



## A STUDY OF NEAR MISS CASES IN A TERTIARY CARE CENTRE

## Gynaecology

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## ABSTRACT

**Background:** Maternal near miss is said to have occurred when women presented with life threatening complication during pregnancy, child birth and within 42 days after delivery, but survive by chance or good institutional care. For identifying near-miss cases five-factor scoring system was used. In 2009 WHO working group has standardized the criteria for selecting these cases.

**Methods:** The study was conducted in the Department of Obstetrics and Gynecology at Guru Gobindsingh Government General Hospital, Jamnagar, Gujarat, India, which is a tertiary care centre. For each case of near miss, data were collected on demographic characteristics including gestational age at the time of sustaining the near-miss morbidity, nature of obstetric complications, presence of organ-system dysfunction/failure, ICU admission and timing of near-miss event with respect to admission.

**Results:** During the 1 year of the study period, 7700 deliveries at the institution and 316 women were identified as near-miss obstetrical cases. Near-miss per 1000 delivery was 41. The leading causes of

maternal near miss were hemorrhage (47%) and hypertensive disorder of pregnancy (29.4%). The morbidity was high in unbooked cases.

**Conclusions:** Maternal near miss is good alternative indicator of health care system.

## KEYWORDS

High dependency unit, Intensive care unit, Maternal near miss, Maternal mortality

## INTRODUCTION-

*"Giving birth should be your greatest achievement not your greatest fear."*—Jane Weideman. Such is not the case in many developing countries where each pregnancy represents a journey into the unknown from which many a women never return. Every minute of every day, a women dies as a result of pregnancy and childbirth. Most societies in the world have considered childbirth a major hazard in the life of a women. Maternal mortality is a neglected tragedy and it has been neglected because those who suffers are neglected people with least power & influence they are poor, the rural, and above all women.

There has been significant improvements in obstetric care over the few decades, still, maternal morbidity and mortality remains challenge in the developing countries. Global MMR dropped by 45 % between 1990 and 2013. Most of the burden of maternal deaths is carried by low-income countries, but maternal mortality is still a relevant public health problem amongst developing countries. Maternal mortality is 'Just the tip of iceberg' and has vast base to the iceberg, maternal morbidity which remains undescribed.

Over the last decade, the identification of cases of severe maternal morbidity has emerged as a promising complement or alternative to the investigation of maternal deaths. Analysis of well-defined near-miss cases may be a more sensitive measure of the standard of obstetric care. Hence, concept of severe acute maternal morbidity (SAMM) is apt for the present health-providing system [1, 2]. SAMM has been studied extensively in the recent past as a complement for maternal mortality and also to evaluate the quality of obstetric care in the particular institution. This concept is superior over maternal death in drawing attention to surviving women's reproductive health and lives and is equally applicable for developing countries as well as developed countries. Maternal near miss cases can directly inform on problems and obstacles that had to be overcome during the process of health care. Maternal near-miss audits have been considered as useful approaches to improve maternal health care [3].

The maternal near-miss mortality is defined by the WHO as a woman who nearly died but survived from complications that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy. In 2009, the WHO has developed a maternal near-miss definition and established standard criteria for identification of women presenting pregnancy-related life-threatening conditions [4]. WHO definition enables a common ground for the implementation of maternal nearmiss assessments across countries and allows international comparisons to be carried out

There are several useful markers of maternal near misses and deaths.

- MNMR (maternal near miss incidence ratio): number of maternal

near miss cases per 1,000 live births.

- Maternal near miss to mortality ratio: proportion of maternal near miss cases to maternal deaths; higher ratio indicating better care.
- Mortality index is the number of maternal deaths divided by the sum of maternal near miss and maternal deaths; expressed as a percentage. The lower the mortality index, the fewer women with life threatening conditions dies (better care) and the higher the index, more women die (lower quality care).
- MMR (maternal mortality ratio): the number of maternal deaths cases per 100,000 live births.

**Justification:** In low and middle income countries, near miss review as a tool for monitoring maternal health care is poorly utilised probably due to the high maternal mortality rates which can mask the more common obstetric near misses. However, lessons learned from community verbal autopsies and facility based maternal death audits help provide some insight into the problem. Little emphasis is placed on the audit of the more common obstetric near misses yet these could provide valuable supplementary information towards the reduction of maternal mortality.[5]

## METHODS:

This is a prospective hospital based study conducted in Guru Gobind Singh Government General Hospital, Jamnagar, from July 2017 to June 2018

## Study population:

The study was carried out on mothers admitted in the hospital and meeting the inclusion criteria during the 1 year study period.

## Study design:

A cohort of emergency obstetric admission in the study setting during the study period was followed till 42 days after delivery, and cases fulfilled WHO set of severity markers for near-miss cases for severe acute maternal morbidity (SAMM) and mortality. All maternal deaths during the same period were analysed and compared with near-miss ones. All relevant data were collected on the pre-designed proforma in details regarding age, parity, gestational age, causes, interventions taken, foeto-maternal outcome.

**INCLUSION CRITERIA:** All patients according to WHO inclusion criteria for maternal near miss were included in the study [6]

## Life threatening conditions (near-miss criteria)

- Cardiovascular dysfunction
- Shock
- Cardiac Arrest
- Severe hypoperfusion (lactate >5 mmol/L or >45 mg/dL)

- Severe acidosis (pH<7.1)
- Use of continuous vasoactive drugs
- Cardio-pulmonary resuscitation
- Respiratory dysfunction**
  - Acute cyanosis
  - Gasping
  - Severe tachypnea (respiratory rate>40 breaths per minute)
  - Severe bradypnea (respiratory rate<6 breaths per minute)
  - Severe hypoxemia (O<sub>2</sub> saturation <90% for ≥60min or PAO<sub>2</sub>/FiO<sub>2</sub><200)
  - Intubation and ventilation not related to anaesthesia
- Renal dysfunction**
  - Oliguria non responsive to fluids or diuretics
  - Severe acute azotemia (creatinine >300 µmol/ml or >3.5 mg/dL)
  - Dialysis for acute renal failure
- Coagulation dysfunction**
  - Failure to form clots
  - Severe acute thrombocytopenia (<50,000 platelets/ml)
  - Massive transfusion of blood or red cells (≥ 5 units)
- Hepatic dysfunction**
  - Jaundice in the presence of pre-eclampsia
  - Severe acute hyperbilirubinemia (bilirubin>100 µmol/L or >6.0 mg/dL)
- Neurologic dysfunction**
  - Prolonged unconsciousness or coma (lasting>12 hours)
  - Stroke
  - Uncontrollable fit/ status epilepticus
  - Global paralysis
- Uterine dysfunction**
  - Hysterectomy due to uterine infection or haemorrhage

## EXCLUSION CRITERIA

All patients that did not fit inclusion criteria were excluded

## RESULTS:

Total Deliveries during study period: 7700

- Vaginal deliveries: 5274 (68.49%)
- LSCS: 2426 (31.5%)
- Live births: 7528 (97.77%)

Total Maternal mortalities during study period: 11

Maternal mortality ratio (MMR) during the study period: 146

Gujarat average: 91 [7]

Mortality Index: 3.36%

Prevalence of near cases (per 1000 live births): 41

Total near miss cases noted during the study period: 316

Maternal near miss incidence ratio (MNMR): 42

During study period mortalities were more common in:

- Urban cases (v/s rural cases)
- Emergency/Referred cases (v/s booked cases)
- Multi-gravid patients (v/s primigravidas)
- Post-natal patients (v/s ante-natal patients)

The most common cause of mortality during study period was associated with liver pathology (4 cases, 36.36%). The second leading cause was Post-partum hemorrhage (3 cases, 27.27%).

## Characteristics of Maternal near miss cases in the study:

**Table 1:**

| Socio demographics: (n=316)   |        |
|-------------------------------|--------|
| <i>Area of residence</i>      |        |
| Rural                         | 55.37% |
| Urban                         | 44.63% |
| <i>Status of registration</i> |        |
| Booked (at GGH)               | 18.35% |
| Referred                      | 37.02% |
| Emergency                     | 44.6%  |
| <i>Socio-economic status</i>  |        |
| Upper                         | 2.59%  |
| Middle                        | 28.16% |

|                          |        |
|--------------------------|--------|
| Lower                    | 69.3%  |
| <i>Education status</i>  |        |
| Educated                 | 32%    |
| Uneducated               | 68%    |
| <i>Gestational Age</i>   |        |
| <13 weeks                | 18%    |
| 13-28 weeks              | 2.53%  |
| >28 weeks                | 65.8%  |
| Post-natal               | 13.6%  |
| <i>Ante-Natal Visits</i> |        |
| Government               | 43.67% |
| Private                  | 22.78% |
| Both                     | 6.32%  |
| None                     | 27.2%  |
| <i>Gravida</i>           |        |
| Primi-gravida            | 43.35% |
| Multi-gravida            | 43%    |
| Post-natal               | 13.6%  |

As is apparent from table 1, majority of the near miss cases were from rural areas (55.37%) and were emergency cases (44.62%). Majority of MNM cases belong to lower socio-economic class (69.3%) and are uneducated (68%). Majority of near miss cases were noted in 3<sup>rd</sup> trimester (65.82%) followed by those in 1<sup>st</sup> trimester (18%). Majority of cases were taking antenatal care at government setups (138, 43.67%). It must however be emphasised that a significant number of cases in the study (86, 27.21%) did not receive any care antenatal care whatsoever. In the current study among ante-natal patients number of primigravidas and multigravidas involved in near miss cases is almost equal. Also, it must be noted that among post-natal cases (n=43), majority are multiparous (27, 62.79%).

**Table 2:**

| Status on Admission       |        |
|---------------------------|--------|
| Near miss on admission    | 67.4%  |
| Near miss after admission | 32.6%  |
| Mode of termination       |        |
| LSCS                      | 49.36% |
| Laparotomy for ectopic    | 15.82% |
| Vaginal                   | 31.3%  |
| Others                    | 3.48%  |

In the current study, majority of maternal near miss cases were near miss on admission (213, 67.4%). Maximum number of near miss cases were terminated by LSCS (156, 49.36%), followed by vaginal deliveries (99, 31.3%). It must be noted that the other category of cases (11, 3.48%) includes those where suction evacuation, exploratory laparotomy were needed.

**Table 3: Interventions undertaken in near miss cases**

| Interventions             | Percentage (%) |
|---------------------------|----------------|
| Laparotomy                | 42.4           |
| • Ectopic                 | 15.8           |
| • Exploration             | 14.8           |
| • Hysterectomy            | 5.06           |
| • Rupture                 | 6.6            |
| Massive blood transfusion | 75             |
| Intubation/Ventilation    | 39.3           |
| Higher antibiotics        | 38.9           |
| MgSO <sub>4</sub>         | 40.5           |
| Inotropes                 | 43.3           |
| ICU admission             | 64.87          |
| • <5 days                 | 50             |
| • 5 to 10 days            | 12             |
| • >10 days                | 2.8            |

The most common intervention in a near miss case is massive blood transfusion (237, 75%) followed by ICU admission (205, 64.87%). Since the studied hospital has a well equipped, 5 bedded Obstetric ICU attached to the Labour room, it is used to its full advantage in managing near miss cases.

**Table 4: Causes of near miss events**

| Causes                                    | Percentage(%) |
|-------------------------------------------|---------------|
| Hemorrhage: late trimester and Post natal |               |
| • APH                                     | 20.8          |
| • PPH                                     | 25.6          |
| Hemorrhage: early trimester               |               |

|                      |      |
|----------------------|------|
| • Abortion           | 2.2  |
| • Ectopic            | 15.8 |
| Severe Pre-eclampsia | 14.8 |
| Eclampsia            | 24.7 |
| Anemia               | 4.7  |
| Hepatitis            | 1.9  |
| Sepsis               | 1.9  |
| Uterine rupture      | 6.6  |
| Cardiac              | 2.8  |

At the outset it must be understood that a near miss event is not the effect of a single cause. Hence, each event may have multiple causes which will be reflected in below table

## DISCUSSION:

**Table 6: Comparison with other Indian studies**

|                                                     | Archana et al [8]<br>(2016) | Samrina et al<br>[9] (2017) | Gazala et al [10]<br>(2016)    | Anuradha et al<br>[11] (2107) | Mamta et al [12]<br>(2016) | Current Study                  |
|-----------------------------------------------------|-----------------------------|-----------------------------|--------------------------------|-------------------------------|----------------------------|--------------------------------|
| MNMR (per 1000 live births)                         | 7.56                        | 26                          | 45.2                           | 63.48                         | 11.9                       | 42                             |
| MMR (per 1000 live births)                          | 2.99                        | -                           | -                              | 9.42                          | 5.8                        | 1.46                           |
| Mortality Index                                     | 29.07                       | -                           | -                              | 12.92                         | 32.7                       | 33.6                           |
| Booking Status:                                     |                             |                             |                                |                               |                            |                                |
| • Unbooked (at studied hospital)                    | 18.63%                      | 80%                         | -                              | -                             | -                          | 81.64%                         |
| Gestational age:                                    |                             |                             |                                |                               |                            |                                |
| • <13wks                                            | -                           | 16.6%                       | 21.3%                          | 11%                           | 5.12%                      | 18%                            |
| • 13-28 wks                                         | -                           | 7.5%                        | 7.4%                           | 8%                            | 7.69%                      | 2.53%                          |
| • >28 wks                                           | -                           | 42%                         | 52.5%                          | 65%                           | 56.41%                     | 65.8%                          |
| • Post-partum                                       | 30.36%                      | 33.75%                      | 18.8%                          | 16%                           | 30.76%                     | 13.6%                          |
| Parity                                              |                             |                             |                                |                               |                            |                                |
| • Primi                                             | Majority                    | Majority                    | 38.5%                          | 53.82%                        | 35.89%                     | 50.1%                          |
| • Multi                                             | -                           | -                           | 61.5%                          | 46.18%                        | 64.10%                     | 49.8%                          |
| Near miss on admission                              | -                           | 52.08%                      | 98.4%                          | -                             | -                          | 67.4%                          |
| Causes of Near miss                                 |                             |                             |                                |                               |                            |                                |
| • Hemorrhage                                        | 26.7%                       | 42.5%                       | 44.3%                          | 41%                           | 43.5%                      | 47%                            |
| • Hypertensive disorders                            | 7.41%                       | 23.5%                       | 34.4%                          | 39%                           | 12.82%                     | 29.4%                          |
| • Anemia                                            | 24.84%                      | -                           | 4.1%                           | -                             | 15.38%                     | 4.7%                           |
| • Hepatitis                                         | 16.77%                      | -                           | -                              | -                             | 2.56%                      | 1.9%                           |
| • Sepsis                                            | 11.11%                      | 10%                         | 2.4%                           | -                             | 5.12%                      | 1.9%                           |
| • Uterine rupture                                   | -                           | -                           | -                              | 2.47%                         | 15.38%                     | 6.6%                           |
| • Cardiac                                           | 7.41%                       | 4.16%                       | -                              | -                             | -                          | 2.8%                           |
| Interventions                                       |                             |                             |                                |                               |                            |                                |
| • Blood                                             | -                           | 2.08%                       |                                |                               |                            |                                |
| • transfusion                                       |                             |                             | 42.6%                          | 40%                           |                            | 75%                            |
| • Hysterectomy                                      |                             |                             | 5.7%                           | 6.6%                          |                            | 5.06%                          |
| • Laparotomy                                        |                             |                             | 31.1%                          | 27%                           |                            | 37.34%                         |
| • ICU                                               |                             |                             | 75.4%                          | -                             |                            | 64.87%                         |
| • Intubation                                        |                             |                             | 31.1%                          | 45.7%                         |                            | 39.3%                          |
| • Higher antibiotics                                |                             |                             | 19.7%                          | -                             |                            | 38.9%                          |
| • MgSO4                                             |                             |                             | 32.8%                          | 32.3%                         |                            | 40.5%                          |
| • Inotropes                                         |                             |                             | 15.6%                          | 80.6%                         |                            | 43.3%                          |
| Most common organ dysfunction (WHO severity marker) | Hematological f/b hepatic   | -                           | Neurological f/b hematological | -                             | -                          | Hematological f/b neurological |

- As can be noted from above comparison, the results of the current study are in line with other studies done in various hospitals In India.
- Souza et al [13] from Brazil reported hypertensive disorders as the most commonly associated (57%) cause for near miss cases Haemorrhage (23.78%) was the next determinant for near miss cases that was mostly because of antepartum haemorrhage (placenta previa and abruptio placentae).
- The near miss rate was 4.1 % in this study as against 4.4 per 1000 live births in a study from Brazil. The maternal near miss incidence ratio is 42 per 1000 live births in this study, which is comparable to other studies done in developing countries show the same trend and vary between 15 to 40 per 1000 live births. The near miss to mortality ratio in our study is 28.72:1 which means for every 28.72 near miss cases, there was one maternal death. Higher ratios indicate better care. Syrian study showed 60:1 and study in Nepal showed a ratio of 7.2:1.
- High income countries have reported a ratio of 117-223:1. If this ratio increases over a period of time it reflects on the improvement achieved in the obstetric care. The analysis of maternal deaths has long been used for the evaluation of women's health and the quality of obstetric care. It has been suggested that with the observed decline in maternal mortality, analysis of well-defined near-miss cases may be a more sensitive measure of the standard of obstetric care.
- In an analogy with the study conducted by Roopa et al, women

The most common cause of near miss event in the given study is hemorrhage due to various reasons, followed by hypertensive disorders in pregnancy.

**Table 5: Neonatal outcome**

|                | Number (n=258) | Percentage (%) |
|----------------|----------------|----------------|
| Live born      | 204            | 79             |
| Stillborn      | 54             | 20.9           |
| NICU admission | 147            | 56.9           |

Of the total 258 deliveries, a significant number (54, 20.9%) were still born and among live born, a significant number (147, 56.9%) required NICU admission

- with 'near miss' outcome at gestational age 1-12, 13-28, >28 weeks and postnatally were 17 (12.9%), 6 (4.6%), 75 (57.2%) and 33 (25.1%) respectively. The study findings for 'near miss's at 24-36 weeks and maternal death at >28 weeks corroborate our study findings [14].
- In another study conducted in Kathmandu by Shrestha et al, it was observed that pregnant women with gestational age of <13, 13-28, >28 weeks and postpartum period who belonged to 'near miss's category were 11 (30.5%), 6 (16.66%), 10 (27.77%) and 9 (25%) women respectively [15]
- A comparable study by Ranatunga et al from Sri Lanka found that majority (57.1%) of 'near miss' cases were gravida G2-G4 [16]. Nelissen et al from Tanzania [17] and Shrestha et al from Nepal also showed similar findings. However, Roopa et al showed in their study from South India that 56% of the 'near miss' cases were of gravid status G1 [14].

## CONCLUSION:

- This study can help us in directing our resources towards steps that reduce mortality and morbidity of mothers
- Majority of near miss cases were from rural areas, from lower socio-economic class and uneducated. This reflects the need for better penetration of medical services in rural areas. Also, it clearly reflects the need for improved literacy.
- A large number of cases were emergency cases and were critical on admission, which points for need of better management at

peripheral centres and early referrals for reducing morbidity. Also, it must be noted that majority of referrals were from government centres pointing towards the need for better training and equipping these centres.

- While it is ideal to provide antenatal care throughout pregnancy, it is specially apparent that a great majority of near miss cases are in mothers of 3<sup>rd</sup> trimester pregnancies, hence the need for better care in 3<sup>rd</sup> trimester and early detection of high risk pregnancies.
- Hemorrhage is the most common cause of near miss events in current study, this justifies aggressive approach in diagnosing complications at early phase and also the need to establish blood banks for better managing such complications.
- A well equipped centre with HDU/ICU, operation theatre, blood bank and multi-disciplinary team can go a long way in saving a critical mother.
- Whilst discussing about maternal near miss cases and its outcome it is also important to discuss neo-natal outcome. A critical mother has disturbed internal environment which adversely affects her fetus, a well equipped and managed NICU can go a long way in reviving the neonate to good health post delivery and help in providing favourable feto-maternal outcome in near miss cases.

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