



STUDY OF OBSTETRIC ADMISSIONS TO INTENSIVE CARE UNIT AND HIGH DEPENDENCY UNIT IN TERTIARY CARE HOSPITAL

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ABSTRACT

**Objective:** To analyse obstetric admissions in Intensive Care Unit and High Dependency Unit and to identify conditions associated with maternal mortality. **Material and Methods:** This was a retrospective observational study. All obstetric cases admitted to ICU and HDU over a period of one year from September 2021 to September 2022 in Government Medical College, Nagpur were studied. Data was collected from case records. The risk factors responsible were analysed. **Results:** During the study period, there were 297 admissions to ICU and HDU accounting for 1.86% of all deliveries. 45.2% of patients admitted in HDU were of age group of 20-25 yrs, while 65.9% of patients admitted in ICU were of age group of 20-25 yrs. Primigravida contributed to 38% of patients admitted in HDU and 36.1% of the patients in ICU. 34% of the patients admitted in HDU were 37-40 wks of gestational age while 36% of the patients admitted in ICU were 37-40 wks of gestational age. Postpartum admissions accounted for 10.4% and 17% of HDU and ICU respectively. Major conditions responsible for HDU admissions were Hypertensive Disorders of Pregnancy (75.6%) followed by severe anemia (18.4%) and Obstetric hemorrhage (6%) while those responsible for ICU admissions were Obstetric hemorrhage (53.1%) followed by Hypertensive Disorders of Pregnancy (27.6%), severe anemia (17.2%) and heart disease (2.1%). Maternal mortality was seen in 7.7% of HDU and ICU cases the commonest cause being Hemorrhagic shock (30.4%) and multi organ dysfunction (17.3%). **Conclusion:** Major obstetric conditions warranting admissions in ICU and HDU were obstetric hemorrhage and hypertensive disorders of pregnancy. Others include severe anemia, heart disease and sepsis. Knowledge about identification of early signs of deterioration and various critical care protocols is of utmost importance so that the sick and the critically ill obstetric patients receive optimum evidence based treatment at the right moment. There is also a need to train obstetricians and staff to handle obstetric emergencies.

**KEYWORDS :** Intensive Care Unit, High Dependency Unit, maternal mortality, maternal morbidity, Obstetric Hemorrhage, Hypertensive Disorders.

INTRODUCTION:

Obstetric medicine due to its unique nature poses a challenge to the obstetrician in dealing with obstetric emergencies.<sup>1</sup>The altered physiology of pregnancy, the presence of foetus, the rapid deterioration of maternal and foetal condition in case of complication and the simultaneous management of two lives with different physiologies are a grandiose and formidable task. For better maternal and foetal outcome, these should be managed in a well equipped, dedicated obstetric intensive care unit.

Despite drastic decrease in maternal morbidity in the last few decades because of advances in obstetric care, maternal mortality remains to be a challenge in the developing world.<sup>2</sup>Hypertensive disorders of pregnancy and obstetric hemorrhage are the two commonest risk factors for ICU admissions.<sup>3</sup>The other risk factors are severe anemia, cardiac disease and sepsis.<sup>4,5,6,7</sup>The present study was done to analyse all the obstetric admissions to intensive care unit of a tertiary care referral hospital for a period of one year and to identify the risk factors for admission.

AIMS AND OBJECTIVES:

- 1) To analyse obstetric admissions in Intensive Care Unit and High Dependency Unit
- 2) To identify conditions associated with maternal mortality

MATERIAL AND METHODS:

It was a retrospective observational study conducted in Government Medical College Nagpur over a period of one year from September 2021 to September 2022. The admissions were identified from ICU and HDU admission register and case records of the patients were studied in detail. The parameters noted were age, parity, diagnosis

on admission, associated medical and surgical condition, any surgical procedure performed, antenatal or post natal admission, details of treatment given like ventilator support,

blood and blood component transfusion, inotropic support and dialysis. The total duration of stay was noted. The maternal mortality and its cause were noted. Data analysis was done by simple analytical and descriptive statistical methods.

RESULTS:

In our study, there were 15,911 deliveries and 297 admissions to ICU and HDU accounting for 1.86% of all deliveries.

**Table no 1-** Distribution of patients according to demographic characteristics, gestational age and mode of delivery

Serial Number	Parameter	ICU	HDU
1	Maternal mean age	27 years	26 years
2	Mean Gestational age	39 weeks	38 weeks
3	Parity	Multipara-63.9% Primipara-36.1%	Multipara-54.4% Primipara-46.6%
4	Mode of Delivery a) vaginal birth b) cesarean birth	a) 33(70.2%) b) 14(29.78%)	a) 183(73.2%) b) 67(26.8%)

45.2% of patients admitted in HDU were of age group of 20-25 yrs, while 65.9% of patients admitted in ICU were of age group of 20-25 yrs. Mean maternal age of patients admitted in HDU was 26 yrs while that in ICU was 27 yrs.

Mean gestational age of patients admitted in HDU was 38 wks while that in ICU was 39 wks. Primigravida contributed to 38% of patients admitted in HDU and 36.1% of the patients in ICU. 34% of the patients admitted in HDU were 37-40 wks of gestational age while 36% of the patients admitted in ICU were 37-40 wks of gestational age.

.Postpartum admissions accounted for 10.4% and 17% of HDU and ICU respectively.

**Table No2** Distribution of patients according to Major Obstetric and Medical Conditions requiring admissions in ICU and HDU

Serial No	Major Obstetric and Medical Conditions	Number of Patients admitted in ICU	Percent age(%)	Number of patients admitted in HDU	Percentage
1	Obstetric Hemorrhage	25	53	15	6
2	Hypertensive Disorders of Pregnancy	13	27.6	189	75.6
3	Severe Anemia	7	17.02	46	18.4
4	Heart Disease	1	2.1	0	0

Major conditions responsible for HDU admissions were Hypertensive Disorders of Pregnancy(75.6%) followed by severe anemia(18.4%) and Obstetric hemorrhage (6%) while those responsible for ICU admissions were Obstetric hemorrhage(53.1%) followed by Hypertensive Disorders of Pregnancy(27.6%), severe anemia (17.2%) and heart disease(2.1%)

**Table No3** Distribution of Patients according to therapy in ICU and HDU

Serial No	Therapy	Number of patients admitted in ICU	Percent age(%)	Number of patients admitted in HDU	Percentage(%)
1	Ventilatory support	19	40.2	-	-
2	Inotropic support	9	19.1	-	-
3	Blood transfusion	36	76.5	59	23.6
4	Blood component transfusion	25	53.1	47	18.8
5	Dialysis	4	8.5	0	0

76.5% of the patients admitted in ICU required blood transfusion while 23.6% of the patients admitted in HDU required blood transfusion.40.42% of the patients in ICU required ventilator support.

**Table No 4** Distribution of Patients according to Duration of Stay

Serial No	Duration of stay	Number of patients admitted in ICU	Percentage(%)	Number of patients admitted in HDU	Percentage (%)
1	<6 hours	3	6.3	2	0.8
2	7- 48 hours	31	65.9	88	35.2
3	2-4 days	9	19.1	134	53.6
4	>4days	4	8.5	26	10.4

65.9% of the patients in ICU had duration of stay of 7 -48 hours while 53.6% of the patients in HDU had duration of stay of >2-4 days. The mean duration of stay of patients in ICU was 1 day while that of HDU was 2 days.

**Table No 5** Distribution of patients according to surgical procedures

Serial No	Surgical Procedure	Number of patients who underwent the given surgical procedure	Percentage (%)
1	Hysterectomy	9	6.4

2	Cesarean Birth	81	57.8
3	Exploratory Laprotomy	1	0.7
4	Repair of rupture	2	1.4
5	B/L Uterine Artery Ligation	9	6.4
6	Modified B Lynch Suture	9	6.4
7	B/L Internal Iliac Artery Ligation	1	0.7

140 out of 298 patients admitted in ICU and HDU underwent surgical procedures.

LSCS being the most common, contributed to 57.8% of all surgical procedures, followed by B/L uterine artery ligation. Hysterectomy contributed to 6.4% of the surgical procedure.

**Table No 6** Causes of Maternal Mortality

Serial no.	Cause of Maternal Mortality	No of patients	Percentage(%)
1	Hemorrhagic Shock	7	30.4
2	Multiorgan Dysfunction	4	17.3
	a) Sepsis	1	8.6
	b) HELLP	2	4.3
	c) AFLP	1	8.6
3	Congestive Cardiac Failure	1	4.3
4	Septic Shock	3	13
5	Hypertensive Encephalopathy	3	13
6	Intracranial Hemorrhage	3	4.3
7	Pulmonary Thromboembolism	2	8.6
8	Hepatic Encephalopathy	1	4.3
9	Pneumonitis	1	4.3

Maternal mortality was seen in 7.7%(23) of HDU and ICU cases the commonest cause being hemorrhagic shock(30.4%) and multi organ dysfunction( 17.3%).

**DISCUSSION:**

Any sort of morbidity that might be encountered during pregnancy and delivery might lead to mortal consequences regarding not only the foetus but the mother as well. In our study, obstetric admissions to ICU and HDU constituted 1.86% of all the deliveries. In the study of Ashakiran<sup>8</sup> et al ICU admission rate was 1.24% of all deliveries. In the study of Poornima<sup>9</sup> et al ICU admission rate was 0.39% of all deliveries. In the study of Dattaray<sup>10</sup> et al ICU admission rate was 1.1% of all deliveries. In the study of Ashraf<sup>11</sup> et al ICU admission rate was 11.65% of all deliveries. In the study of Togonal<sup>12</sup> et al ICU admission rate was 1% of all deliveries. The admission rate of our study was similar to those of Ashakiran<sup>8</sup> et al, Dattaray<sup>10</sup> et al and Togonal<sup>12</sup> et al. The higher admission rate of Ashraf<sup>11</sup> et al was attributed to the study being conducted at JIPMER which due to its status as a tertiary care centre of national importance provides free of cost high quality care to majority of patients of South India. The results of demographic features like age, gestational age in the present study was comparable to other studies. Postpartum admissions accounted for 10.4% and 17% of HDU and ICU respectively.

In the present study major obstetric and medical conditions responsible for HDU admissions were Hypertensive Disorders of Pregnancy(75.6%) followed by severe anemia(18.4%) and Obstetric hemorrhage (6%) while those responsible for ICU admissions were Obstetric hemorrhage(53.1%) followed by Hypertensive Disorders of Pregnancy(27.6%), severe anemia (17.2%) and heart disease(2.1%). In the study of Ashakiran<sup>8</sup> et al, obstetric hemorrhage (44.05%) was the commonest condition requiring ICU admission followed by hypertensive disorder of pregnancy(28.88%). In the study of Poornima<sup>9</sup> et al, major obstetric hemorrhage(27.7%) and hypertensive disorder of pregnancy(26.2%) were the commonest conditions requiring ICU admissions. In the study of Dattaray<sup>10</sup> et al, sepsis accounted for the majority of admissions.(35.08%). In

the study of Ashraf<sup>11</sup> et al, obstetric hemorrhage and subsequent hemodynamic collapse were the commonest reasons for ICU admission. (51%). In the study of Togonal<sup>12</sup> et al, Hypertensive Disorders of Pregnancy (51 %) was the most common cause necessitating admission to ICU. The results of our study were similar to those of Ashakiran<sup>8</sup> et al, Poornima<sup>9</sup> et al and Ashraf<sup>11</sup> et al. In the study of Dattaray<sup>10</sup> et al,

although sepsis was the major contributing factor, the commonest cause of sepsis was massive obstetric hemorrhage and increased incidence of PPH occurring in the background of maternal malnutrition and anemia.

In our study, 76.5% of the patients admitted in ICU required blood transfusion while 23.6% of the patients admitted in HDU required blood transfusion. 40.42% of the patients in ICU required ventilator support. In the study of Ashakiran<sup>8</sup> et al, blood transfusion (51.37%) comprised the majority of therapy received in ICU. In the study of Poornima<sup>9</sup> et al maximum number of patients underwent mechanical ventilation (63%) as a part of ICU intervention.

In the study of Dattaray<sup>10</sup> et al, blood and blood products transfusion (89.47%) occupied the major chunk of interventions done in HDU. In the study of Ashraf<sup>11</sup> et al, 85% required mechanical ventilation which was the commonest intervention in ICU. In the study of Togonal<sup>12</sup> et al, 85% of the patients required endotracheal intubation and mechanical ventilation as the majority of ICU interventions. The results of our study was similar to that of Ashakiran<sup>8</sup> et al and Dattaray<sup>10</sup> et al.

In the present study, 65.9% of the patients in ICU had duration of stay of 7 hrs-2 days while 53.6% of the patients in HDU had duration of stay of >2-4 days. The mean duration of stay of patients in ICU was 1 day while that of HDU was 2 days. In the study of Ashakiran<sup>8</sup> et al, the mean duration of stay was 2 days. In the study of Togonal<sup>12</sup> et al, the mean duration of ICU stay was 7 days.

The longer duration of stay would reflect the severity of patients, clinical situation. Hence the necessity of the policy of early and elective admission to the ICU for the patients at high risk.

In our study, 140 out of 298 patients admitted in ICU and HDU underwent surgical procedures. LSCS being the most common, contributed to 27.27% of all surgical procedures, followed by B/L uterine artery ligation.

Hysterectomy contributed to 2.02% of the surgical procedures. In the study of Ashakiran<sup>8</sup> et al, the commonest surgical procedure performed was emergency cesarean section. Similar results have been shown in the study of Togonal<sup>12</sup> et al, where 90% of the patients underwent cesarean section. The results of our study were similar to those of Ashakiran<sup>8</sup> et al and Togonal<sup>12</sup> et al. This indicates that most of the women needed operative delivery. Cesarean section especially in the presence of obstetric and medical comorbidities can be a potential risk factor for ICU admission and needs further research. Cesarean section is considered to be an adjusted risk factor for ICU admission.<sup>13</sup>

In the present study, maternal mortality was seen in 7.7% of HDU and ICU cases the commonest cause being hemorrhagic shock (30.4%) and multi organ dysfunction (17.3%). The maternal mortality in the study of Ashakiran<sup>8</sup> et al was 15.55%. the commonest cause of maternal mortality was hemorrhagic shock (26.89%) followed by multi organ dysfunction syndrome (26.05%). In the study of Poornima<sup>9</sup> et al, the maternal mortality was 33.8% of ICU admissions. The common causes were hemorrhage (44.4%) and hypertensive disorder of pregnancy (35.2%). In the study of Dattaray<sup>10</sup> et al,

the maternal mortality was 12.28% of HDU admissions, causes being hypertensive disorder of pregnancy and hemorrhage. In the study of Ashraf<sup>11</sup> et al, the maternal mortality was 13% of ICU admissions. 71.4% of these deaths were due to disseminated intravascular coagulation and multiorgan failure secondary to obstetric hemorrhage. In the study of Togonal<sup>12</sup> et al, the maternal mortality was 33.8% of ICU admissions. The most common cause of death was hemorrhagic shock. The maternal mortality rate in our study was 151 per 1,00,000 live births which is acceptable as ours is a tertiary referral centre with well equipped facilities and round the clock supervised care according to standard protocols.

## CONCLUSION:

Major obstetric conditions warranting admissions in ICU and HDU were obstetric hemorrhage and hypertensive disorders of pregnancy. Others include severe anemia, heart disease and sepsis. Hemorrhagic shock and multiorgan dysfunction were the major causes of maternal death in our study. Knowledge about identification of early signs of deterioration and various critical care protocols is of utmost importance so that the sick and the critically ill obstetric patients receive optimum evidence based treatment at the right moment. There is also a need to train obstetricians and staff to handle obstetric emergencies.

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