

# Severe Acute Maternal Morbidity and Intensive Care in Paropakar Maternity and Women's Hospital

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**Aims:** Maternal morbidity occurs due to complications arising in pregnancy or within 42 days of delivery. Women with acute severe morbidity require admission in the intensive care unit (ICU). This study was done to explore the profile of those women requiring intensive care.

**Methods:** A study was conducted at Paropakar Maternity and Women's Hospital in which records of patients admitted in Maternal Intensive Care Unit (MICU) were evaluated for demographics, disease responsible for critical illness, complications that prompted MICU admissions, interventions required, length of MICU stay and resulting maternal morbidity and mortality.

**Results:** Over the study period, 159 obstetric patients were transferred to MICU, representing 2.23% of 7109 deliveries. Hypertensive disorders of pregnancy (50%) and postpartum haemorrhage (14.46 %) were the two major obstetrical conditions responsible admission into MICU.

**Conclusions:** Auditing of severe maternal morbidity will improve the quality of obstetric care and decrease the incidence of maternal morbidity and maternal mortality.

**Keywords:** maternal intensive care unit, pregnancy complications, severe maternal morbidity.

## INTRODUCTION

Severe maternal morbidity emerges as a new quality indicator of obstetrical care. WHO describes it as near-death but survival from complications which occurred during pregnancy, childbirth or within 42 days of termination of pregnancy.<sup>1,2</sup> Each year nearly 5,29,000 women die globally due to pregnancy causes. For each death, nearly 118 women suffer from life threatening events.<sup>3</sup>

In Nepal, maternal mortality has decreased from 539/100000 live births in 1998 to 229 in 2008/2009.<sup>4</sup> Exploration of severe maternal morbidity is required to identify deficiency and strengths of obstetrical services. The obstetrics morbidity results from obstetric complications of pregnancy, labour and puerperium. The recognition of signs, symptoms and severity of illness, antenatal and postnatal care seeking are associated with maternal mortality and morbidity.<sup>5</sup> This study aimed to explore the case series requiring maternal intensive care.

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## METHODS

This was a cross-sectional study conducted at Paropakar Maternity and Women's Hospital (PMWH), Kathmandu. One hundred and fifty-nine critically ill obstetrics patients who were transferred to Maternal Intensive Care Unit (MICU) from 3 April 2011 to 13 July 2011 were enrolled in the study. Research was conducted after ethical approval from hospital authority and written consent from patients and relatives. All data were analyzed manually and with the help of software excel and statistical analyses were done accordingly.

## RESULTS

Over the study period, 159 obstetrics patients were transferred to MICU representing 2.23% of 7109 deliveries. The mean duration of stay at MICU was 2.6 days with standard deviation of 1.84 days.

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**Table 1. Obstetrical characteristics of the patients(n=159).**

Gestational age (weeks)	Number (%)
< 13	22 (13.18)
13 - 27	8 (5.03)
≥ 28	89 (55.97)
Postpartum	40 (25.16)
<b>Parity</b>	
0	63 (39.62)
1-2	78 (49.06)
3-4	14 (8.80)
≥ 5	4 (2.52)
<b>Booking status</b>	
Booked in PMWH	59 (37.11)
Unbooked in PMWH	100 (62.89)

Table 1 outlines the obstetrical characteristics of the patients. Majority of the patients (55.97%) were at ≥28 weeks of gestation, 13.84% at ≤ 13 weeks of gestation, 5.03 % at 13-27 weeks of gestation and 25.16% were postpartum cases. Regarding parity, 39.62 % were nulliparous and majority of them were para 1 to 2 (49.06%).

**Table 2. Diseases responsible for illness (n=159).**

Hypertensive disorders in pregnancy	Number (%)
PIH	18 (11.32)
Severe Pre-Eclampsia (PE)	43 (27.04)
Superimposed PE	3 (1.89)
Eclampsia	16 (10.06)
Puerperial sepsis	17 (10.69)
<b>Obstetrical Haemorrhage</b>	
<b>Early pregnancy</b>	
Ectopic pregnancy	9 (5.66)
Abortion	7 (4.40)
H. Mole	2 (1.26)
<b>Late pregnancy</b>	
Placenta praevia	6 (3.77)
Rupture uterus	3 (1.89)
<b>Postpartum haemorrhage</b>	
Primary PPH	20 (12.58)
Secondary PPH	3 (1.89)
<b>Others</b>	
Chest infection	2 (1.26)
UTI	2 (1.26)
GDM	2 (1.26)
Heart disease	2 (1.26)
Cardiomyopathy	2 (1.26)
Epilepsy	1 (0.63)
Postpartum psychosis	1 (0.63)

Table 2 shows the diseases responsible for maternal illnesses. Hypertensive disorder of pregnancy was the leading cause of maternal illness, responsible for >50% of all MICU admissions. Forty-three (27%) were of severe pre-eclampsia while 16 (10%) were of eclampsia. In this study renal failure was the major complication of severe pre-eclampsia for which four cases were referred to specialised hospitals.

The second most common diagnosis was obstetric haemorrhage leading to MICU transfer in 23 (14.5%) cases. Causes of haemorrhage included uterine atony (eleven from twenty cases of PPH), retained placental tissue (nine cases) and genital tract injury (one case following vacuum delivery). Caesarean hysterectomy and sub-total hysterectomy were performed in two cases to controlled intractable haemorrhage.

In this study 17 (10.7%) women had puerperal sepsis (six hospital and 11 home delivery), of which manual removal of placenta were done in seven cases and two had explorations for retained placental tissues. Medical disorders responsible for obstetric ICU admission included gestational diabetes mellitus, heart disease, cardiomyopathy, postpartum psychosis and UTI constituting 7.5% of the total MICU admission. Sixty-one (38.3%) of the cases admitted in MICU were for intensive monitoring of the patient with severe morbidity (Table 3).

**Table 3. Intervention required in MICU ( n=159).**

Intervention required	Number (%)
Mechanical ventilation	2 (1.26)
Vasoactive infusion	8 (5.03)
Intensive monitoring	61 (38.36)
Blood transfusion	52 (32.71)
Magnesium sulphate therapy	36 (22.64)

The patients who received magnesium sulphate therapy for eclampsia and pre-eclampsia constituted 22.6%. Vasoactive drugs infusion was performed in eight cases, two with postpartum haemorrhage, one with rupture uterus and five cases were with incomplete abortion in shock. There were two maternal deaths (2.5%), which were because of sudden postpartum collapse of a patient in whom induction of labor with Misoprostol was done and another was a case of severe pre-eclampsia resulting into pulmonary oedema. Postmortem was not done so the actual cause of death could not be revealed.

## DISCUSSION

Critical incidence audit and feedback are recommended interventions to improve the quality of obstetrics care. This concept is relatively new in maternal care, but it is increasingly becoming important in areas with low maternal mortality ratios

and where the geographic area is small. This has the advantage of events still being rare enough not to overload clinicians and data capturing personnel within the facility.<sup>5,6</sup> In our study, 159 patients were transferred to MICU, representing 2.23% of 7109 deliveries corresponding to 1.34 to 1.4% of other developing countries' reports. However, this rate seems to be high as 0.17 to 0.26% are documented from developed world.<sup>3</sup> In a study from Ibadan et al, 1.4% of deliveries required ICU admission during a five-year period.<sup>7</sup> Serious forms of maternal morbidity occur in about 1% of women in the United States in contrast to 3.01- 9.05% in some developing settings<sup>8</sup> as in this current study.

Worldwide, the leading causes of severe morbidity are haemorrhage and pregnancy related hypertensions or eclampsia/pre-eclampsia (PE).<sup>8</sup> This study showed that the leading cause of maternal morbidity causing intensive care unit admission were severe pre-eclampsia, haemorrhage, pregnancy induced hypertension (PIH), sepsis and eclampsia 27.04%, 14.47%, 11.32%, 10.69% and 10.06% respectively. Similar results were reported in the European population based study by the MOMS-B survey.<sup>9</sup> Studies from India showed maternal morbidity leading to transfer to ICU were pre-eclampsia (35%), haemorrhage (35%) and sepsis (13%) and other medical conditions (11%).<sup>10,11</sup> The rates of sepsis and other medical conditions are comparable to our study (Table 2).

According to Pakistan reproductive health and family planning survey,<sup>9</sup> 59.5% of rural women did not receive prenatal care and 86.5% delivered at home by untrained attendants; as in our country. These untrained birth attendants do not follow clean and safe delivery rules and are unable to predict and handle pregnancy complications. Shortage of beds in hospital especially in MICU and lack of high dependency units in obstetric departments are responsible for high morbidity and mortality too.<sup>3</sup>

It is estimated that 5-10% of pregnancies are complicated due to pre-eclampsia. The attending maternal mortality is very high. In developed countries with better facilities and improved antenatal care, the incidence has reduced significantly. The complication of the conditions such as acute renal failure and intracranial haemorrhage are usually the causes of death as reflected in different study. Renal failure was the major complication of the severe pre-eclampsia causing four cases to be referred to other hospitals in our study. Therefore, an antenatal service with aggressive management of pre-eclampsia particularly in labour is to be encouraged. The provision of an elaborate and intensive care unit for eclamptic patients especially in certain designated areas of labor suites with excellent nursing care would be helpful. In this study eclampsia was the third commonest

indication for admission in the MICU among hypertensive disorders in pregnancy (Table 2). This is similar to the findings in some other studies.<sup>8-11</sup> Magnesium sulphate has been used for more than 10 years in our hospital. Magnesium Sulphate is an evidence-based protocol for treating eclampsia.<sup>6,7</sup> The reasons for persistently high maternal morbidity due to sepsis is multi-factorial like home deliveries by unskilled birth attendants in unhygienic conditions, late referral to hospital, low socio economic conditions, prolonged and neglected labor, induced miscarriage and illiteracy.

A total of 32 (20.13%) obstetrical haemorrhages were studied. There were 23 (14.47%) women with postpartum haemorrhage which represented 20 cases of primary and three were secondary postpartum haemorrhage, among them nine cases (5.66%) were transferred to ICU with the diagnosis of placenta previa in six (3.77%) and (1.89%) rupture uterus in three (Table 1). Initially post-partum haemorrhages were managed conservatively: uterine massage, use of oxytocin. Intra uterine balloon catheter (condom tamponade) were used in two patients (8.69%) which correlates to the results (9.7%) of a study by Zwart et al in 154 women.<sup>12</sup> Re-laparotomy was performed in one patient (4.35%) for hemoperitoneum following caesarean section. B-Lynch suture was applied in one case (4.35%) for uterine atony. Most of the women who developed post-partum haemorrhage due to uterine atony were of severe pre-eclampsia. Scarcity of blood was a big hurdle in the timely intervention and provision of free and safe blood banking services round the clock at tertiary care hospitals like ours is likely to yield better outcomes.<sup>3</sup> Haemorrhage is reported to be the leading cause of maternal death in Japan and Europe as a whole and the third most common cause of death in the United States.<sup>6</sup> Another study<sup>2</sup> reported the rate of major obstetrical haemorrhage as 4.5 per 1000 deliveries, whereas it was 3.23 per 1000 deliveries in our study. Admission to MICU was 14.47% in our study compared to 27% for major obstetrical haemorrhage in the above-mentioned study.

There were three women with uterine rupture (with incidence of 2%) during the study period (Table 2) and is comparable to the result of a study contributing 1 to 3%.<sup>3</sup> No cases of pregnancy related death due to uterine rupture occurred. Causes of rupture uterus included use of prostaglandin in primipara for labor induction, another one was a case of previous caesarean section done for fetal distress that was kept for vaginal birth after caesarean section and one case had silent rupture of previous transverse scar.

A total of twelve cases were studied as other causes leading to severe maternal morbidity with transfer to MICU (Table 2). Chest infection, UTI, Gestational DM, heart disease and epilepsy are the

co-morbid conditions needing MICU admission. Cardiomyopathy and postpartum psychosis are the postpartum complication that can cause not only morbidity but mortality also.<sup>7,10</sup> Interventions during ICU stay (Table 3) included mechanical ventilation in two women (1.26%), vasoactive support in 8 (5.03%) and intensive monitoring in 61 (38.35%). Blood were transfused in 52 women (32.7%, range 1-7 units). Similar ICU interventions were reported from other countries too.<sup>6,11-13</sup>

Severe maternal morbidity should be considered internationally as a new indicator of the quality of obstetric care. Substandard care was found in the majority of assessed cases due to limited resource available in own country. Reduction of severe maternal morbidity seems a mandatory challenge. Therefore auditing of severe maternal morbidity at local or regional level should be encouraged to improve the quality of obstetric care and decrease the incidence of maternal morbidity and maternal mortality.<sup>11-13</sup> The availability, definition and admission criteria of intensive care units vary between countries and from one region to another within the same country. Pilot studies in Brussels suggested that the threshold for transfer to intensive care units might vary according to the clinical work load of the hospital.<sup>14-16</sup> To wrap up, the findings in the current study agree with other studies showing the major obstetric causes of severe maternal morbidities are hypertensive disorder of pregnancy, haemorrhage and sepsis.<sup>17</sup>

## CONCLUSIONS

The most common obstetric events among the severe acute maternal morbidity were hypertensive disorders in pregnancy, obstetric haemorrhage and sepsis. These events can be reduced by provision adequate and effective care. Team approach involving obstetricians, intensivists and anaesthetists is needed for early meticulous assessment and aggressive intervention. Therefore, auditing of severe maternal morbidity should be encouraged to improve the quality of obstetric care and decrease the incidence of maternal morbidity and maternal mortality.

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