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Original article

Incidence of maternal near miss mortality and underlying factors leading to maternal near miss mortality: Our experience from Maharashtra

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Abstract

Definition of near miss mortality - a woman who survives a severe life- threatening condition (either after receiving emergency medical or surgical intervention or otherwise) during pregnancy, childbirth or within 42 days of termination of pregnancy.[1] Maternal mortality is the death of a woman during pregnancy, childbirth or 42 days after termination of pregnancy. Women with life threatening condition (WLTC) refers to all women whowere either maternal near miss or who died. (WLTC = MNMM + MM).

Objectives: To study the incidence of maternal near miss mortality and underlying factors leading to maternal near miss mortality

Methodology: The present a facility based prospective observational study carried from January 2021 till June 2022, i.e., for 18 months involving all the cases that fulfilled criteria for near miss mortality that came to this institute were considered for this study.

Results: Majority of patients were booked and registered under government setups - 77 (81.05%). Majority of patients were near miss on admission - 78 (82.10%). According to this study, most common underlying causes of MNMM at this tertiary care centre are Hypertensive disorders - 46 (48.42%), followed by anaemia - 18 (18.94 %) cases. Maternal near miss incidence ratio in our study was 9.6 every 1000 livebirths. Maternalnearmissrate in our study was 8.8 every 1000 obstetricadmissions. Severe maternal outcome ratio was 15.18 every 1000 live births.

Conclusion: Maternal near miss incidence ratio in our study was 9.6 every 1000 live births. Maternalnear miss rate in our study was 8.8 every 1000 obstetricadmissions. Severe maternal outcome ratio was 15.18 every 1000 live births. Most common underlying causes of MNMM at this tertiary care centre are Hypertensive disorders - 46 (48.42%), followed by anaemia - 18 (18.94 %) cases.

Key words: maternal near miss mortality, causes, incidence

Introduction

Definition of near miss mortality - a woman who survives a severe life- threatening condition (either after receiving emergency medical or surgical intervention or otherwise) during pregnancy, childbirth or within 42 days of termination of pregnancy.[1] Maternal mortality is the death of a woman during pregnancy, childbirth or 42 days after termination of pregnancy.

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Women with life threatening condition (WLTC) refers to all women whowere either maternal near miss or who died. (WLTC = MNMM + MM).

Women's healthcare especially that of mother and child, is a reflection of not only healthcare system of a nation, but also of its social disparities. After all, maternal mortality is thechasm between first world and third world countries. Looking at data from over last thirty years, there has been consistent decrease in maternal mortality rate. No doubt that we have been successful in lowering the maternal mortalityfrom 38 lakhper 1 lakh livebirthsto 33 lakhsper 1 lakh live births over the last decade, giving us an impression of increasing safety revolving around childbirth and maternal health, yet maternal morbidity remains one of the major factorsaffectingthehealthofsocietyasawhole.Stonesetallwere the first to use the term "near miss mortality" to define a narrow category of morbidity encompassing potentially life-threatening episodes.[2,3]

Due to wide variation in identification of identification of near miss cases, it has been difficult to make a summary estimate of the prevalence of near miss globally. In the systemic review published in 2004 the prevalence of near miss varied between 0.80% and 8.23% in studies that used disease-specific criteria while the range was 0.38% - 1.09% in the group that used organ system-based criteria. Rates were within the range of 0.01% and 2.99% in the studies that used management- based criteria. In another recent review on articles between January 2004 and December 2010 the prevalence rate of maternal near miss varied between 0.6% t o14.98% for disease specific criteria between 0.04% to 4.54% for management-based criteria and between 0.14% to 0.92% for organ-based dysfunction based on mantel criteria.[3]

Objectives: To study the incidence of maternal near miss mortality and underlying factors leading to maternal near miss mortality

Materials and methods:

Study duration: From January 2021 till June 2022, i.e., for 18 months.

Study population: All the cases that fulfilled criteria for near miss mortality that came to this institute were considered for this study.

Place of study: The study was conducted in the department of obstetrics and gynaecology at a tertiary care hospital in Maharashtra, which serves as a referral centre for majority of Primary health centres and District Hospitals in the district.

Study design: This is a facility based prospective observational study.

Near miss cases were identified according to guidelines and they were followed up to their discharge or death.

For each case of near miss, data was collected on demographic characteristics, presenting complaints on admission, necessary interventions, underlying medical disorder, maternal morbidity and foetal outcome.

Sample size: With reference to study by Archana DR et al (2016)12 the maternal near miss incidence r was 7.56.

Formula for sample size = 4*P*Q/L2 Where P = 52.2/1000 live births

Q = 100 - P = 100 – 52.2 = 47.8

L = allowable error 20 % of P (absolute error)

Sample size = 4*52.2*47.8/10.44*10.44

= 92.03 ~ Sample size rounded off to 95

Inclusion Criteria:

- To be diagnosed as near miss, patient should meet following criteria, requiring ICU admission.

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- The definitions for near miss used in this study was the specific criteria given by WHO in 2009. According to WHO, various events were classified as life threatening conditions present at hospital admissions (type A) and life- threatening conditions developing during hospital stay after admission (type B). Various symptoms were classified system wise. Clinical, management and laboratory criteria were identified as per WHO guidelines.
- Clinical criteria were acute cyanosis, breathing rate >40/min or < 6/min, oliguria unresponsive to fluids or diuretics, loss of consciousness for > 6 hours, cardiorespiratory arrest, jaundice, gasping, shock, coagulation disorders, cerebrovascular accident, total paralysis.
- Laboratory criteria were Oxygen saturation < 90% for > 60 mins, acute thrombocytopenia (<20000), creatinine >3.5 mg/dl, bilirubin >6 mg/dl, lactate
- >5, paO2/FiO2 < 200, pH < 7.1.

- Intervention criteria were use of continuous vasoactive drugs, dialysis for treatment of acute kidney failure, puerperal hysterectomy due to infection or haemorrhage, cardiopulmonary resuscitation, transfusion > 5 units of red blood cell concentrate, intubation and ventilation for a period of > 60 minutes unrelated toanaesthesia.

Exclusion criteria:

- Women who do not fit into the above-mentioned criteria.
- Patients who were not willing to participate in this study.
- MNM criteria as per Maternal Near Miss Review Operational Guidelines Dec 2014 by Maternal Health Division Ministry of Health and Family Welfare, Government of India was used for this study
- For diagnosis of near Miss, the patient should meet minimum 3 criteria: one each from
    - Clinical findings (either symptoms or signs).
    - Investigations.
    - Interventions done or any single criteria which signifies cardiorespiratory collapse.

Methodology specified for data collection:

After obtaining clearance from institutional ethics committee, informed consent was taken for those subjects who were willing to participate in study. Data was collected in pretested predesigned case record form. Data was be collected about sociodemographic factors like age, educational status, etc. A history of other comorbid conditions along with presenting complaints was noted. Further, these patients were subjected to a physical examination for evaluating the clinical signs. All essential investigations were carried out. A hospital based, prospective study was conducted on 95 consecutive patients fitting in the inclusion criteria for maternal near miss in tertiary care centre and patients were assessed accordingly over a period of 18 months.

For this study, Maternal near miss review Operational guidelines published in December 2014 by maternal health division of Ministry of Health and Family Welfare under Government of India was used.13

Data analysis:

The data was coded and entered into Microsoft Excel Worksheet and analysed using the

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application of MS excel workbook. The categorical data was expressed as rates, ratios, and proportions and the quantitative data was expressed as mean ± standard deviation.

Results

During the study period of 18 months starting from January 2021 to June 2022, totalnumber of labour room admissions were 10738 out of which near miss caseswere 95, resultingin near missmortalityincidenceratioof9.6every1000live births.

There were 10366 deliveries ofwhich 5531 werevaginalbirths and 4349 were caesarean sections. There were 9880 live births.

CATEGORY	NO. of PATIENTS
In Patients (Obs.)	10738
Live Births	9880
Near Miss	95
Maternal Deaths	55

- Total number of near miss cases = 95
- Total number of maternal deaths = 55
- Women with life threatening conditions =MNMM + MD = 95 + 55 =150
- Maternalnearmissincidenceratio=MNMM/1000LB=95/9880x1000=9.6 every 1000 livebirths
- Maternalnear miss rate/ 1000 obstetricadmissions = 95/10738 x1000 = 8.8 every 1000 obstetricadmissions
- Severe maternal outcome ratio = MNMM + MD / LB = 150/9880 x 1000 =

  15.18 every 1000 live births

Table no. 1: Distribution of patients according to age

Sr. no	Age (In years)	Frequency	Percentage
01	16-20 years	04	4.21 %
02	21-25 years	55	57.89 %

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03	26-30 years	22	23.15 %
04	31-35 years	07	7.36 %
05	>35 years	02	2.10%
Total		**95**	**100%**

Above table shows that majority of patients fall in the age group of 21-25 years (57. 89 %) followed by 26-30 years (23.15 %).

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Table no. 2: Distribution of patients according to residence

Sr. no	Residence	Number	Percentage
01	Rural	57	60%
02	Urban	38	40%
Total		**95**	**100%**

In this study, 57 patients (60%) were from rural areas, while 38 patients (40%) were from urban areas.

Table no. 3: Distribution of patients according to socioeconomic status

Sr. no	Economic status (according to BPL)	Number	Percentage
1	Below	26	27.36%
2	Above	69	72.36%
Total		**95**	**100%**

Majority of patients were above poverty line strata - 69 (72.36%) while 26 (27.36%) were below poverty line.

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Table no. 4:Type of government facility where patients were registered and booked

Sr. no	Type of government facility	Number	Percentage
01	Unregistered and un-booked	10	10.52%
02	PHC	12	12.63%
03	RH	45	47.36%
04	SDH	20	21.05%

Majority of patients were booked and registered under government setups - 77 (81.05%). 28 patients were booked and registered under private setups (29.47%). 10 patients (10.52%) were un-booked and unregistered. And those amongst government registered and booked, maximum was booked at RH - 45 (47.36 %).

Table no. 5: Distribution of patients according to timing of near miss

Sr. no	**Timing of near miss**	**Number**	**Percentage**
01	On admission	78	82.10%
02	Post LSCS	14	14.73%
03	Post delivery	03	3.15%
Total		**95**	**100%**

Majority ofpatients werenear miss on admission - 78 (82.10%). 17 patients were not near miss on admission but became near miss after delivery (17.88%). Out ofthose, 14 (14.73%) werepost LSCS and 3 (3.15%) werepost-delivery.

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Table no. 6: Distribution of patients according to underlying cause

Underlying cause	Number	Percentage
haemorrhage	11	11.57%
hypertension	46	48.42%
sepsis	6	6.31%
Post-partum collapse	1	1.05%
Liver dysfunction/ failure	3	3.15%
Cardiac dysfunction/ failure	5	5.26%
Severe Anaemia	18	18.94%
Respiratory dysfunction	4	4.21%
Endocrine dysfunction	1	1.05%
Thyroid disorders	0	0%
Total	95	100%

According to this study, most common underlying causes of MNMM at this tertiary care centre are Hypertensive disorders - 46 (48.42%), followed by anaemia - 18 (18.94 %) cases.

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Discussion

Though near miss mortality was serving to be useful in gathering crucial data on maternal health, the lack of uniformity proved to be an obstacle in universal application of results. WHO criteria 2009 takes into account clinical, laboratory based as well as management-based criteria hence incorporating both Mantel's and Waterstone's criteria.[4,5]

The analysis of maternal deaths has been used to reflect women's health and quality of obstetric care. A decline in maternal mortality let to analysis of well- defined near miss cases which proved to be an effective tool in assessment of obstetric care.

The near miss mortality ratio is 9.6 every 1000 live births, which is comparable to a study carried out in similar settings in Maharashtra by Archana D Rathod et al in their study, the near miss ratio was 7.56 per 1000 live births while maternal near miss ratio was 3.43 :1. Mortality index was 29.07. Lower index is indicative if better quality of health care.

- Thematernalnearmissmortalityincidenceratioofthisstudyis9.6per1000live births is comparable to other studies done in similar settings in developing nations.[6,7]

Study	This study	Sanju Kumari et al study[6]
near miss mortality incidence ratio	9.6 per 1000 live births	8.0 per 1000 live births

- The near miss to mortality ratio in this study is 1.72: 1, which means for every 1.72nearmisscases,thereisonematernaldeath.Higherratioindicatesbetter facility based high risk obstetrical care.

Study	This study	Patiala study[7]	Sri Lankan Study[8]
near miss to mortality ratio	1.72: 1	1.89: 1	18.2 : 1

- The mean age of near miss patients in this study is 23.6 years, which is comparable to24.8 years found in studyconducted by Uma Jain et al, studyon maternalnearmiss casesinGovernmentMedicalCollegeShivpuri,India.[9]
- From this data, we can draw the conclusion that unlike any other medical or surgicaldisorders,majorityofnearmisscasesbelongtoyoungagegroup.
- 60% of near miss cases were from rural areas, which is comparable to study conducted by Uma Jain et al., studyon maternal near miss cases in Government Medical College Shivpuri,India.[9]
- Wecan conclude thatplace of residence does affectthe incidence of near miss cases. Rural population have limited access to healthcare and hence the higher incidence of near miss cases.
- In this study, most of the patients were educated up to primary school - 42 (44.21%).

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- We can interpret from this study that higher education is related to lesser incidence of near miss cases.
- From this study, we can draw the conclusion that the presence of economic stabilitydoesnotofferanyadvantagewhennearmisscasesareconcerned.

More than half the cases of near miss are attributable to obstetric causes -.

The most common underlying cause amongst pregnancy related disorders in this study is hypertensive disorders of pregnancy 48.42% (which includes severepreeclampsia, eclampsia and HELLP syndrome) followed by anaemia. this is comparable to other studies done in similar settings in developing nations.

Study	**This study**	**Jain Umadevi et al Study[31]**
Most common cause of maternal near miss cases	• Hypertensive disorders : 48.42% • Haemorrhage:14.72%	• Hypertensivedisorders: 30.18% • Haemorrhage: 27.60%

So, we can clearly interpret from this study that the two most important causes of near miss cases are hypertensive disorders and anaemia. Both these conditions are easily detectable during ante natal check-up and can be taken care of if timely intervention is provided. It only reinforces the importance ofquality Antenatal care and risk stratification of all pregnancies.

The mode of delivery in cases of near miss in this study is 35.95% vaginal births and 64.44% by emergency LSCS. This can be compared with other studies done in similar settings in developing nations.

Conclusion

- Maternal near miss incidence ratio in our study was 9.6 every 1000 livebirths.
- Maternalnearmissrate in our study was 8.8 every 1000 obstetricadmissions.
- Severe maternal outcome ratio was 15.18 every 1000 live births
- Most common underlying causes of MNMM at this tertiary care centre are Hypertensive disorders - 46 (48.42%), followed by anaemia - 18 (18.94 %) cases.

References

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1. WHO (2011) Evaluating the quality of care for severe pregnancy complications: The WHO Near Miss Approach for maternal health. World Health Organization.
2. Kalhan M, Singh S, Punia A, Prakash J. Maternal Near-Miss Audit: Lessons to Be Learnt. Int J Appl Basic Med Res. 2017 Apr-Jun;7(2):85-87. doi: 10.4103/2229-516X.205815. PMID: 28584736; PMCID: PMC5441269.
3. Chhabra P. Maternal near miss: an indicator for maternal health and maternal care. Indian J Community Med. 2014 Jul;39(3):132-7. doi: 10.4103/0970-0218.137145. PMID: 25136152; PMCID: PMC4134527.
4. Pattinson RC, Vandecruys HI, Macdonald AP, GD. Why do women die during childbirth. Science in Africa Available at: URL: http://www. Science in africa. co. za/2001/august/mothers. htm. 2001.
5. Waterstone M, Bewley S, Wolfe C : incidence and predictors of severe obstetric morbidity : case control study. BMJ. 2001, 322: 1089-94. 10.1136/bmj.322.7294.1089.
6. Sanju Kumari et al., Study of Maternal Near Miss and Maternal Mortality in a Tertiary Care Hospital, 10.7860/JCDR/2020/42710.13634
7. Kaur L et al, Int J Reprod Contracept Obstet Gynaecol, 2018 Aug ; 7 (8) : 3239-3243 International Journal of Reproduction, Contraception, Obstetrics and Gynaecology.
8. Ranatunga GA, Akbar JF, Samarathunga S, Perera YAG, Kariyawasam L, Kumarasiri JM. Severe acute maternal morbidity in a tertiary care institution. Sri Lanka J ObstetGynaecol. 2012;34:135-43
9. International Journal of Reproduction, Contraception, Obstetrics and Gynecology Jain U. Int J Reprod Contracept Obstet Gynecol. 2019 Aug A study on maternal near miss cases in Government Medical College Shivpuri, India.