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Research Article

Maternal near miss review from a tertiary care center in South India

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ABSTRACT

Background: Maternal near miss review acts as complimentary for mortality audits. It indicates the quality of obstetric care and helps obstetricians to revise policies and practices.

Methods: A retrospective observational study was carried out at institute of maternal and child health, Government Medical College Kozhikode from January to December 2014. Cases were defined based on WHO criteria 2009.

Results: Total live births during the study period were 15604 and there were 24 maternal deaths. Near Miss cases were 267. Maternal mortality rate was 153.5/lakh live births and maternal near miss incidence ratio was 17.03/1000 live births. Maternal near miss to mortality ratio was 11.1 and mortality index was 8.2%. Hypertensive disorders comprised 46%, followed by haemorrhage 36%, sepsis 7% and other causes 10%.

Conclusions: Even with improving care, maternal near miss incidence (17.03 per 1000 live births) is found to be higher in our institution compared to developed nations. However high maternal near miss to mortality ratio (11.1) and low mortality index (8.2%) shows good quality of obstetric care in our institution.

Keywords: Maternal near miss, Maternal mortality

INTRODUCTION

Maternal and Child Health Care is one of the eight basic components of primary health care in declaration of Alma Ata.¹ Maternal mortality ratio (MMR) of India has declined from 212 in 2007-2009 to 174 in 2015.² The MMR of Kerala stands at 66 per one lakh live births according to 2010-2012 survey of registration.

Women who survive severe complications during pregnancy, child birth and postpartum period could serve as surrogates to help us give a better understanding of the set of conditions and preventable factors that together contribute to maternal death. This is known as concept of maternal near miss.³

WHO defined maternal near miss in 2009 as “a women who nearly died but survived a complication during pregnancy, child birth or within 42 days after termination of pregnancy”.

The advantages of reviewing near miss events are

Near misses are more common than maternal death, they have the same pathway which leads to death and provide information regarding care received and possible means of prevention, as the women survives, near miss review may be seen as less threatening than the death reviews, for the team who report them and one can learn from the women themselves as they themselves can be interviewed.

Broadly, WHO recommends 3 different approaches of selection criteria for identification of maternal near miss cases. They are:

- Disease specific criteria
- Management based criteria
- Organ dysfunction criteria.

Disease specific criteria

Clinical criteria related to specific disease entity like pre-eclampsia, eclampsia, HELLP syndrome, severe haemorrhage, sepsis and uterine rupture.⁴

Intervention based criteria

In most developed countries, admission to intensive care unit or requirement of critical care, have been used to identify near misses.⁵ However the disadvantage of these criteria is the accessibility and availability of intensive care facilities for patients who need them. Other interventions like performance of intra-partum hysterectomy, blood transfusion or caesarean section have been used to identify near misses.

Organ system dysfunction based criteria

The system is based on the concept that there is sequence of events leading from good health.⁶ The sequence is clinical insult, followed by a Systemic Inflammatory Response (SIR), organ dysfunction, organ failure and finally death. Near misses would be those women with organ dysfunction and organ failures who survive the criteria for defining a near miss and are defined per organ system.

The advantages of this system are that it helps in establishing the pattern of the disease causing morbidity, comparisons can be made, definition can be standardized and used in many different settings, problem within the health system may be studied and audit can be carried out prospectively.

The disadvantages are that it is dependent on minimum level of care in a country and there must be functioning laboratories for some specific blood tests and basic critical care monitoring must be available.

The practical aspects of WHO criteria includes⁷

Clinical criteria

Acute cyanosis, gasping, respiratory rate >40 or <6 breaths /minute, shock, oliguria not responsive to fluids or diuretics, coagulation disorders, total paralysis, loss of consciousness for ≥12 hours, jaundice with pre eclampsia and unconsciousness with no pulse and heart beats

Laboratory criteria

Oxygen saturation <90% for ≥60 minutes, PaO₂/FiO₂ <200 mm Hg, Creatinine ≥300 mmol/L or ≥3.5 mg/dl, bilirubin >100 mmol /L or >6 mg/dl, pH <7.1, lactate <5, acute thrombocytopenia (<50,000 platelets), loss of consciousness and ketoacidosis and glucose in urine.

Management criteria

Continued use of vasoactive drugs, hysterectomy for postpartum haemorrhage or infection, transfusion of ≥5 units of PRBSs, dialysis for acute renal failure, intubation and ventilation for ≥60 minutes and not related to anaesthesia and cardiopulmonary resuscitation.

Maternal near miss incidence ratio =

$$\frac{\text{Number of maternal near miss cases}}{\text{Total number of live births}} \times 1000$$

Mortality index =

$$\frac{\text{Number of maternal deaths}}{\text{Number of maternal deaths} + \text{Number of near miss cases}} \times 100$$

The objective of this study was to determine maternal near miss ratio (MNMR), maternal near miss to mortality ratio and mortality index and to evaluate the level of care by comparatively analysing near misses and maternal mortality.

METHODS

This is a retrospective observational study conducted at institute of maternal and child health, Government Medical College Kozhikode, Kerala, India from January - December 2014. Data was collected from case records of the patient and statistical analysis was done using SPSS software. Cases were defined based on WHO Criteria 2009.

RESULTS

The total number of live births during the study period was 15604 and total maternal deaths were 24 with a Maternal Mortality rate of 153.5/lakh live births. Total near miss cases were 267 with a maternal near miss ratio of 17.03/lakh live births. Maternal near miss to mortality ratio was 11.1 and mortality index was 8.2%.

The main cause of maternal mortality (Figure 1) during the study period was hypertensive disorders of pregnancy (25%) followed by haemorrhage and sepsis 17% each. Amniotic fluid embolism comprised 12% followed by anemia and heart disease 8% each. Other causes comprised 10%.

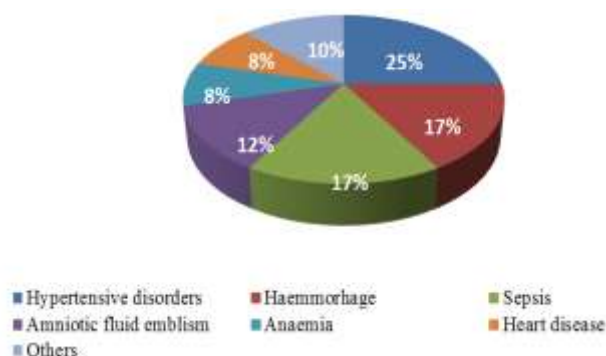


Figure 1: Causes of maternal mortality.

Main causes of maternal near misses (Figure 2) were hypertensive disorders of pregnancy (46%) followed by haemorrhage 37%, sepsis 7% and others 10%.

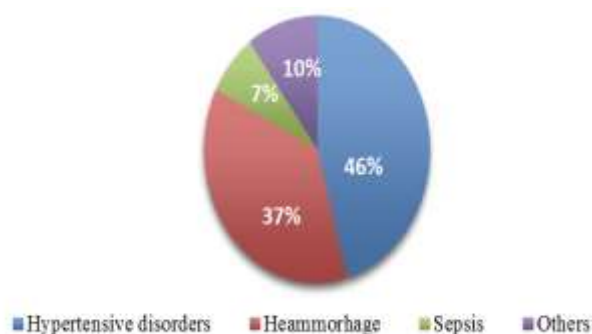


Figure 2: Main causes of maternal near misses.

Among the hypertensive disorders severe preeclampsia comprised 23.5%, eclampsia 14.9%, HELLP syndrome 7.1%. Among the spectrum of haemorrhage (Table 1), postpartum haemorrhage comprised maximum (13.1%) cases of near misses.

Table 1: Spectrum of haemorrhage.

Postpartum haemorrhage	35	13.1%
Abruptio placentae	30	11.2%
Rupture uterus	15	5.6%
Ectopic pregnancy	10	3.7%
Placenta praevia	8	2.9%

The demographic characteristics (Table 2) reflects that majority of the patients were between the age of 20-34 years (48.6%), were Multigravidas (55.4%) and had preterm delivery (63.2%).

Obstetric and perinatal outcome (Table 3) shows that Majority of Near Miss cases happened with caesarean delivery (53.1%) and had babies weighing between 1.5-2.5 kg (40.4 %). The live birth rate was 67.4% and 77.5% patients needed hospitalization for 10-20 days.

Table 2: Demographic characteristics.

Age (years)	
<19	40 14.9%
20-34	130 48.6%
>34	97 36.3%
Parity	
Primigravida	119 44.5%
Multigravida	148 55.4%
Gestational age	
Term	98 36.7%
Preterm	169 63.2%

Table 3: Obstetric and perinatal outcome.

Mode of delivery	
Vaginal	115 43.07%
C-section	142 53.1%
Instrumental delivery	10 3.7%
Birth weight (kg)	
<1.5	47 17.6%
1.5-2.5	108 40.4%
>2.5	112 41.9%
Neonatal condition	
Live birth	180 67.4%
Fresh still birth	27 10.1%
Macerated still birth	60 22.4%
Hospital stay after near miss event (days)	
<10	20 7.4%
10-20	207 77.5%
>20	40 14.9%

There had been delay in providing care (Figure 3) to near miss cases 46% at level 1, 32% at level 2 and 22% at Level 3. Sepsis contributed to 17% of maternal mortality and 7% of near miss cases. Sepsis continues to be a major problem in spite of use of higher antibiotics and improved care

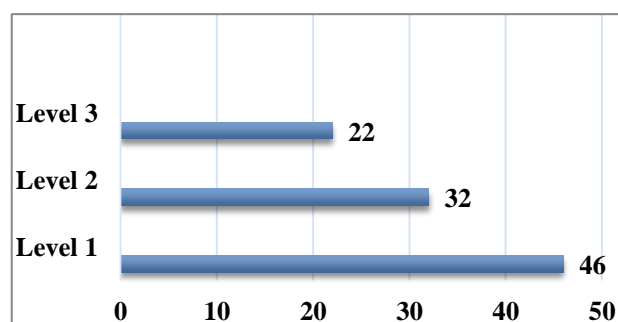


Figure 3: Levels of delay in care.

DISCUSSION

The primary determinant of near miss cases in our study was hypertensive disorders of pregnancy (46%). A retrospective observational study conducted by FOGSI

from 2005-2007 in India also observed hypertension as the leading cause of maternal death.⁸ Souza et al from Brazil also reported hypertensive syndromes as the most commonly associated (57%) cause for near miss cases.⁹

Haemorrhage (37%) was the next determinant for near miss cases. This also collaborates with FOGSI and Brazilian studies.^{8,9} Sepsis contributed 7% of near misses and 76% of patients with caesarean delivery developed sepsis. Irrational use of antibiotics leads to antibiotic resistance. Moreover the rate of C-section was significantly higher in the women who developed severe morbidity during pregnancy compared to those who developed it during the puerperium.

Majority (48.6%) were in the age group 20-34 years. Marcia Lait et al found that more cases were in the age group 20-29 years except that using WHO criteria, more cases were identified in the age group 30-39 years.¹⁰ Multigravidas were more 55.4% than primigravidas (44.6%). However in other studies, majority were primigravidas.¹⁰ 53.1% underwent cesarean delivery and 40.4% delivered babies with birth weight between 1.5-2 kg. Similar data was seen in Brazilian study.¹⁰

The live birth rate was fairly good at 67.4% but hospital stay was prolonged for 10-20 days in 77.5% of patients, reflecting morbidity and financial burden to the health facility.

In a prospective study in Nigeria conducted by Ikeola et al, women who were referred from another facility had a fourfold risk (OR=3.84) for near miss as compared to those who were not referred. One probable reason was late referral. In our study there was 46% delay at level 1, 32% at level 2 and 22% at level 3. Several narratives from near misses strongly suggest that the act of first approaching lower level centers (which lack emergency obstetric care) inadvertently delay the referral process.

Even with improving care, maternal near miss incidence (17.03 per 1000 live births) is found to be higher in our institution probably being a tertiary care center. However high maternal near miss to mortality ratio (11.1) and low mortality index (8.2%) shows good quality of obstetric care in our institution.

CONCLUSION

Near misses can be prevented to some extent by spreading awareness about possible obstetric complications and risk stratification. Timely referral after first line therapy would play a very important role. Availability of blood bank facility, ventilator support

should be mandatory in first referral units and co-ordinated critical care team care should be available in tertiary hospitals. Obstetricians should receive adequate training in managing obstetric emergencies good nursing care and psychological support is also an important need of the hour.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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