ANALYSIS OF MATERNAL NEAR MISS CASES IN A MAIN MATERNITY HOSPITAL IN BAGHDAD

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ABSTRACT

Background: Maternal near miss refers to a woman who almost died as a result of pregnancy-related complications (life-threatening condition). World Health Organization (WHO) developed a new system based on organ system dysfunction, which is embodied in clinical, laboratory, and management-based criteria used to identify MNM.

Objective: To find out the determinants of MNM and the possible associated factors in a main Maternity Teaching Hospital in Baghdad.

Methods: A descriptive cross sectional study with analytic elements, conducted from first of January to the end of December, 2020, in Al Elwiyah Maternity Teaching Hospital which is a main maternity hospital in Baghdad. The data was collected through hospital based record reviews of all patients admitted during the study period. A modified questionnaire based on the WHO structured data collection form had been adopted for identification of MNM women.

Results: During this study, 166 were recognized as SMO, out of these, 161 were MNM cases and remaining five cases were dead. Obstetric hemorrhage was the major MNM morbidities 80.1%, then hypertensive disorder 34.2%, ruptured uterus 15.5%. Hematological/coagulation system was the commonest organ dysfunction 91.2%.

Conclusion: Work should be continued to educate women and health care providers about common predictors of MNM such as history of previous cesarean section (C/S) and preexisting chronic illnesses, decrease the percentage of unnecessary C/S.

Key wards: Maternal near miss, determinants.

I. INTRODUCTION:

Maternal near miss (MNM) is a critical life-threatening obstetric condition that requires immediate medical interventions and can result in death if treatment is not started promptly. (1)

Over 800 women are dying each day from complications in pregnancy and childbirth, and for every woman who dies, approximately 20 others suffer serious injuries, infections or disabilities. There is a slow improvement toward achieving the target of a maternal mortality ratio (MMR) of less than 70 per 100,000 live births by 2030 (2). Almost 7000 newborns die and more than 7000 babies are stillborn. The vast majority of these deaths occur in low- and middle-income countries (LMICs). (3,4)

Nearly 75% of maternal deaths are due to preventable causes, including severe hemorrhage, pre-eclampsia/eclampsia, infection, complications during delivery, and unsafe abortions. (5)

Most of MNM causes are similar to those of maternal death because it has the same circumstances and pathological pathways as maternal mortality but differs in that, it has higher prevalence than maternal death. (6)
Near miss is a multifactorial condition which is caused by socioeconomic, health event, skill of health care providers, and sub-standardized services (7).

Ngoma-Hazemba et al, 2019, (8) reported that low socioeconomic status, unemployment, high parity, and previous caesarean section are predictors of maternal near misses.

Near misses occur more often than maternal deaths, making them a more accurate predictor. Quantitative review of near-miss incidents gives a more complete picture of health-care system performance. (9) It can provide valuable information on identifying delays, failures, and successes in the treatment of pregnant or postpartum women (10).

II. METHODS:

Study design and setting:

A descriptive cross sectional study with analytic elements (hospital based records review).

Records of all woman admitted to obstetrical wards in Al –Elwiyah Maternal Teaching Hospital (main obstetric hospital review in Baghdad) for the period from the 1st of Jan to the end of Dec, 2020, and met WHO identification criteria. (11)

The purposive selection of this hospital was based on its characteristics as large referral teaching hospital in the public sector with qualified health professional and high case load.

The Al – Elwiyah Maternity Teaching Hospital lies in Al Rusafa side in Baghdad. It serves about (1000000 – 1250000) women in Baghdad as well as districts and provinces around Baghdad. It offers primary antenatal health care services, outpatient clinic for 24 hrs./ 7 days a week services, ICU services, RCU and NICU, and in addition to blood transfusion services (blood bank). (12)

Data collection:

The data collection period lasted four months, starting from November the 1st, 2020, to February 28th, 2021, six days a week, during official working hours. A modified questionnaire was used, which was based on the WHO structured data collection form. Other obstetrical conditions were added to potentially life-threatening conditions such as problems of ectopic pregnancy, complications of abruptio placentae, placenta Previa, and other complications linked with SMO. WHO suggested a set of 25 criteria focused on the presence of organ and system dysfunctions (cardiovascular, respiratory, renal, coagulation /hematological dysfunction, hepatic, neurologic, and uterine dysfunctions) via clinical, laboratory and management – based parameters for identification of MNM (11).

Records review from the statistical unit of all admissions to labour or delivery wards, postpartum (who delivered or aborted within 42 days postpartum and suffer from severe maternal complications or life-threatening condition (organ dysfunction), and admissions to ICU. In addition to that, all maternal deaths records during 2020 was also revised. The data which was obtained from patient’s records were double checked with information documented in the admission wards, delivery wards, I.C.U. and blood bank, in addition to the daily morning meeting reports.

The collected data included information about Socio-demographic characteristics, current and past obstetrical characteristics, pregnancy outcome, time of beginning of MNM event, time of hospital admission. Severe complication affecting MNM women (PLTC) included PPH, APH, pre-eclampsia/ HELLP syndrome, eclampsia, severe complication of (abortion, ectopic pregnancy, placenta previa, abnormal placentation) and ruptured uterus. Contributory factors and critical interventions, organ dysfunction involvement and the use of process indicators.

Maternal death (death during pregnancy, labour or within 42 days of termination of pregnancy) were also included in this study.

Data analysis was done by using the available statistical package of SPSS – 27 (Statistical Packages for Social Sciences- version 27).
Data was presented using tables and graphs. Simple frequency, percentages, mean, and standard deviation measurements were used to present the data. The Chi-squared test of association was utilized in this study. Statistical significance was defined as a P-value of less than (0.050).

III. RESULTS:

In the current study, total admission during the study period was 22089, the entire number of all deliveries were 21360, of these, lived births was 16762. Potentially life threatening conditions were 271, in which MNM cases accounted for 161 and five cases were dead. It was found that MNMR (9.61/1000 Lbs.), maternal near miss mortality ratio was (32.2: 1) and mortality index was (3%), while MMR (29.83/100 000 Lbs.)

A total of 161 MN misses, (88.8%) of cases accounted for (20-39y) age groups with mean age (30.1± 6.3) range (15-44 years), majority 91.9% were housewives and 57% resided in urban areas. Concerning the level of education, nothing was mentioned in patient’s medical record.

About half of the cases 48.4% had 2-4 pregnancies with mean gravida was (4.4 ± 2.6) range (1-13), The mean parity noticed in this study was (3.5 ± 1.9) range (0-10). About two- thirds of near miss cases (66.5 %) were among women had (1-4) parities. Concerning birth interval prior current pregnancy, the result demonstrated (23%) of cases were between (3 - ≥ 4) years interval.

Significant association was detected between age of the mothers (< 20 years) and severe PPH. While severe pre-eclampsia was significantly associated with primiparous patients, presence of previous medical and surgical problems and previous cesarean section. (Table 1,2,3)

<table>
<thead>
<tr>
<th>Table 1: Association of severe postpartum hemorrhage with maternal age.</th>
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<tbody>
<tr>
<td>Age years</td>
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<tr>
<td></td>
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<tr>
<td>&lt;20 years</td>
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<tr>
<td>20-39</td>
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<tr>
<td>&gt;=40 years</td>
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*Significant Chi-square test at 0.05 level

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<thead>
<tr>
<th>Table 2: Association of severe pre-eclampsia with gravida, parity and previous surgical and medical problem.</th>
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<tr>
<td>Gravida</td>
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<tr>
<td></td>
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<tr>
<td>Gravida 1</td>
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<tr>
<td>Gravida 2-4</td>
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<tr>
<td>Gravida 5 &amp; more</td>
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<tr>
<td>Parity</td>
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<tr>
<td>Primi</td>
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<tr>
<td>1-4</td>
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<tr>
<td>5 &amp; more</td>
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<tr>
<th>Table 3: Association of previous cesarean section with gravida, parity and Previous surgical or medical problem.</th>
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<tbody>
<tr>
<td>Gravida</td>
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<tr>
<td></td>
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<tr>
<td>Yes</td>
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<tr>
<td>No</td>
</tr>
</tbody>
</table>

*Significant Chi-square test at 0.05 level
Regarding history of antenatal care (ANC) during current pregnancy, the result showed that 127/161 (79%) women attending antenatal care. Of these, only 13/127 (10.2%) had four visits and more.

The result of this work demonstrated that 72/161 (44.7%) of near misses were between 28-36 wks. of gestational age. (Figure 1)

![Figure 1: Distribution of MN misses according to gestational age.](image)

More than half of all maternal near miss cases started during pregnancy 87/161 (54%). Of these, the third trimester constituted the highest proportion 62/161 (38.5 %). As shown in (Figure 2)

![Figure 2: Timing of MNM event](image)
Regarding final mode of delivery, all deliveries were 126/161 (78.3%), 17/126 (13.5%) delivered by NVD. Laparotomies seen in 109/126 (86.5%), of these, 84/109 (77%) delivered by C/S while 25/109 (23%) cases end with ruptured uterus. Abortion accounted for 19/161 (11.8%) cases where 5/19 (26.3%) had complete abortion, 8/19 (42.1%) needed curettage and 9/19 (47.4%) cases needed hysterotomy for evacuation of uterus. Ruptured ectopic pregnancy accounted for 16/161 (10%) all ended with salpingectomy.

The major underlying causes of maternal near miss was obstetric hemorrhage 129/161 (80.1%), Severe PPH had the highest proportion 71/129 (55.1%), followed by hypertension disorders 55/161 (34.2%), pre-eclampsia was observed in 32/55 (58.2%), ruptured uterus accounted for 25/161 (15.5%). (Table 4)

Table (5) showed that associated medical and surgical complications represented the highest contributory factor among near miss cases that accounted for 91/161 (56.5%) of these hypertensive disorder (chronic or gestational) accounted for more than half of cases 55/91 (60.4%), followed by previous cesarean section that accounted for 83/161 (51.6%).

This study revealed that out of 161 MNM cases 136/161(84.5%) was affected by organ dysfunction. The major organ dysfunction noticed was hematological /coagulation dysfunction accounted for 124/136 (91.2%) where blood transfusion was required in 120/124 (96%), involvement of more than one organ found in 51/136 (37.5%) of MNM cases, Cardiovascular dysfunction was the third common organ dysfunction 30/136 (22.1%). (Table 6)
IV. DISCUSSION

Majority of maternal near misses in the present work were in their third and fourth decade of life, because this is the most common reproductive age, as a result, the majority of complications occur in this age group. So, the possibility of being MNM and maternal deaths was high (13). This result was consistent with other studies (14, 15) but in contrast to (16).

Majority of women in this work were housewives and resided in urban areas. These findings may be due to study setting which was conducted in a main tertiary referral hospital that was the place for receiving complicated cases referred from other health facilities in Baghdad and other provinces. These studies were in parallel with other studies conducted in Iraq and elsewhere (17, 18).

In this work, high prevalence of maternal near misses was seen in women with multigravida and multiparous, the mean gravida was (4.4 ± 2.6) while the mean parity was (3.5 ± 1.9). These findings were in line with studies in Iraq, Philippines, and India (17, 19, 20), respectively. Yemane & Tiruneh et al, 2020, (21) declared that mothers who were pregnant for the 2nd – 4th times were nearly fivefold more prone to experience maternal near miss events respectively. According to Cunningham et al. (2010), (22) repeated pregnancy and childbirth can induce damage to the uterine blood vessel wall and decreased tissue flexibility, which can lead to abnormal placental-fetal growth.

Significant association was detected between age of the mothers (< 20 years) and severe PPH. While severe pre-eclampsia was significantly associated with primiparous patients, presence of previous medical and surgical problems and previous cesarean section.

<table>
<thead>
<tr>
<th>Organ(s) system dysfunction in MNM women</th>
<th>No. of patients suffer from organ dysfunction *</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients with organ dysfunction</td>
<td>136</td>
<td>85.09</td>
</tr>
<tr>
<td>Hematologic/coagulation dysfunction</td>
<td>124</td>
<td>91.2</td>
</tr>
<tr>
<td>Red cells or blood product or Plasma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>expander ≥ 3 units</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Failure to form clot</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Severe acute thrombocytopenia</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>More than one organ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiovascular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>51</td>
<td>37.5</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>30</td>
<td>22.1</td>
</tr>
<tr>
<td>Cardio-pulmonary resuscitation</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Uterine dysfunction/hysterectomy</td>
<td>24</td>
<td>17.6</td>
</tr>
<tr>
<td>Renal dysfunction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glucosuria/ketoacidosis</td>
<td>18</td>
<td>13.2</td>
</tr>
<tr>
<td>Azotemia</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Oliguria</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Dialysis</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Neurological dysfunction</td>
<td>11</td>
<td>8.1</td>
</tr>
</tbody>
</table>

* Occurrence of more than one associated factor in the same patient
This study declared that ANC visits was documented in 127/161 (79%) of MNM cases but only 13/127 (10.2%) had four visits and more, which was similar to (23, 24).

Mothers who did not obtain ANC follow-up during their pregnancy have a 1.7 times more risk of near-miss occurrences than those who did (21), it could be due to a lack of antenatal follow-up, information about forecasting labor and signs of it, the best birth sites, and when to seek professional help instead of home management. There will be a conversation with health specialists about the risk indicators of pregnancy and delivery. (25)

The current results showed that approximately half (44.7%) of MN misses were in the (28-36) wks. of gestation. The explanation for this finding might be due to most of pregnancy related complications developed during third trimester and as the studied hospital (Al Elwiyah) was a main tertiary hospital that receives a large number of referred cases or self- referral presented with serious complications. Similar finding was reported by other workers in Iraq (17, 13, 20). A higher figure was noticed by former studies in Ethiopia and India (26, 27).

In this work more than half (54%) of maternal near miss events presented during pregnancy in which more than one third (38.5%) of them occur during the third trimester, complications affect pregnant women during pregnancy in which majority of them occur in the third trimester may be the possible explanation. Higher percentage (62.5%) was reported by (28) occurred during antenatal period.

As a final mode of delivery, in this study cesarean section accounted for more than two thirds 84/109 (77%) of MN misses. Lower figure (36%) and (38.6%) was reported by (29, 30) respectively, but was in parallel with (31). Higher figures were documented by (32).

The cesarean section as a surgical procedure results in loss of blood, poses anesthetic risks, and increases the hazard of complications postoperatively. As a result, a cesarean section appears to be an unnecessary risk factor that raises the risk of complications. (33). The WHO recommended that a population-based cesarean section rate of (5–15%), citing greater rates as potentially unsafe and expensive to pregnant women and health-care systems. (11)

Laparotomy was noticed in 109/126 (86.5%) of MNM cases, ruptured uterus was seen in nearly one fourth 25/109 (23%) of cases, Significant number of ruptured uterus seen in women who had previous C/S or delivered by NVD (midwives intervention) or in the hospital, with abnormal placentation (accrete, percreta and previa) Ectopic pregnancy was seen in 16/161 (10%) of MNM women, all of them end with salpingectomy. Jabir et al, 2013, (32) reported that laparotomy was done in (40.09%), out of which (13.68%) used for ruptured uterus and (0.78%) for ectopic pregnancy. Lower figure of laparotomy was reported in Pakistan 14.8 % (34), South Ethiopia mentioned higher result 57% (18).

Analysis of the result showed that most of near miss cases 140/161 (87%) occurred at arrival, and the remaining (13%) developed after that. This indicated that probably there was a delay in referring and / or in the detecting pregnant mothers with life-threatening complications due to delay in seeking care or in arrival to health facility. Same findings were noticed in Iraq (32, 17), in Egypt (35), and in Nigeria (36).
Hemorrhagic disorders were identified as the first causes 129/161 (80.1%) of severe maternal morbidity and MNM as in the current study, in which post-partum hemorrhage 71/161 (55.1%) was the main cause of obstetric hemorrhage. Lower figures (30.8%) and (29.6%) were reported of the annual reports by Iraqi Ministry of Health (29, 30) respectively. Different studies documented that the women who had vaginal bleeding that ended in a life-threatening problem were 2.75 times more likely to suffer MNM. (10, 37). It's also been proven that managing the third stage of labor decrease the likelihood of PPH by 60–70%. (38).

Results of this study demonstrated that hypertensive disorders were the second main causes of MNM 55/161 (34.2%). The annual reports of MOH in Iraq documented that hypertensive disorders were (15.5%) and (14.5%) respectively (29, 30). In the current work, more than half 32/55 (58.2%) of near misses were caused by pre-eclampsia, which was coincided with (21).

Other studies conducted in Northeastern Brazil (38) and Oman (5), demonstrated that hypertensive disorders followed by obstetric hemorrhage during pregnancy was the leading cause of MNM.

Uterine rupture was other contributor for maternal near miss event. It accounted for 25/161 (15.5 %) of near miss cases, the present analysis is nearly similar to previous study in Iraq (13.68%) (32). Ruptured uterus in the current study was associated with previous history of cesarean section, abnormal placentation, midwife intervention and after curettage.

This study found that most common contributory factor was the history of preexisting medical and surgical complications 91/161 (56.5%) of cases. This finding is comparable with studies in Iraq (17) and Uganda (40). Hypertension was clearly the most common medical condition associated with MNM cases. Studies mentioned that chronic hypertension significantly rises the risk of complications like superimposed pre-eclampsia, abruptio of placental, IUGR and premature delivery (41) In contrast Lotufo et al, 2012, (42) illustrated that previous medical morbidity has not elevated the risk of MN-misses

Previous cesarean section that accounted for 83/161 (51.6%) was the second contributory factor seen in MNM patients, this figure was near to (44.96%) that illustrated by Jabir et al, 2013 in Iraq (32). The finding of the present work showed that previous cesarean sections may predispose mothers to placenta accretion in scar tissue, in addition uterine rupture in attempted vaginal birth after cesarean section, both of which may result in MNM., same conclusion was reported in other work (10). In addition, Lawton et al, 2010, (43) documented that previous or current caesarean section is often linked with increased likelihood of hysterectomy, that is in line with this work, which showed that 30% (21 out of 71) near missed women with previous cesarean section underwent hysterectomy.

This study showed that coagulation/hematologic disorder was the commonest associated with organ dysfunction that accounted for 124/136 (91.2 %), which was manifested by 120/124 (96.8 %) of MNM patients who received massive blood transfusions. This finding coincided with studies in Malaysia. (24) and India (44).

The second dysfunction manifested in the current analysis was the involvement of more than one organ that was seen in 51/136 (37.5%), Involvement of one or more organ dysfunction was present on arrival showing that the 1st and 2nd delays may be the underlying cause of the high morbidity and mortality, and making matters worse, they might have no prior antenatal visits. (20, 45). However, cardiovascular was the commonest organ system dysfunction in MNM cases, following that multiple or unspecified disorders that was reported in Iraq (17, 32). Similar findings reported in studies in Iran and Egypt (34, 35).

V. CONCLUSION:

MNM events occurred more among women in the third and fourth decade of life, most of them were grand multiparous and had inadequate ANC visits, medical and surgical complications with previous history of cesarean section and those had first delay, these factors independently associated with the occurrence of maternal near-miss.

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