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MATERNAL NEAR-MISS MORBIDITY AND MORTALITY — A CONTINUUM

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ABSTRACT

Objective: To determine the frequency and nature of maternal near-miss cases and to comparatively analyse near miss morbidities and maternal deaths in pregnant women.

Material and Methods: This descriptive study was conducted in Gynae A Unit, Khyber Teaching Hospital Peshawar from January 2012 to December 2013. Cases of maternal near miss morbidities were identified from records of women presenting with potentially life threatening complications in pregnancy. Maternal mortality during the same period was also analysed.

Results: A total of 71 women were identified as cases of maternal near-miss (MNM) with a frequency of 1.05%. Maternal deaths were 20 with MMR (Maternal Mortality Ratio) of 283/100,000 live births and MNM to MMR ratio of 3.5:1. Causes were obstetrical haemorrhage in 23(32.39%), Hypertensive disorders of pregnancy in 21 (29.58%), Dystocia in 13(18.315), sepsis and Cardiac diseases in 7(9.86%) and 4(5.63%) cases of near miss while severe aneamia unrelated to haemorrhage in 3(4.23%)cases of MNM. Of the 20 maternal deaths 8(40%) were due to haemorrhage, 4(20%) hypertension, 1(5%) dystocia, 4(20%) Sepsis, 2(10%) cardiac diseases in pregnancy. Mortality index (MI) for sepsis and cardiac disease were highest, 36.36% and 33.33% respectively. MI for haemorrhage was 25.81% and hypertension 16%. Forty two (59.15%) cases required intensive care unit admission with 22 (30.98%) requiring more than 3 units blood and component transfusion and 12 (16.90)% ventilator support. Surgical intervention in the form of emergency hysterectomy was done in 22 (30.98%) cases and 23 cases had different organ system failures.

Conclusions: Obstetrical haemorrhage, hypertensieve disorders, dystocia and sepsis are the leading causes of MNM. The underlying causes for severe morbidity and mortalities were almost the same, therefore evaluation of the circumstances surrounding MNM could lead to improvement in the care and reduction in maternal mortality.

Key Words: Maternal, Near-Miss, morbidity, maternal, mortality.

INTRODUCTION

Maternal mortality has traditionally been the indicator of maternal health and quality of obstetric care.[1] A 75% reduction in the maternal mortality by 2015 is one of the Millenium Development Goals (MDGs) but the goal to improve maternal health is falling way below our target.[2] The WHO (World Health Organization) estimated that in year 2000, 20 million women suffered acute complication in pregnancy and 529,000 maternal deaths[3,4].

Pregnant women's health status is not reflected by mortality indicators alone. Recently review of cases at the very severe end of maternal morbidity spectrum, described as 'Near Miss', or 'Severe acute maternal morbidity', has been found to be a useful complement to investigate maternal mortality.[5,6]

Near-Miss has been extensively used to evaluate the quality of obstetric care in an institute. The concept is superior to drawing attention to surviving women's reproductive health and provides superior information about the burden of disease and high lights the deficiencies as well as the positive elements in provision of obstetrics services in any heath system, is equally applicable in developing as well as developed countries.[3,5,6] There is limited experience with the use of near-miss reviews as a tool for monitoring quality of maternity services in developing countries probably due to high level of maternal mortality that has over shadowed other severe obstetric complications. Near-Miss cases occur more often than maternal deaths and generate more comprehensive and statistically reliable quantitative analysis for clinical audits and can be rapidly conducted.[7,8,9]

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Till recently there were no set criteria for identification of these cases. In 2009, WHO came up with clinical, laboratory and management criteria for identification of theses cases. Maternal Near-Miss case is defined as, 'a woman who nearly died but survived a complication that occurred during pregnancy, child birth, or within 42 days of termination of pregnancy'.[10] 'Near-Miss events are defined as acute obstetric complication that immediately threaten a woman's survival but do not result in her death either by chance or because of good hospital care she receives during pregnancy or labour or 6 weeks afterwards.[7,11] The sequence from good health to death in a pregnant woman is a clinical insult followed by a systemic inflammatory response, organ failure and finally death. By viewing pregnancy and its potential outcome as a continuum, beginning at normal pregnancy and concluding with maternal death, the number which can be studies meaningfully can be increased by examining the group of outcome closet to death.[12]

This study was conducted to determine the frequency of near-miss cases, their causes and to compare the causes of Near-Miss cases to that of maternal mortality in our setup.

MATERIAL AND METHODS

Study was conducted at the obstetrical and Gynaecology Unit-A at Khyber Teaching Hospital, Peshawar. Our hospital provides health care to local community as well as serves as a major referral centre for public and private hospitals with in the province and also patients are received in emergency from the farflung tribal areas and neighboring country Afghanistan. The maternal Near-Miss cases were identified retrospectively from January 2012 to December 2013, from the case records. For identifying Near-Miss events and cases, the disease specific criteria by Filippi was employed. These are: haemorrhage-leading to shock, emergency hysterectomy, coagulation defects and or blood transfusions of > 2 liters, Hypertensive disorders to pregnancy- eclampsia, severe pre-eclampsia with clinical/laboratory indication for termination of pregnancy to save life; Dystocia – uterine rupture and inpending rupture e.g. prolong obstructed labour and or with a previous cesarean section; Infection-hyperthermia or hypothermia or clear source of infection and clinical signs of septic shock; and Anemia- hemoglobin <6gm% or clinical signs of severe aneamia without severe haemorehage.

Life threatening obstetric conditions refer to those maternal complications severe enough to cause Near-Miss morbidity and maternal death. Potentially life threatening conditions were identified and those with WHO criteria for Near-Miss cases were selected. Maternal mortality during the same period was also analysed.

Patients characteristics including age, parity, gestational age, booking status, mode of delivery, nature of obstetrical complications, ICU admission and stay, surgical intervention to save mothers life, presence of organ system dysfunction / failure, blood and component transfusions and any other intervention were considered. Patients were categorized by final diagnosis, with respect to haemorrhage, hypertension, dystocia, sepsis, aneamia, cardiac disease and other medical disorders contributing to material near-miss and deaths.

The descriptive analysis of the collected data was done and results were given as percentages, the frequency of near miss cases and indices calculated, 1-MNM ratio – number of maternal near miss cases per 1000 live births (LB). 2 MNM: mortality ratio as proportion of maternal near miss and maternal deaths. Higher ratios indicate better care, and 3 – Mortality index, and indices were determined for various disease process to appreciate care provided for life threatening conditions. (Mortality index (MI) – no of material deaths (MD) divided by the number of women with life threatening obstetric condition (LTOC =MNM+MD) expressed as percentages (MI=MD/MNM+MD)x100]. The higher the index is, more women with LTOC die.

RESULTS

There were a total of 7406 deliveries and 7064 live births during the study period. Seventy one women were indentified as near miss cases by using the selected criteria. The frequency of maternal near miss (MNM) in this study was 0.96%. Twenty maternal deaths occurred during this period resulting in MMR (material mortality

Table 1: Frequency of Maternal near miss, maternal deaths, MMR & MNM to Mortality ratio

Year 2012 AND 2013	
Total Deliveries	7406
Total no of live births	7064
Near miss cases	71 (0.96%)
On arrival	56 (78.87%)
During Hospitalization	15 (21.13%)
MNM ratio	10.05/1000 live birth
Maternal Deaths	20
MMR	283/100,000 live births
MNM to maternal death ratio	3.5:1

MNM – maternal near miss
MMR-maternal mortality ratio

Table 2: Characteristics of Maternal near-miss cases (n=71)

Charactistics	No. of patients & percentage
Age: < 20 years	4(5.63%)
20-29 years	18(25.35%)
30-39 years	36(50.70%)
> 39 years	13(18.31%)
Party:	
Primigravida	15(21.13%)
Multigravida	33(46.47%)
Grand Multi	23(32.40%)
Gestational Age (Weeks)	
< 12 weeks	0(0%)
13-28	4(5.63%)
29-37	26(36.62%)
> 37	36(50.70%)
Post Natal	5(9.04%)
Unbooked cases	56(78.87%)
Causes of near-miss	
Haemorrhage	23(32.39%)
Hypertension	21(29.58%)
Dystocia	13(18.31%)
Sepsis	7(9.86%)
Cardiac disease	4(5.63%)
Aneamia	3(4.23%)

Table 3: Frequency of different factors in MNM cases

Factors	Total No. of patients & percentage
I.C.U Admissions	42(59.15%)
Transfusion ≥ 3 units	22(30.98%)
Blood component transfusion	18(25.35%)
Extended intubation	6(8.45%)
Ventilator support	12(16.90%)
Use of vasoactive drugs	12(16.90%)
Surgical intervention	22(30.38%)
Dialysis for ARF	5(7.04%)
Organ system Failure	23(32.39%)
i) Renal	5 (Sepsis 2, PPH.3)
ii) Cardiac (Pul.oedema)	5 (Eclampsia-1, Postop. Cases 2, Aneamia 1, Cardiac Dis. 1)
iii) Coagulation system	10 (APH-4, PPH-3, HELLP-3).
iv) Hepatic	1 (HELLP)
v) Cerebral	2 (eclampsia 1, Puerperal sepsis 1)

ratio) of 283 per 100,000 line births. The MNM incidence ratio was 10.5 and MNM to maternal death ratio 3.5:1 as shown in Table 1. Table 2 shows the age parity and other characteristics of near-miss cases. Majority (50.70%) were in age group 30-39 years and only 4 (5.63%) were aged less than 20 years. Primigravidae were 15(21.18%) whereas the rest were multi. or grandmultigravidae, and majority were in third trimester while only 5 (9.04%) were postnatal. Fifty six (78.87%) were in a critical condition on arrival.

A total of 983 patients were identified with potentially life threatening conditions, 373 with near miss events, of there 71 cases were identified as maternal near-miss. Haemorrhage was the leading cause of near-miss in 23 (32.39%) patients, mainly due to placental abruption in 13 cases and postpartum haemorrhage (PPH) in 8, while 2 case in early pregnancy were due to H.mole and ectopic pregnancy. Hypertensive disorders were the cause for near miss in 21 (29.57%) cases. Eclampsia in 11, severe-pre-eclamptic toxemia (PET) in 5 and another 5 developed HELLP syndrome. Dystocia was the third leading cause with 13 (18.30%) cases, 9 with ruptured uterus, (3 of them with previous c/s), and 4 with obstructed labour. Sepsis in 7 (9.86%) of these 3 had prolonged rupture of membranes, IUD and chorioammiounites, 2 with neglected transverse lie for more than 24 hours and 2 with puerperal sepsis and infected retained products. Indirect cause like cardiac disease lead to 4 (5.63%) of near miss cases, 2 patients with peripartum cardiomyopathy and with severe mirtal stenosis and aortic regurgitation. Severe aneamia not due to haemorrhage in 3 (4.22%) cases and of these one had aplastic aneamia.

Frequency of different factors in MNM cases are shown in Table 3. The disease profile of near miss morbidities was compared with that of mortality as shown in Table 4.

DISCUSSION

In the present study the prevalence of near-miss maternal morbidity was 10.05 per 1000 live births (1.05%). Other studies have reported a prevalence of 2.3% and 5.3% respectively.[1,7] Range of prevalence of MNM cases varied between 0.4% - 8% in a systemic review of maternal morbidity and mortality by WHO.[1] Depending on the set of criteria used maternal morbidity ratio ranged between 15 and 42 cases per 1000 deliveries in literature.[4] The disparity in prevalence of near-miss cases is possibly due to difference in definition and identification of cases. The WHO criteria is most specific and least vulnerable to bias and is used in developed countries. We adopted a tested case definition that best fits our environment to allow local improvement

Table 4: Nature of near miss cases, maternal death and mortality index

Compilictions	MNM n (%)	Maternal death n (%)	LTOC n (%)	MI n (%)
Haemorrhage	23(32.39)	8 (40%)	31(34.07)	25.81
Early pregnancy				
H.Mole	2	1		
Ectopic pregnancy	1	—		
Late pregnancy				
APH	13	2		
PPH	8	5		
Hypertension	21(29.57)	4 (20%)	25(27.47)	16
Eclampsia	11	1		
Severe PET	5	1		
HELLP	5	2		
Dystocia	13(18.30)	1 (5%)	14(15.38)	7.14
Uterine Rupture	9	—		
Impending rupture	4	1		
Sepsis/Infection	7(9.86)	4(20%)	11(12.09)	36.36
Cardiac Disease	4(5.63)	2(10%)	6(6.60)	33.33
Aneamia	3(4.22)	—	3(3.30)	0
Embolism	1(5%)	1(1.09)	1	100
Total	71	20	91	

H.mole- Hydatidiform mole. APH-antipartum haemorrhage, MI-mortality index
PPH- Postpartum haemorrhage, PET – preeclamptic toxeurria, LTOC-life threatening Obstetrics condition
HEELP. Hemolysis, elevated liver enzynes, low platelet syndeome.

in services and comparison. The WHO based criteria, not all factors identification were applicable in this rereospective study, specifically the laboratory based. Only oxygen saturation and platelet count records were available in some, while PaO2, PH, lactate and ketetoacids were not done, while management criteria was applicable. To rely simply on ICU admissions would have heavily under estimated severe morbidity as also specified in other studies.[3]

Our study showed that severe maternal morbidity occurs in a considerable percentage of women as 13.2% had potential life threatening complications. The near-miss to maternal death ratio in this study was 3.5:1 while another studies have reported it as 5:1 and 7:1.[5,7]. It is much higher than that of developed countries.[14] Majority of patients were unbooked (77.4%) and arrived at hospital in critical condition reflecting that community is still unaware of complication of pregnancy. Many other studies also report low antenatal booking in near-miss case.[6,7] In this study obstetrical haemorrhage was the leading cause with great potential for near-miss and mortality in 32.39% and 40% cases respectively. APH due to abruption was the major cause for near miss while PPH lead to 8 cases of near miss but responsible for 5/8 cases of maternal mortality. Another local study also shows haemorrhage to be responsible for 51% cases of near-miss and PPH being the major cause of maternal mortality. Other researchers have also reported haemorrhagic complications leading to near-miss and death accounting for 39.5% and 40% case and PPH due to uterine atony in 8 /17 cases.

Hypertensive disorders of pregnancy were the other major cause of severe maternal morbidity responsible for 21 (29.57%) cases of near-miss and eclampsia being the predominant determinant of morbidity. Hypertensive disorders were responsible for 20% (4 cases) of maternal deaths mainly due to HELLP syndrome and eclampsia. Studies from developed countries report pre-eclampsia, PPH and sepsis being major cause of near-miss and show similar trends.[1,5,15] Other studies also reported a high prevalence of eclampsia in 25.2% cases and found it as the most often cause of maternal death.[2,4] In a comparative study of near-miss and maternal deaths, obstetrical haemorrhage and hypertension were the leading causes of severe maternal outcomes.[15,17] Dystocia leading to uterine repture

or impending rupture was the third common cause of near-miss in 13 (18.30%) cases. Uterine rupture is a serious obstetric complication with high morbidity and mortality in less developed countries, and 75% cases of rupture are associated with obstructed labour, and previous cesarean section.[7,13] Efforts to reduce morbidity and mortality from uterine rupture should focus on reducing primary cesarean section rate and optimizing care for women with previous C/S.[19] In our set up 70-80% deliveries still take place at home by traditional birth attendents and majority of near-miss and maternal death were unbooked, thus awareness for early referral is of utmost importance. Uterine rupture was responsible for more than half the cases of emergency peripartum hysterectomy. Studies have reported an increasing rate of peripartum hysterectomies for haemorrhage, rupture, placental retension and atony from developed countries.[20] However in another study analysing women for whom morbidity was associated with progress to PLTC, near-miss or death, cesarean section was a statistically protective factor i.e, interrupting a high risk pregnancy by cesarean was used in 86% of cases.[2]

The near-miss cases resulting from infection / sepsis (due to obstetric causes) were 7 (9.86%) while it was the cause in 4 (20%) cases of maternal deaths. Sepsis has been the leading cause of death but uncommon association for near-miss in 0.9 / 1000 live births which is well above developed countries rate of 0.2 / 1000 line births.[3,21] The near-miss to maternal death ratio for infection has been reported 4.5:1 and mortality index 18%.[2] In our study the near-miss to maternal death ratio for infection was 7:4 and the mortality index was 36.36%. Mortality index was also high for cardiac disease in pregnancy i.e, 33.33% while it was responsible for 5.63% (4 cases) of near-miss.

The maternal mortality ratio in this study was 283/100,000 livebirths. Other studies from developing countries have reported MMR as 260,313, 423 and 324 / 100,000 live birth.[20,21,22]

CONCLUSION

Evaluation of the circumstances surrounding near-miss cases could lead to improvement in care and reduction in mortality. Efforts towards prevention of occurrence and improving the management of near-miss morbidities would definitely go a long way in reducing maternal mortality.

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