Original Article

Maternal near miss events at a tertiary care center

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Objective: To study the types and frequency of maternal near miss event cases at a tertiary care center.

Methodology: This descriptive study was conducted at Combined Military Hospital, Sialkot which is a tertiary care set up. Patients undergoing a major morbidity or mortality event from 1st December 2016 to 31st October 2017 fulfilling the WHO severity criteria were included in the study. Cases were identified based on laboratory findings, clinical assessments, or management procedures. Frequencies and types of near misses were noted, and the data were used to calculate maternal mortality ratio, maternal near miss incidence ratio per 1000 live births, maternal near miss to mortality ratio and mortality index.

Results: Total patients attended at the outpatient during study period were 25900. There were 3372 deliveries and 3360 live births; 64 patients fitted the WHO severity criteria. Patients surviving a major morbidity event were 54. Morbidly adherent placentation accounted for 25.92%. Deaths were 8 during due to eclampsia followed by hemorrhage. The maternal mortality ratio and near miss incidence ratio per 100,000 live births was 238 and16.07, respectively. Maternal near miss to mortality ratio came out as 6.75: 1. Mortality index was 12.90.

Conclusion: Eclampsia and hemorrhage remain the main cause of morbidity and mortality. Documentation, registrations of maternal mortalities and audits of near miss events must be made mandatory for all medical facilities, as analyzing them can overcome their shortcomings and raise its standard of care by learning from the deficiencies. (Rawal Med J 202;45:677-681).

Keywords: Maternal mortality, maternal near miss, eclampsia.

INTRODUCTION

As you read this article, women will be dying in many areas of Pakistan due to pregnancy and birth-related complications which are preventable. Maternal death is a rare occurrence, but its impact is huge. Measuring it becomes difficult as most low-income countries like Pakistan have no or little data for national estimates. Fewer than 40% of nations have a proper system of registration or data collection for maternal deaths. The most effective way to identify causes of maternal mortality is the Reproductive Age Mortality Studies (RAMOS), which utilizes records of health facilities, death in a community and data from census.

The indicator of improvement of maternal health as per the fifth Millennium Development Goal was maternal mortality ratio and rate which dropped by 43.9% between 1990 to 2015 from 385 to 216 and not 75% as was hoped. WHO wants the maternal mortality rate (MMR) to be less than 140/100,000 live births for all countries and lowering it further to 70/100,000 by 2030. Pakistan has a maternal mortality of 178/100,000 live births and it recorded a 4.4% reduction annually between 1990-2015. It is ranked 53 among 181 countries with respect to its higher MMR ahead of Burma, Bangladesh and India. MMR can be reduced by ensuring presence of skilled health personnel during childbirth. However, the paucity of funds in low resource setups can overburden the health facilities and its poor standard still puts the patient and her baby's life at risk.

Near misses events are utilized to assess the quality of health care, as they are frequent enough to be easily studied but not so frequent as to overwhelm the care givers. Secondly, surviving a near-miss helps in reviewing the shortfalls, challenges and priorities of a health facility. WHO defines maternal near-miss as "a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy." [9] It established a criterion in 2008 (Table 1) for pregnant women with life-threatening conditions including multi-organ failure that was lacking in the SOFA score.[7] Clinical signs, laboratory tests, management interventions

not performed as a routine during pregnancy or postpartum are used as indicators. The aim of this study was to review types and frequency of maternal near miss event cases at our tertiary care center.

METHODOLOGY

This descriptive study was conducted at CMH Sialkot, Pakistan which is a 650 bedded military referral hospital with facilities of intensive care management. Between 1st December 2016 and 31st October 2017, 62 women admitted at CMH Sialkot in a serious condition having severity markers in accordance with the WHO criteria (Table 1) were included in the study. The presence of at least one of the criteria in a woman who had a major morbid episode and survived was labeled as a near miss.[12] Patients who died immediately after reaching the facility were also included. Those who had an uneventful stay and parturitions were excluded. Consent was taken from the patient or their next of kin where applicable and approval was obtained from the hospital ethical committee.

A detailed history was taken, and thorough general physical and gynecological examination was performed. Radiological studies like ultrasound, CT scans and MRI were done and culture studies were done to rule out bacteriological pathologies. A multidisciplinary approach was used where relevant. Sample size was calculated with 95% confidence interval, 5% margin of error, using WHO formula $n = \frac{(1.96)^2 * (p)(1-p)}{(0.05)^2}$.

Statistical Analysis: Statistical analysis on the sample size was done using SPSS version 22. Mode, mean and percentages were calculated.

RESULTS

The total number of patients attended during the study period in the out-patient department were 25900. The number of deliveries were 3,372 and live births 3,360. Out of 64 cases which fitted the WHO severity index, maternal near miss cases were 54, with 25.92% cases due to morbidly adherent placentation followed by eclampsia in 16.66% and post-partum hemorrhage (PPH) in 14.81%. There were 8 maternal deaths during this time. Eclampsia was the main reason of maternal death (37.5%) and PPH was responsible for two (25%) deaths. Clinically diagnosed patients were 39 (62.90%), management based 17 (27.41%) and biochemical six (9.67%).

Table 1. The WHO indicators for maternal near-miss assessments.[12]

	Group 1	Group 2 (SOFA score 3,4)
Respiratory dysfunction	Acute cyanosis Respiratory Rate >40 or < 6/min Oxygen Saturation<90%for ≥60 min	Gasping PaO^2/FiO^2<200mmHg Intubation and ventilation not related to anesthesia
Cardiovascular dysfunction	Shock Lactate >5	pH < 7.1 use of continuous vasoactive drugs Cardiac Arrest Cardiopulmonary resuscitation (CPR)
Coagulation/Hematologic dysfunction	Coagulation failure Transfusion > 5 units blood/red cells	Acute thrombocytopenia. (Platelets <50.000)
Renal dysfunction	Oliguria not responsive to fluids/diuretics	Creatinine ≥ 300mmol/l or ≥ 3.5mg/dl Dialysis for acute renal failure
Neurological Dysfunction	Metabolic Coma (loss of consciousness, presence of glucose, ketoacids in urine) Stroke Status epilepticus/uncontrolled fits/ total paralysis	Coma/ loss of consciousness lasting 12 hours or more
Uterine Dysfunction	Hysterectomy due to hemorrhage or infection	
Hepatic Dysfunction	Jaundice due to pre-eclampsia	Bilirubin> 100mmol or > 6mg/dl

Table 2. General characteristics of study population (n=62).

Variable	Number	Percentage
Age range	19-41	28yrs
Primipara	11	17.74
Multipara	51	82.25
Booked	17	27.41
Un booked	45	72.58

Table 3. Causes of maternal mortality (n=8).

Cause	Number	Percentage
Eclampsia	3	37.5
PPH	2	25
Septicemia	1	12.5
Embolism	1	12.5
Brought in dead	1	12.5

Table 4. Cause of maternal near misses (n=54).

Diagnosis	Number	Percentage
Eclampsia	9	16.66
PPH	8	14.81
Uterine rupture	6	11.11
Morbidly adherent placenta	14	25.92
Uterine inversion	2	3.70
Ectopic pregnancy	2	3.70
Gut injury	4	7.40
Abdominal pregnancy	1	1.85
Placental abruption	4	7.40
Uterine perforation	1	1.85
Septicemia	2	3.70
Anaphylactic reaction	1	1.85

The maternal mortality ratio was calculated per 100,000 live births, which was 238. Maternal near miss incidence ratio per 1,000 live births was 16.07. With these statistics, our maternal near miss to mortality ratio was 6.75 :1. Mortality index was calculated as 12.90. Tables 2, 3 and 4 respectively show the general characteristics, the causes of 8 maternal deaths during the study period and the reasons of severe acute maternal morbidity.

DISCUSSION

The near miss to mortality ratio is an indicator of the standard of care. Our study had a ratio of 6.75 :1 which is comparable to that quoted by Shaheen and Begum. It has been quoted as 5.6 :1 and 7:1 in studies in India and by Mustafa and Hashmi.[7] Ansari et al had a ratio of 10:1.

A delay in referral to tertiary care was the main cause of increased morbidity and deaths, as in another study.[17] Eclampsia followed by PPH was the leading causes of maternal morbidity in our as well as other setups. Most patients were unbooked, brought postpartum with a considerable delay and irreversible damage, as 72.58% of our cases were unbooked as compared to 86% in a local study.[18] Hypertensive complications in a booked case had a better outcome as compared to unbooked cases.

The bulk of near misses due to excessive hemorrhage requiring major transfusions were due to morbidly adherent placentation (25.92%). Some were diagnosed intra-operatively and referred in a moribund state. It is difficult to comprehend how a low-lying placenta can be missed in this age of high-resolution ultrasound machines.

The figures of resource poor setups differ from those of developed countries. Pattison et al reported sepsis unrelated to pregnancy as a leading cause of death (26.6%) followed by complication of hypertension (23.4%). Maternal mortality has remained unchanged from 2012 to 2017 as 9.16/ 100,000 in UK. Deaths due to preeclampsia and eclampsia are low while hemorrhage due to morbid placental implantation have increased slightly. Leading cause of direct deaths is thromboembolism whereas cardiac disease is the main reason for indirect deaths. Sepsis and mental health are also of significance with suicide as the second largest cause of direct maternal deaths during the first 6 weeks.

Causes of near miss events differ from those of mortality. Women less educated, primiparas, previous cesarean section scars and hypertensive disorders are major cause of morbidity.[20] Infections, induced abortions and noncommunicable diseases also contribute.[3] Unregistered private setups lacking basic facilities of intensive care and qualified personnel are also responsible for failing to timely refer the patients to tertiary care. Social and financial issues cannot be ignored as well.

Reviewing the causes and carrying out audits will improve the standard of care. As a developing

nation, we must work harder to achieve the goals set by WHO by 2030. Investing in education and research, making strategies, policies, and funds for provision of skilled personnel is necessary. Meeting the contraceptive requirement is also essential as maternal deaths can be reduced by 29% through this means alone.[3]

CONCLUSION

Eclampsia and post-partum hemorrhage remain the main cause of maternal morbidity and mortality. Documentation and registrations of maternal mortalities, audits of near miss events must be made mandatory for all medical facilities if mortality is to be reduced. The aim should be to train and improve the skills of care providers along with educating them about the importance of timely referral where required.

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