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Original Research Article

A study of maternal near miss cases in tertiary health centre in north India

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ABSTRACT

Background: Maternal near miss is defined as woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy.

Methods: It was one-and-a-half-year prospective study from April 2016 to September 2017 conducted in the department of Obstetrics and Gynecology, Government Medical College, Patiala. The causes of maternal near miss based on WHO 2010 Near Miss criteria were studied.

Results: In the present study out of total deliveries of 6166, there were 5461 live births and 123 maternal near miss cases which were included based on WHO 2010 maternal near miss approach. The maternal near miss incidence ratio (MNMR) in present study is 22.5. Literature reports the similar trends and MNMR varies between 15 to 40 per 1000 live births. Maternal near miss to mortality ratio is 1.89:1 in the present study.

Conclusions: The most common direct cause for maternal near miss is hemorrhage. Severe preeclampsia is one of the easiest identifiable and avoidable factors for preventing maternal death. Studying near miss in detail allows us proper assessment of opportunities that were missed, analyzing the gaps and patient care related factors and helps to develop an audit system for maternal care.

Keywords: Causes, Maternal near miss, WHO criteria

INTRODUCTION

Maternal near miss is defined as woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy. Maternal mortality is one of the most important indicators used for assessing maternal health. According to WHO, a maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.¹ Despite being caused by pregnancy related events, these deaths do not count as maternal deaths in routine civil registration system. An

alternative concept of the maternal death was included in ICD-10, in order to capture these delayed deaths that occur between 6 weeks and 1-year post-partum.¹

About 80% of maternal deaths are due to direct causes i.e. obstetric complications of pregnancy, labour and puerperium or inappropriate and inadequate interventions, treatment and/ or referral. Remaining 20% of maternal deaths are due to indirect causes like, the result of pre-existing diseases or disease that developed during pregnancy which are not due to direct obstetric cause but are aggravated by the physiological cause of pregnancy. Causes of maternal mortality being: Hemorrhage, hypertension, eclampsia, obstructed labour, abortion, etc. Anemia being one of the major indirect

cause along with other indirect causes such as hepatitis, cardiovascular disease, endocrine diseases and metabolic systems, infections such as tuberculosis, malaria and increasing number of infections like HIV/ AIDS.²

Social factors contributing to maternal mortality in India are: Age at child birth, parity, too close pregnancies, family size, malnutrition, poverty, illiteracy, ignorance and prejudices, lack of maternity services, shortage of health man-power, delivery by untrained dais, poor environmental sanitation, poor communication and transport facilities, social customs, etc.³

Reduction in maternal mortality is one of the Millennium Development Goals (MDG 5) with target 5A that calls for reduction of maternal mortality by 3 quarters between 1990 and 2015.³

In any setting women who develop severe acute morbidity during pregnancy share many pathological and circumstantial factors related to their condition. While some of them die, a proportion of women narrowly escape deaths which come under maternal near miss category. Many maternal deaths occur at home or in transit which makes it difficult to obtain complete information regarding maternal death and its cause especially in developing countries. Near miss cases survive these complications and therefore can provide vital information. By evaluating these cases with severe maternal outcome, one can get to know about processes in health system (or lack of them) to deal with maternal morbidities.³

The near miss criteria developed by WHO technical group have been tested and validated as being able to provide robust and reliable data. The WHO working group has also developed a set of indicators for the assessment of quality of care within a health care facility or the health system. In order to ensure that the evaluation of quality of care with the near-miss approach is comprehensive, a set of process indicators is developed which is considered to be beneficial and feasible method of auditing the quality of maternal health care.³

METHODS

Inclusion criteria

The present study was one-and-a-half-year prospective study from April 2016 to September 2017 conducted in the department of Obstetrics and Gynecology, Government Medical College, Patiala. The study was conducted on patients admitted in labour room including referred, emergency and booked admission. Women with severe complications of pregnancy/ labour/ puerperium irrespective of gestational age as per WHO near miss criteria were identified and studied. The eligibility was not restricted by the gestational age at which complications occurred i.e. women having abortions or ectopic pregnancy as well as medical conditions and

presenting with any of the inclusion criteria were eligible. The first step in implementing the near miss approach was to systematically identify women with severe complications of pregnancy.

Exclusion criteria

Women that developed those conditions unrelated to pregnancy i.e. not during pregnancy or 42 days after termination of pregnancy were excluded.

RESULTS

Table 1: Characteristics of patients.

Age	Number	Percentage
<20yr	04	3.3
20-35	118	95.9
>35	01	0.8
Parity		
Primipara	39	31.7
Multipara	84	68.3
Gestational age		
<13 weeks	15	12.2
13-28 weeks	22	17.8
>28 weeks	52	42.4
Postnatal	34	27.6
Mode of delivery		
Vaginal	20	24.7
Caesarean section	35	43.2
Laparotomy for rupture uterus/ hysterectomy	8	9.9
Laparotomy for ectopic	15	12.2
Classical caesarean	3	3.7

Table 1 shows the distribution of near miss cases according to different age groups. Maximum number of cases fall between 20-35 years of age making constituting 95.9% of total near miss cases in present study which is the common reproductive age group. Multipara forming majority of cases i.e. 68.3% as the number of complications increase in multipara patients. In first trimester there were 12.2% cases of ruptured ectopic with hemoperitoneum who underwent laparotomy. In second there were 17.8% cases. Majority of cases were of hemorrhage (26%) out of which, abruptio placentae (15.62%) followed by placenta previa (9.3%), placenta accreta (6.25%), placenta percreta (3.125%). Third trimester had 42.4% cases which had eclampsia (18.7%) and severe preeclampsia with jaundice (5.6%). Sepsis was seen in 9.8% cases. Respiratory distress in 4%, rupture uterus in 4% cases. 24.7% patients had vaginal deliveries, 43.2% underwent Lower segment caesarean section, 9.9% underwent laparotomy for rupture uterus, 12.2% underwent laparotomy for ruptured ectopic pregnancy and 3.7% underwent classical caesarean section. Remaining 42 patients were referred from other centres due to postpartum hemorrhage, acute uterine

inversion and non-availability of blood bank and ventilator.

Table 2: Distribution of maternal near miss according to complication of pregnancy.

Complication of pregnancy	No. of near miss cases N=123	Percentage
Anaemia without hemorrhage	42	34.1
Hemorrhage	32	26
Eclampsia	23	18.7
Sepsis	12	9.8
Liver disease	7	5.7
Rupture uterus	5	4
Respiratory disease	5	4
Obstructed labour	4	3.2
Heart disease	2	1.6

Most common direct complicating factor being hemorrhage 26%, eclampsia 18.7%, sepsis 9.8%, rupture uterus 4% (rupture uterus was present in 2 cases of grand multipara and 3 cases had more than 2 previous LSCS) and obstructed labour 3.2%.

Table 3: Management, clinical and laboratory-based identification of near miss cases.

Intervention	Number	Percentage
Massive blood transfusion	67	54.47
Magnesium sulphate therapy	27	21.95
Laparotomy	23	18.69
ICU admission	18	14.63
Higher antibiotic use	17	13.82
Inotrope use	15	12.19
Peripartum hysterectomy	4	3.25
Clinical criteria		
Loss of consciousness >12 hours	23	18.7
Shock	17	13.8
Clotting failure	16	13
Respiratory rate <6/min or >40/min	10	8.1
Oliguria	9	7.3
Jaundice in presence of preeclampsia	7	5.7
Laboratory findings		
Oxygen saturation <90% for >60min	18	14.6
Acute thrombocytopenia <50,000	7	5.6
S. bilirubin >6mg/dl	7	5.6
S. Creatinine >3.5 mg/dl	1	0.8

Among the indirect causes anaemia 34.1% was leading cause. Out of this iron deficiency anaemia was seen in 88% cases and 12% cases had other types of anaemia like megaloblastic and thalassemia minor. Respiratory disease

4%, liver disease 5.7% (mainly hepatic encephalopathy) and heart disease 1.6% (1 patient had dilated peripartum cardiomyopathy and 1 patient was revived from sudden cardiac arrest).

Table 3 depicts various interventions done in near miss cases in present study, with massive blood transfusion given to 54.47% of cases, which included 15 cases of ruptured ectopic with hemoperitoneum, 17 cases of caesarean section, 2 cases of acute uterine inversion, 19 cases of atonic PPH and 2 cases of traumatic PPH and 12 cases of very severe anaemia with failure. ICU admission needed by 14.63% cases, inotropic support (due to shock) in form of dopamine and noradrenaline needed by 12.19% cases, 18.69% cases underwent laparotomy (15 cases due to ruptured ectopic with hemoperitoneum, 4 cases due to rupture uterus followed by repair, 3 cases due to rectus sheath hematoma and 1 post LSCS case of ileal resection followed by ileostomy) and 3.25% underwent hysterectomy (1 case due to placenta percreta, 2 cases due to placenta accreta and 1 case due to rupture uterus beyond repair. (The total of this table does not sum up to 123 as one patient underwent more than one form of treatment.)

Distribution of cases according to clinical criteria include maximum cases of loss of unconsciousness for more than 12 hours i.e. 18.7%, shock 13.8%, clotting failure 13%, respiratory rate <6/min or >40/min in 8.1%, oliguria in 7.3% and jaundice with severe preeclampsia in 5.7% cases. Distribution of near miss cases according to laboratory criteria, and oxygen saturation <90% for >60 min in 14.6% cases. 5.6% cases with acute thrombocytopenia and serum bilirubin >6mg/dl and serum creatinine >3.5% in 0.8% cases.

DISCUSSION

The study conducted for a period of one and a half year included 123 patients categorized as maternal near miss who reported to the labour room of department of obstetrics and gynecology, Govt. Medical College, Patiala. In the present study out of total deliveries of 6166, there were 5461 live births and 123 maternal near miss cases which were included based on WHO 2010 maternal near miss approach. The maternal near miss incidence ratio (MNMR) in present study is 22.5. Literature reports the similar trends and MNMR varies between 15 to 40 per 1000 live births.⁴⁻⁶ Maternal near miss to mortality ratio is 1.89:1 in the present study, which means for every 2 lives saved there was 1 maternal death. The ratio is similar to a study conducted in Bastar district of Chhattisgarh, India which had near miss to mortality ratio of 2:1.⁷ Study of near miss morbidity done in western Rajasthan also had a near miss mortality ratio of 2:1.⁸ Present results are also similar to those of African countries where range is 2-11:1.⁹

Table 4: Distribution of clinical criteria for identification of near miss cases.

Study	Brace et al	Das et al	Present study
Clinical criteria			
Loss of consciousness >12hour	13%	11.3%	18.7%
Shock	3%	53%	13.8%
Clotting failure	7.74%	4%	13%
Gasping	8%	4%	9.8%
Respiratory rate <6/min or >40/min	9%	17.7%	8.1%
Oliguria	10%	11.8%	7.3%
Jaundice in presence of preeclampsia	2.3%	3.6%	5.7%

Table 4 shows a comparison of clinical criteria for identification of maternal near miss cases.^{4,10} Study by Brace et al reported loss of consciousness >12 hours in 13% cases, shock in 3% cases, clotting failure in 7.74%, gasping in 8%, respiratory rate <6/min or >40/min in 9% cases, oliguria in 10% and jaundice in presence of preeclampsia in 2.3% cases. Das et al reported loss of consciousness in 18.7% cases, shock in 53%, clotting failure in 4%, gasping in 8% cases, respiratory rate problems in 17.7%, oliguria in 11.8% and jaundice in presence of preeclampsia in 3.6% cases. Present study concluded loss of consciousness in 18.7% cases, shock in 13.8%, clotting failure in 13%, gasping in 9.8% cases, respiratory rate <6/min or >40/min in 8.1%, oliguria in 7.3% and jaundice in presence of preeclampsia in 5.7% cases. Results of present study matched with Brace et al and Das et al except shock was in 13.8% cases which is one fourth of the cases in Das et al. Clotting failure in 13% cases which is almost 3 times the study by Das et al.

Table 5: Management based criteria and intervention performed.

Criteria	Das et al ¹⁰	Rajakumari et al ¹¹	Present study
Massive blood transfusion	38%	31%	54.47%
Magnesium sulphate therapy	18%	-	21.95%
ICU admission	2.8%	73.49%	14.63%
Higher antibiotic use	10%	8.48%	13.82%
Inotrope use	54.7%	-	12.19%
Peripartum hysterectomy	5.21%	3.53%	3.25%
Dialysis	1%	1.06%	0.8%

Table 5 shows the intervention done and management in MNM cases. Study by Das et al reported massive blood transfusion in 38% cases, magnesium sulphate therapy in 18% cases, ICU admission in 2.8% cases, higher antibiotic uses in 10% cases, peripartum hysterectomy in 5.21% and dialysis in 1% cases. In the present study, massive blood transfusion was in 54.47% patients, magnesium sulphate therapy in 21.95%, ICU admission in 14.63%, higher antibiotic uses in 13.82%, ionotrope use in 12.19%, peripartum hysterectomy in 3.25% and

dialysis in 0.8% patients. The results of present study matched with Das et al and differed in two parameters i.e. ICU admissions were 7 times more in present study and ionotrope use was one fourth of Das et al, Rajakumari et al reported blood transfusion in 31%, ICU admission in 73.49%, higher antibiotic use in 8.48%, peripartum hysterectomy in 3.53% and dialysis in 1.06%.¹¹

Table 6: Laboratory based criteria for identification of near miss cases.

Criteria	Das et al ¹⁰	Present study
Oxygen saturation <90% for >60min	8.21%	14.6%
Acute thrombocytopenia <50,000	1.26%	5.6%
S. Bilirubin >6mg/dl	13.7%	5.6%
S. Creatinine >3.5 mg/dl	11.8%	0.8%

Table 6 shows laboratory-based criteria for identification of MNM. Study by Das et al (2014) reported 8.21% cases with oxygen saturation <90% for >60 min, acute thrombocytopenia in 1.26%, serum bilirubin >6mg/dl in 13.7% and serum creatinine >3.5mg/dl in 11.8%. The present study reported oxygen saturation <90% for >60minutes in 14.6% cases, acute thrombocytopenia in 1.26% cases, serum bilirubin >6mg/dl in 5.6% and serum creatinine >3.5mg/dl in 0.8% cases. Results matched with Das et al with difference in Serum bilirubin parameter which was 13.7% in Das et al and 5.6% in present study. Also, serum creatinine parameter was much less in the present study 0.8% as compared to Das et al which had reported 11.8% cases.

CONCLUSION

The most common direct cause for maternal near miss is hemorrhage. Severe preeclampsia is one of the easiest identifiable and avoidable factors for preventing maternal death. Regular blood pressure monitoring at every antenatal visit along with urine complete examination for sugar and albumin serves as a baseline marker and can predict about the state of patient. Obstructed labour is still a major problem being encountered these days. Plotting a partograph when a patient enters active phase of labour is very important and helps to decide about any action that

needs to be taken and save the maternal and neonatal morbidity. The need for identifying the patient conditions and deciding for the referral on time and to the right centre is a critical step towards saving a maternal death. The core of the health system should emphasize on 'when to refer' and 'where to refer' policy. Studying near miss in detail allows the proper assessment of opportunities that were missed, analyzing the gaps and patient care related factors and helps to develop an audit system for maternal care. Managing a near miss case is a team work and prompt and objective intervention can avert a maternal death.

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