

# Clinical Study of Maternal Near Miss

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## Abstract

**Introduction:** The women who survive serious complications of pregnancy are referred to as “near miss.” For every maternal death, there are many others who suffer serious life-threatening complications of pregnancy, referred to as “near miss” morbidity. In fact, for the over 500,000 mothers who die annually worldwide, and mostly in developing countries, there are more than 8 million who suffer severe maternal morbidity (WHO 2004). There is currently no standard definition of “near miss” such as there is for a maternal death because it is difficult to determine exactly at which point a woman becomes a “near miss.” WHO defines maternal “near miss” as a woman who nearly died but survived complications that occurred during pregnancy, childbirth, or within 42 days of termination of pregnancy.

**Aims and Objectives:** The aim of the study was to determine the magnitude and types of life-threatening maternal complications in pregnant and recently delivered women, timing and management, blood transfusion and major surgery, and inpatient duration of stay of patients with “near miss” morbidity.

**Materials and Methods:** The prospective cohort study was done by the Department of Obstetrics and Gynaecology, Kamla Raja Hospital, Gwalior, study period from 1 year, November 2014 to October 2015. **Inclusion Criteria:** Acute cyanosis, Gasping, Respiratory rate >40 or <6/min, shock, oliguria, clotting failure, loss of consciousness lasting >12 h, stroke, uncontrolled fit/total paralysis, and jaundice in the presence of pre-eclampsia were included in the study. **Exclusion Criteria:** Morbidity resulting from causes not related to pregnancy or its complication or management, for example, malignancies, ca breast, and liver rupture. Morbidity from accidental or incidental causes no way related to pregnancy, for example, morbidity from automobile accident/ suicide. Women who develop these conditions unrelated to pregnancy.

**Results:** Near miss to maternal death ratio as 3.69:1 which means out of five women with severe morbidity we are saving four cases. Near miss cases are 97 (61%) war multigravida and only 61 (39%) war primigravida. Referred cases were 102 to which means 66.1% of near miss were referred to our institute from various center. Only 57 cases (33.9%) came directly. Fifty-four patients (33.9%) have 4 days intensive care unit (ICU) stay followed by 50 cases (31.44%) having 3 days ICU stay and maximum stay was of 6 days in 11 cases.

**Conclusion:** Still, it needs improvement, which can be achieved by ongoing training and simulation sessions for obstetrical staff in early recognition and management of severe obstetric morbidity and also by resource allocation that is required in the management of the near miss cases.

**Key words:** Maternal near miss, Pre-eclampsia, Primi gravida

## INTRODUCTION

The woman who survives serious complications of pregnancy is referred to as “near miss.” For every maternal death, there are many others who suffer serious life-

threatening complications of pregnancy, referred to as “near miss” morbidity.

Mantel *et al.*<sup>[1]</sup> identified 5 times as many “near misses” as maternal deaths. In fact, for the over 500,000 mothers who die annually worldwide, and mostly in developing countries, there are more than 8 million who suffer severe maternal morbidity (WHO 2004).

There is currently no standard definition of “near miss” such as there is a maternal death because it is difficult to determine exactly at which point a woman becomes a “near miss.” Locally appropriate and acceptable definitions are

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**Month of Submission :** 09-2019  
**Month of Peer Review :** 10-2019  
**Month of Acceptance :** 11-2019  
**Month of Publishing :** 11-2019

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encouraged and have been used by various researchers. For instance, the West African “near miss” audit network used the following definition for the case review of “near miss.” “Any pregnant or recently delivered woman (within 6 weeks termination of pregnancy) in whom immediate survival is threatened and who survives due to chance or hospital care she receives.”<sup>[2]</sup>

Mantel *et al.*<sup>[1]</sup> defined a “near miss” as a patient with an acute organ system dysfunction which if not treated appropriately, could result in death.

Basket and Sternadel<sup>[3]</sup> proposed to define maternal “near miss” cases as those women requiring critical care or transfer to an intensive care unit (ICU).

In a study in Benin, a “near miss” was defined as “a severe life-threatening obstetric complication necessitating urgent medical interventions to prevent the likely death of the mother.”<sup>[4]</sup>

WHO<sup>[5]</sup> defines maternal “near miss” as a woman who nearly died but survived complications that occurred during pregnancy, childbirth, or within 42 days of termination of pregnancy.

It is estimated that 80% of complications of pregnancy and maternal death are avoidable, even in resource-poor countries. Studies including those by Kassas<sup>[6]</sup> It is estimated that 80% of complications of pregnancy and maternal death are avoidable, even in resource-poor countries. Studies including those by Kassas<sup>[6]</sup> in Egypt (1995) and Bouvier-Colle *et al.*<sup>[7]</sup> in France (2001) have shown that the quality of care provided to pregnant women is critical and that appropriate emergency obstetric care can save many lives. In the past, maternal audit using that have traditionally been used to improve maternal health outcomes.

Confidential inquiries into maternal death in the United Kingdom Malaysia and other countries have resulted in continuous improvement of maternal health in those countries (WHO, 2004; Rowe *et al.*<sup>[8]</sup> 2005). Martey *et al.*<sup>[9]</sup> in Ghana and Mbaruku and Bergstrom<sup>[10]</sup> in Tanzania reported on the use of maternal mortality review to identify avoidable factors and improve on services. In Tanzania, there was a 50% reduction in maternal mortality over 3 years of interventions following implementation of the maternal death reviews.

Over the past decade, review of near misses or severe maternal morbidity 2008,<sup>[11,12]</sup> prevalence was 3.3 using disease-specific and management-based criteria. The leading causes were hemorrhage, pregnancy-induced hypertension, and sepsis, immediate resuscitation mechanical ventilation,

laparotomy, hysterectomy, manual removal of placenta, and repositioning of inverted uterus. Blood transfusion remains the mainstay for near miss management.

Maternal near miss analysis will

- provides us information which helps in understanding patterns of maternal morbidity, use of clinical and other health-care interventions
- Used to develop culture of early identification of complications and preparedness for acute morbidities.

## Aims and Objectives

### Main objectives

The aim of the study was to determine the incidence of and describe the type of life-threatening maternal complications in pregnant and recently delivered women on admission to the Kamla Raja Hospital Obstetrical ICU.

### Specific objectives

The objectives are as follows:

1. To determine the magnitude and types of life-threatening maternal complications in pregnant and recently delivered women (“near miss” morbidity) admitted at Kamla Raja Hospital Obstetrical ICU
2. To describe the characteristics of women (demographic and pregnancy) related that have a “near miss”
3. To assess the timing and management of “near miss” morbidity
4. To determine the use of blood transfusion and major surgery in the management of “near miss” morbidity patients
5. To determine the inpatient duration of stay of patients with “near miss” morbidity.

## MATERIALS AND METHODS

The prospective cohort study was done by the Department of Obstetrics and Gynaecology, Kamla Raja Hospital, Gwalior, study period from 1 year, November 2014 to October 2015.

### Inclusion Criteria

Acute cyanosis, Gaspings, Respiratory rate >40 or <6/min, Shock, Oligouria, Clotting failure, loss of consciousness lasting >12 h, stroke, uncontrolled fit/total paralysis, and jaundice in presence of pre-eclampsia were included in the study.

### Exclusion Criteria

Morbidity resulting from causes not related to pregnancy or its complication or management, for example, malignancies, carcinoma breast, and liver rupture morbidity from accidental or incidental causes no way related to pregnancy, for example, morbidity from automobile accident/suicide

were excluded from the study. Women who develop these conditions unrelated to pregnancy.

## RESULTS

Our study used a case definition that included clinical laboratory management and interventional criteria. This yielded the proportion of near miss at 1.3% of admissions [Table 1].

Our study also yielded near miss incidence ratio as 20.7/1000 live births and maternal near miss to maternal death ratio as 3.69:1 [Table 1].

Our study shows 105 cases 66.03% belongs to a rural area with 98 cases (61.6%) being referred from nearby institutes [Table 2].

The reason may lie in fact that referral from interiors of community due to lack of proper transportation facilities can lead to severe maternal morbidity to life-threatening complications while arriving at tertiary center [Table 1]. About 66.03% cases belong to rural communities as less knowledge toward health-seeking behavior as well as low health facility in that area.

The age range of cases was from 18 to 40 years 115 cases that are 72.32% of total cases belongs to 21 to 30 years, which is the most active reproductive age group. However, younger and older are group both (13.8% of total) were markedly represented.

Our study has 97 cases (61%) to be multigravida and 62 cases (39%) to be primigravida. As would be expected, there was a close correlation between gravidity and cause of near miss. Nulliparity is an important risk factor of hypertensive disorder and responsible for most of the cases, whereas hemorrhage cases were having higher parity.

Maximum referrals are from district hospital (DH) Shivpuri ( $n = 28$ , 17.61%) followed by DH Morena ( $n = 20$ , 12.57%). This is consistent with the transportation distance between our institute and referral center [Table 2].

Two main clinical diagnoses in the near miss cases hypertensive disorders of pregnancy ( $n = 56$ ; 35.22%) and hemorrhage ( $n = 42$ ; 26.41%). Other two main causes were severe anemia ( $n = 21$ , 13%) followed by rupture uterus  $n = 16$ , 10.0.6%) [Graph 1].

## DISCUSSION

During the 1 year study period, November 2014–October 2015, 12,137 of obstetric patients were admitted in the department of obstetric and gynecology; 159 cases (1.3% of all the cases admitted) had life-threatening complications of pregnancy or the puerperium and fulfilled the case definition used in this dissertation for a near miss. These patients nearly died but survived a severe complication during pregnancy, delivery or the puerperium.

The WHO is still in the process of establishing a uniform set of identification criteria and standard definition of near miss cases at the moment it is difficult to make comparisons across studies from different regions because of the different definitions used.

Say *et al.*<sup>[13]</sup> reported in a systematic review by WHO that many near miss studies used criteria of admission to an ICU worldwide prevalence for search criteria range from 0.01% to 2.99%. In another systematic review, Wilson and Salihu<sup>[14]</sup> found that serious forms of maternal mortality occur to about 1% of women in the United State to 3% in some developing countries.

The prevalence of maternal near miss by a systematic review<sup>[15]</sup> covering nearly 4000 articles between January 2004 and December 2010 by BJOG 2004 using disease-

**Table 1: Prevalence and comparison of near miss, maternal deaths, and blood transfusion**

Months	Total no. of admissions	Live births	Total near miss cases	Maternal deaths	Blood transfusion
November 14	905	636	14	-	65
December 14	976	609	14	1	55
January 15	1080	616	12	4	40
February 15	574	553	15	1	49
March 15	746	601	11	2	37
April 15	864	538	11	1	45
May 15	963	660	10	4	35
June 15	1181	626	12	3	34
July 15	1202	710	16	7	57
August 15	1272	753	18	7	55
September 15	1182	619	14	8	40
October 15	1242	742	12	5	46
Total	12187	7663	159	43	558

specific criteria – 0.6% and 14.98%, management base criteria 0.04% and 4.5%, and organ dysfunction mantel<sup>[1]</sup> criteria 0.14 % and 0.92%.

Our study used a case definition that included clinical laboratory management and interventional criteria. This yielded the proportion of near miss at 1.3% of admissions.

Our study also yielded near miss incidence ratio as 20.7/1000 live births and maternal near miss to maternal death ratio as 3.69:1, the study conducted in tertiary care hospital, Karachi<sup>[16]</sup> from April 2010 to September 2010, have maternal near miss ratio as 76.97/1000 lives birth and near miss mortality ratio 5.8:1. Similar study in tertiary hospital of Delhi<sup>[17]</sup> in October 2008 reveals maternal near miss incidence ratio as 33/1000 live births.

It is not possible to compare proportions to the general prevalence found across other studies worldwide because

of the many differences in the terms of geographical location, population, and study methodologies used.

**Management of Near Miss Cases**

Surgical management is the mainstay for near miss cases. One hundred and fourteen cases (11.69%) managed surgically, out of which +n = 60; 37.73%) by lower segment cesarean section (LSCS) and by cesarean hysterectomy (n = 20, 12.5%). Study in tertiary hospital, Delhi<sup>[17]</sup> (October2008) revealed 54.5% cesarean section and hysterectomy rate 14.8%, whereas hysterectomy rate was 3.6% in near miss study in civil hospital Karachi<sup>[16]</sup> in September 2010.

Thirty-two cases that were 20.1% of total cases need ventilatory support which also remains one of the important inclusion criteria for our study. Almost all cases got blood transfusion either as primary management or supportive management packed red cell transfusion being life-saving in severely anemia patient and fresh frozen plasma in hypertensive disorders to prevent coagulation disorders.

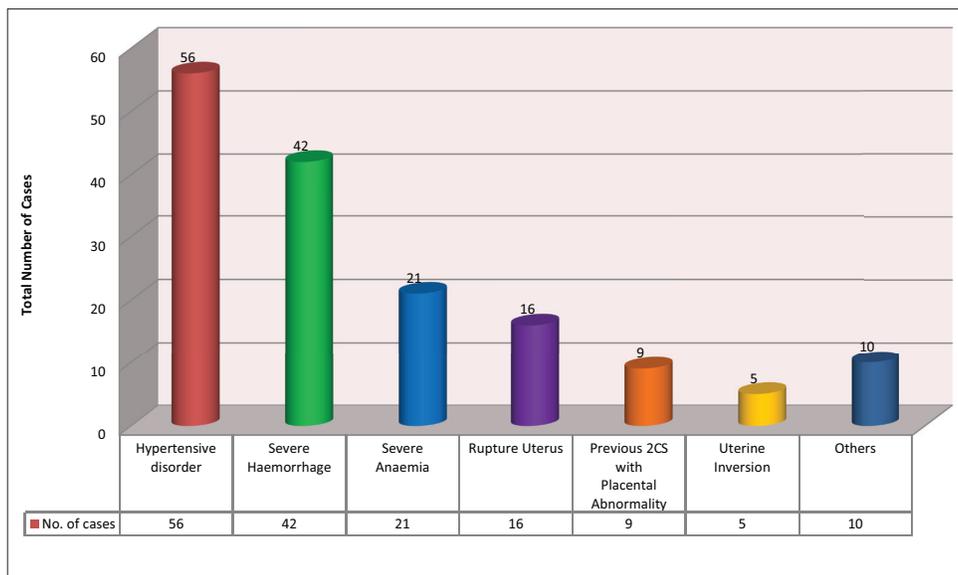
Average ICU stay of patient was 4 days (n = 54; 33.96%) and 3 days (n = 50, 11.44%) very less patient (n = 11, 6.91%) with severe life-threatening complication required 6 days ICU stay. There was no significant difference among different causes of near miss.

**Table 2: Demographic profile according to direct or referred cases**

Months	Direct cases	Referred cases
November 14	03	11
December 14	04	10
January 15	04	08
February 15	05	10
March 15	05	06
April 15	05	06
May 15	04	06
June 15	04	08
July 15	05	11
August 15	07	11
September 15	03	11
October 15	08	04
Total	57	102

**Summary**

- Total number of admission during study period 12,187 and live birth 7663. Our near miss cases were 159 the prevalence of near miss cases. Maternal near miss incidence ratio was 20.7/1000 live births



**Graph 1: Causes of near miss**

- Near miss to maternal death ratio as 3.69:1 which means out of five women with severe morbidity we are saving 4 cases
- Maximum number of near miss cases 115 was in 21–30 years, followed by equal distribution in both extremes of age group
- Maximum near miss cases that are 97 (61%) war multigravida and only 61 (39%) war primigravida
- Maximum near miss cases 105 (66.03%) belongs to rural community and only 54 (34.07%) belong to the urban community
- Referred cases were 102 to which means 66.1% of near miss were referred to our Institute from various center. Only 57 cases (33.9%) cases came directly
- Referrals 26 were from DH Shivpuri followed by DH Morena (20) and other primary health centers (14). DTH Guna and DH Bhand that is 12 and 10 cases, respectively, also contribute significantly
- Maximum cases of near miss were due to hypertensive disorder (56) followed by severe hemorrhage (42), severe anemia (21), and rupture uterus (16) also contributed significantly. Nine cases were due to previous section with placental abnormality and 5 cases due to uterine inversion. The other 10 cases were due to heart disease; lower respiratory infection perennial obstructed labor and hepatic encephalopathy
- Maximum number of near miss cases that is 37 in whom continuous vasoactive drugs are given and 31 cases required ventilatory support 24 cases required transfusion >5 units of red blood cell and hysterectomy done following hemorrhage in 20 cases
- LSCS as surgical management in 60 cases (37.73%) followed by hysterectomy in 20 cases (12.5%). Laparotomy for rupture uterus was done in 16 (9.43%) cases and for ectopic pregnancy in 6 cases (3.7%) other management include laparotomy for uterine inversion (4), intrauterine packing (4), and hematoma drainage (1). D and C (1), internal iliac artery ligation (1) uterine reposition followed by vaginal packing (1) and manual removal of placenta (1)
- Only 32 cases that that is 20.1% require ventilatory support
- Total 368 packed cell red blood cells and 190 other blood components transfused all 159 near miss cases. Almost all cases require blood transfusion
- Maximum number of patients 54 (33.9%) have 4 days ICU stay followed by 50 cases (31.44%) having 3 days ICU stay and maximum stay was of 6 days in 11 cases.

## CONCLUSION

This study has shown that near miss cases constituent some 1.3% of life-threatening complications at KRH, Obstetrical

ICU, Gwalior, which despite different case definitions is consistent with other studies in developing and developed countries.

Eclampsia, hemorrhage rupture uterus still remains main cause for severe acute maternal morbidity and ultimately maternal death. As in present study, 98.77% near miss cases were diagnosed at admission and already had these complications because of inability to reach to facility on time, further strengthening of antenatal care services at peripheral level and robust referral system through better availability of transport facilities is needed to reaching higher level facility on time.

I hereby conclude that due to the presence of Obstetrical ICU at KRH and immediate active intervention the maternal mortality rate (MMR) has been reduced from 868/lakh live births in 2012–2013 to 694/per lakh live birth in 2013–2014 to 561/lakh in our study period (2014 to 2015).

Still, it needs improvement, which can be achieved by ongoing training and stimulation sessions for obstetrical staff in early recognition and management of severe obstetric morbidity and also by resource allocation that is required in the management of the near miss cases.

## Study Limitations

Our study was carried out in a single unit (KRH, Obstetrics and Gynaecology Department) in 1 year duration period. The results cannot be applied to general population due to variations in geographical location and population awareness.

The patients were only followed up to discharge from the obstetric ICU. Following up patients for a longer period would determine whether they survived the puerperium, developed Sheehan's syndrome and about their quality of life, mensurational abnormality. However, this would have required the community to follow-up.

Data, as was obtained for near miss cases, were not obtained from all those died as the intent was not to study maternal mortality. However, if it had been collected, it would have allowed for a detailed comparison and identification of risk factors in cases of life-threatening complications leading to survival (near miss) as a pose to death (maternal mortality).

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**How to cite this article:** Gupta M, Sharma P. Clinical Study of Maternal Near Miss. *Int J Sci Stud* 2019;7(8):25-30.

**Source of Support:** Nil, **Conflict of Interest:** None declared.