Gebhardt S, Vollmer L, de Vries JI, Theron G, van den Akker T. Maternal mortality: near-miss events in middle-income countries, a systematic review. Bulletin of the World Health Organization. 2021 Oct 10;99(10):693. http://dx.doi.org/10.2471/BLT.21.285945
16. Verma A, Choudhary R, Chaudhary R, Kashyap M. Maternal Near-Miss and Maternal Mortality in a Tertiary Care Center of Western Uttar Pradesh: A Retrospective Study. Cureus. 2023 Jul;15(7).
17. De Silva M, Panisi L, Lindquist A, Cluver C, Middleton A, Koete B, Vogel JP, Walker S, Tong S, Hastie R. Severe maternal morbidity in the Asia Pacific: a systematic review and meta-analysis. The Lancet Regional Health–Western Pacific. 2021 Sep 1;14. https://doi.org/10.1016/j.lanwpc.2021.100217
18. Sotunsa JO, Adeniyi AA, Imaralu JO, Fawole B, Adegbola O, Aimakhu CO,et al. Maternal near-miss and death among women with postpartum haemorrhage: a secondary analysis of the Nigeria Near-miss and Maternal Death Survey. BJOG: An International Journal of Obstetrics & Gynaecology. 2019 Jun;126:19-25.https://doi.org/10.1111/1471-0528.15624
19. Liyew EF, Yalew AW, Afework MF, Essén B. Distant and proximate factors associated with maternal near-miss: a nested case-control study in selected public hospitals of Addis Ababa, Ethiopia. BMC women's health. 2018 Dec;18:1-9.https://doi.org/10.1186/s12905-018-0519-y.
20. Li J, Fang J, Luo J, Duan Y, Xiao X, Li Y, et al. The Association Between Severity of Anemia During Pregnancy and Severe Maternal Outcomes: A Retrospective Cohort Study. Clinical Epidemiology. 2022 Jan 1:1427-37.https://doi.org/10.2147/clep.s383680