www.jmscr.igmpublication.org
Impact Factor (SJIF): 6.379
Index Copernicus Value: 71.58
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossrefDOI: https://dx.doi.org/10.18535/jmscr/v6i7.120

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

# A One Year Audit of Maternal Near Miss and Maternal Death at Tertiary Care Hospital

Authors
**Khushpreet Kaur, Sambli Garg*, Sargun Singh Walia**
Department of Obstetrics and Gynaecology, Government Medical College, Patiala, Punjab
*Corresponding Author
**Sambli Garg**
Department of Obstetrics & Gynaecology, Rajindra Hospital, Patiala, Punjab, India
Email: *sambligarg@yahoo.com*

**Abstract**
**Objective:** *The present study aims at to determine various Maternal Near Miss indicators as focus is shifting from maternal mortality to maternal morbidity now a days.*
**Material and Method:** *The present study was conducted on retrospective basis in all women fulfilling WHO MNM criteria with inclusion of maternal deaths for a period of one year from January 2017 to December 2017.*
**Results:** *During the study period, there were 4599 deliveries and 4387 live births with 96 near miss cases and 62 maternal deaths. The maternal near miss mortality ratio came out to be 1.5: 1 with 39.2% mortality index. As per WHO criteria; shock (14.6%), acute severe thrombocytopenia (17.7%) and multiple transfusion of blood or red cells (≥5 units) (62.5%) were the commonest parameters among clinical criteria , laboratory marker and management based proxies respectively. The main cause of maternal morbidity was obstetric hemorrhage (41.6%) whereas hypertensive disorders of pregnancy (43.5%) was primary causative factor for maternal mortality.*
**Conclusion:** *A developing countries like India carry high burden of maternal mortality and morbidity. Despite increase in instrumental deliveries and various policies and programmes started by Government , most pregnant women do not receive any antenatal care due to lack of knowledge and are at high risk of obstetric complications. So, near miss audit aids maternal mortality audit in identification of factors contributing to high maternal morbidity and mortality.*
**Keywords**: *maternal mortality; maternal morbidity; maternal near miss; mortality index ; near miss audit.*

## Introduction

Every pregnancy faces risks. Any pregnant woman can develop life-threatening complications with little or no advance warning,– all women need access to quality maternal health services that can detect and manage life-threatening complications.[1] If such complications are not managed on time they can become fatal.[2] Maternal mortality (MM) is frequently described as "Just The Tip of The Iceberg" alluding that there is a vast base to the iceberg in the form of maternal near miss (MNM) i.e. maternal morbidity which has remained largely undescribed.[3] Maternal mortality is believed to

be a consequence of the innate risks related with gravidity and parturition, as well as the monetary and sociocultural aspects keeping women away from the available health services. Even after being successful to reach a health infirmary, non-availability of vital facilities and subnormal care may compromise maternal survival.[4] About two decades ago, in low MM settings, MNM was found to be a more useful indicator of obstetric care than MM alone. [3] MNM shares same pathway and pathological processes as MM. (Normal pregnancy□morbidity□severe morbidity □near miss□death). Also, the major reasons and causes are same for both, so review of MNM cases is likely to yield valuable information regarding severe morbidity, which, if untreated may lead to MM. [4] As the woman survives, near-miss reviews may be seen as less threatening than death reviews for the teams who report them .[3]As the rate of maternal mortality reduced, there is increasing interest in analysing SAMM (severe acute maternal morbidity) cases with view of understanding health failure in relation to obstetric case and addressing them.[1]

**Aims and Objectives**

1. To determine near miss cases as per WHO identification criteria and calculate its frequency
2. To calculate various MNM indicators .i.e. SMOR ; MNMR (1000 LB); MNM :1 MD AND MI
3. Comparison of demographic trends and pattern of MNM (maternal near miss) and MD (maternal death).

**Material and Methods**

The present study was conducted among all high risk maternal complicated cases who were referred to tertiary care centre and those who reported directly to labor room at Government Medical College, Patiala. Data was collected for one year from January 2017 to December 2017 retrospectively and then it was analysed.

**Exclusion Criteria**

Patient with conditions unrelated to pregnancy

**Inclusion Criteria**

1. Maternal near miss cases as per WHO MNM identification criteria (includes clinical criteria; laboratory markers and management based proxies with respect to dysfunction system)

- 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 per minute), intubation and ventilation not related to anaesthesia, severe hypoxemia (O2 saturation <90% for ≥60 minutes or PAO2/ FiO2 <200)

- 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)

- Coagulation/haematological dysfunction

— Failure to form clots, massive transfusion of blood or red cells (≥5 units), severe acute thrombocytopenia (<50 000 platelets/ml)

- Hepatic dysfunction

— Jaundice in the presence of pre-eclampsia, severe acute hyperbilirubinemia
(bilirubin >100 μmol/l or >6.0 mg/dl)

- Neurological dysfunction

— Prolonged unconsciousness (lasting ≥12 hours)/coma (including metabolic coma), stroke, uncontrollable fits/status epilepticus, total paralysis

- Uterine dysfunction

— Uterine haemorrhage or infection leading hysterectomy [5]

2. Maternal deaths

The following near miss indices are calculated

1. Severe maternal outcome ratio (SMOR) refers to the number of women with life-

threatening conditions (MNM + MD) per 1000 live births (LB). [SMOR = (MNM +MD)/LB].

2. Maternal Near Miss ratio (MNMR) refers to the number of maternal near-miss cases per 1000 live births. (MNMR = MNM/LB).

3. Maternal near-miss mortality ratio (MNM : 1 MD) refers to the ratio between maternal near miss cases and maternal deaths. Higher ratios indicate better care.

4. Mortality index refers to the number of maternal deaths divided by the number of women with life-threatening conditions expressed as a percentage [MI = MD/(MNM + MD)]. The higher the index the more women with life-threatening conditions die (low quality of care),whereas the lower the index the fewer women with life-threatening conditions die (better quality of care).

Following critical interventions or intensive care unit use are also calculated

- Admission to intensive care unit
- Interventional radiology
- Laparotomy (includes hysterectomy, excludes caesarean section)
- Use of blood products

**Results**

During the study period of one year from January 2017 to December 2017, there were 4399 deliveries and 4387 live births . Out of them 96 maternal near miss cases identified while there were 62 maternal deaths. About 76 out of 96 (75%) near miss cases were referred from periphery centres.

As per table 2 showing demographic trends of maternal near miss and maternal death, with almost similar pattern in age group distribution depicting maximum number of patients were in 18-25 years age group. About 58.3% near miss cases were multi-para whereas maternal deaths were more among primi-para (51.6%). Also majority of the women develop life threatening conditions in third trimester (>28 weeks gestational age) leading to 64.6% of MNM and 64.5% of MD cases. Complication in postnatal period were seen in 16.7% of MNM cases. Table 3 indicates thatin present study, about 73 out of 96 (MNM) had blood and blood components transfusions with >50% (i.e. 62.5%) cases had multiple blood or red cells (≥5 units) transfusion. Also 38.5% had ICU admissions either post surgery or direct admission with 11 case needs ventilatory support and intubation not related to anaesthesia. About 13 patients needed hysterectomy, out of which 9 cases were of placenta accreta and rest 3 due to rupture uterus and one because of secondary hemorrhage at early gestation (post-abortal).

Approximately 4.2% cases had anuria because of acute renal failure with increase in creatinine levels (≥3.5mg/dl) and ultimately undergoes dialysis for acute renal failure with even one patient even required 7 consecutive dialysis.

Table 4 represents various interventions done to save the life of mother thereby prevent maternal mortality. Many near miss patients needed >1 intervention during management. The platelet transfusion in form of SDP (single donor platelets) and PC(platelet concentrates) done in 17 patients with acute severe thrombocytopenia . One patient undergoes successful hydrostatic reduction for inversion uterus. About 4 patients had laparotomy done for rupture uterus followed by hysterectomy in 3 and uterine repair in one only.

In 7 patients, CG ballon tamponade was used for control of uterine bleeding leading to prevention of mortality.

| | |
|---|---|
| Control of post-abortion bleeding | one |
| Following correction of inversion uterus | one |
| Intraoperative PPH | three |
| Postoperative PPH | one |
| Secondary PPH (H/O placenta accreta) | one |

As shown in table 5, obstetric hemorrhage was responsible for maximum number of maternal near miss cases of both early and late pregnancy (41.6%) as compared to hypertensives disorders of pregnancy (43.5%) was main cause of maternal mortality with 14 cases of severe preeclampsia and 13 of eclampsia.

**Table 1 Maternal Near Miss indicators**

| | |
|---|---|
| SMOR | 36.0/1000 live births |
| MNMR | 21.9/1000 live births |
| MNM:1MD | 1.5:1 |
| MI (mortality index) | 39.2% |

(SMOR: severe maternal outcome ratio; MNMR: maternal near miss ratio; MNM:1MD : maternal near miss mortality ratio)

**Table 2** Demographic Profile

| **Age group( in years)** | **Maternal near miss(n=96)** | **Percentage MNM** | **Maternal deaths (n=62)** | **Percentage MD** |
|---|---|---|---|---|
| 18-25 | 48 | 50.0% | 34 | 54.8% |
| 26-30 | 35 | 36.4% | 15 | 24.2% |
| 31-35 | 9 | 9.4% | 10 | 16.1% |
| >35 | 4 | 4.2% | 3 | 4.8% |
| **Parity** | | | | |
| P0-1 | 34 | 35.4% | 32 | 51.6% |
| P2-4 | 56 | 58.3% | 28 | 45.2% |
| P>5 | 6 | 6.3% | 2 | 3.2% |
| **Gestational age** | | | | |
| <12 weeks | 8 | 8.3% | 3 | 4.8% |
| 13-28 weeks | 10 | 10.4% | 5 | 8.1% |
| >28 weeks | 62 | 64.6% | 40 | 64.5% |
| Postpartum | 16 | 16.7% | 14 | 22.6% |

**Table 3** Classification of near miss cases as per WHO identification criteria

| Maternal Near Miss criteria | No. of cases | %(N=96) |
|---|---|---|
| Dyspnoea (RR >40 breaths / minute ) | 8 | 8.3 |
| Intubation and ventilation not related to anaesthesia | 11 | 11.6 |
| Shock | 14 | 14.6 |
| Prolonged unconsciousness(≥12 hours) | 2 | 2.1 |
| Multiple transfusion of blood or red cells(≥5 units) | 60 | 62.5 |
| Use of continuous vasoactive drugs | 16 | 16.6 |
| Acute sever thrombocytopenia | 17 | 17.7 |
| $O_2$ saturation <90% for ≥60 minutes | 11 | 11.5 |
| Clot failure | 1 | 1.0 |
| ICU admissions | 37 | 38.5 |
| Hysterectomy following infection or hemorrhage | 13 | 13.5 |
| Oliguria non-responsive to fluids or diuretics | 4 | 4.2 |
| severe acute azotemia (creatinine ≥300 µmol/ml or ≥3.5 mg/dl) | 4 | 4.2 |
| Dialysis for Acute renal failure | 4 | 4.2 |
| Jaundice in presence of preeclampsia | 4 | 4.2 |
| severe acute hyperbilirubinemia (Bilirubin >6.0 mg/dl) | 5 | 5.2 |
| Uncontrolled fits | 2 | 2.1 |

**Table 4** Various intervention to prevent maternal deaths

| | |
|---|---|
| Laparotomy for rupture uterus | 4 |
| Relaparotomy (PPH) | 1 |
| Laparotomy for hemoperitoneum | 7 |
| Laparotomy for pus drainage | 1 |
| Inversion uterus correction | 1 |
| Platelet transfusion | 17 |
| Exploration of PPH | 7 |
| Laprotomy for ruptured ectopic pregnancy | 5 |
| CG ballon tamponade | 7 |
| Hysterotomy | 1 |

**Table 5** Causes of maternal morbidity and mortality

| CAUSE | Maternal near miss | Maternal death |
|---|---|---|
| Hemorrhage | 40(41.6%) | 12(19.4%) |
| Early pregnancy | | |
| Ectopic Pregnancy | 5 | 2 |
| Abortion | 3 | - |
| Late pregnancy | | |
| Antepartum hemorrhage | 18 | 5 |
| Postpartum hemorrhage | 14 | 5 |
| Hypertensives disorder of pregnancy | 20(20.8%) | 27(43.5%) |
| Severe preeclampsia | 12 | 14 |
| Eclampsia | 8 | 13 |
| Sepsis | 10(10.4%) | 4(6.5%) |
| Obstructed labor and uterus rupture | 4(4.2%) | 2(3.2%) |
| Anaemia | 8(8.3%) | 2(3.2%) |
| Medical causes | 9(9.4%) | 7(11.3%) |
| Others | 5(5.2%) | 8(12.9%) |

## Discussion

Reduction in maternal mortality is our target of MDG (Miillennium Development Goals) 2015 but in spite of national and international efforts, high maternal mortality and morbidity remains a major challenge in developing countries.

In our study, mortality index was 39.2% which comparatively higher than other studies i.e. 32.7% by Mamta et al[6] and 12.92% by Anuradha etal[7]. This may be because maximum number of cases were referred (~75%) and most of them were in critical condition. Also, MNM:1MD ratio was 1.5: 1 depicting every 1-2 women ; there was one maternal death whereas 6.7:1 ratio by Anuradha etal [7] and 2.07:1 by Kalra etal.[8] ;indicating higher rate of maternal mortality as usually patients referred in moribund state. In present study, majority of patients in age group of 18-25 years comparable to Mamta etal.[6]

Majority of women becoming near miss were multipara which is supported by other studies.[9]

Most of the critical obstetric events occurred in third trimester. Also hemorrhage (41.6%) followed by hypertensives diseases of pregnancy (20.8%) was commonest factor in near miss cases. These finding were similar to Anuradha etal {41% & 39%}; Gazala etal {44.3% &34.4%}. As our study was retrospective, so there was lack of data regarding delay in treatment at three levels.

## Conclusion

As near miss /SAMM cases share many characterstics with maternal deaths and can directly inform on obstacles that had to be overcome after the onset of complication. Also process indicators of MNM by WHO helps in auditing quality of maternal health care along with comparison between institution, countries and changes over time.

As mortality was high among hypertensives group, so more awareness is required among reproductive age group women for regular antenatal checkups with early detection of increase in blood pressure with compliance for treatment along with use of preventive measures to prevent the development of eclampsia in cases of severe preeclampsia. Moreover, role of pre-conceptional counselling for diagnosis and management of medical disorders has to be explained to women and her family members.

But still in developing countries carry high rate of maternal mortality and morbidity, mainly because of improper management of obstetric emergencies at referral centre, poor referral practices and limited availability of blood products at peripheral centres. So need of hour is to increase awareness among pregnant women with community education for health seeking behaviour and to provide regular training to medical and paramedical staff for management of obstetric

emergencies at referral centre along with efficient transport system. Moreover, need for setting Obstetric ICU and High dependency units with a team approach consisting of treatment by obstetricians, intensive care specialists, and anesthesiologists are essential to save a maternal life. Therefore, reduction of maternal mortality requires strengthening the capacity of local health systems in providing continuous, appropriate and timely life-saving services to women with complications during pregnancy, childbirth and postpartum.

**References**


1. J P Souza. WHO Department of Reproductive Health and Research Training Course in Sexual and Reproductive Health Research Geneva 2011
2. Maternal near miss review; Operational Guidelines..December 2014 .Ministry of Health & Family Welfare Government of India. Maternal Health Division
3. C. N. Purandare .Maternal Near Miss Review: A Way Forward. The Journal of Obstetrics and Gynecology of India (July–August2013)63(4):213–215
4. Sheeba Marwah, Manjula Sharma Maternal near miss review: a brief appraisal.Int J Reprod Contracept Obstet Gynecol. 2017 May;6(5):1703-1706 .
5. Evaluating the quality of care for severe pregnancy complications.The WHO near-miss approach for maternal health.
6. Mamta Bansal , Jyoti Lagoo, Khushbu Pujari Study of near miss cases in obstetrics and maternal mortality in Bastar, Chhattisgarh, India .Int J Reprod Contracept Obstet Gynecol. 2016 Mar;5(3):620-623 .
7. Anuradha .J, Srinivas. P.J, Manjubhashini. S.A Prospective Study on Maternal Near Miss Cases at a Tertiary Care Hospital in Visakhapatnam. Journal of Dental and Medical Sciences (IOSR-JDMS) Volume 16, Issue 11 Ver. III (Nov. 2017), PP 31-35
8. Priyanka Kalra, Chetan Prakash Kachhwaha. Obstetric Near Miss Morbidity and Maternal Mortality in a Tertiary Care Centre in Western Rajasthan Indian Journal of Public Health, Volume 58, Issue 3, July-September, 2014
9. Gazala Yasmin, Rehana Najam, Shahreyar Ghazi, Astha Lalwani. Maternal near miss events: a prospective observational study in a tertiary care centre. Int J Reprod Contracept Obstet Gynecol. 2016 Sept; 5(9):3088-30.


**Abbreviation**: MNM :-maternal near miss ; MD:- Maternal Death ;MM :- Maternal Mortality ; WHO:- World Health Organisation ;ICU:- Intensive Care Unit .