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**Dr. Nishat Fatima**  
PG Resident 3<sup>rd</sup> Year, Dept. of  
Obs. and Gynae., M.G.M Medical  
College and M.Y. Hospital, Indore,  
Madhya Pradesh, India

**Dr. Somen Bhattacharjee**  
Associate Prof., Dept. of Obs. and  
Gynae., M.G.M Medical College and  
M.Y. Hospital, Indore, Madhya  
Pradesh, India

## To analyze obstetric admissions to intensive care unit and to identify the risk factors responsible for intensive care admission

**Dr. Nishat Fatima and Dr. Somen Bhattacharjee**

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### Abstract

**Objective:** To analyze obstetric admissions to intensive care unit and to identify the risk factors responsible for intensive care admission.

**Method:** This is a retrospective study of all obstetric cases admitted to the intensive care unit over a period of 1 year. Data were collected from case records. The risk factors responsible for ICU admission were analyzed.

**Result:** In the 12 month period from 1 January 2016 to 31 December 2016, 12828 women delivered in our hospital, with 67 maternal deaths, giving a maternal mortality ratio of 5.22/1000 deliveries. The total admissions in the obstetric ICU were 128 women (ICU utilization rate was 0.99 per 100 deliveries) with 61 (48%) survivors and 67 (52%) non-survivors.

Majority of the patients belonged to 20-30 years age group (72.8%) 46.8% were primipara, 82 % were admitted in antepartum period. Most were in the gestational age between 37 and 40 weeks (38%) Obstetric hemorrhage found to be the most important antepartum risk factor (44%) after anaemia 58%. In our study ICU maternal mortality were 52%, majority of patients were referred from other peripheral centers and the majority were due to eclampsia and pre-eclampsia (58%) and postpartum hemorrhage (22%).

Maternal mortality were 52%, majority of patients were referred from other peripheral centers and the majority were due to eclampsia and pre-eclampsia (58%) and postpartum hemorrhage (22%). Other disorders included jaundice 23%, puerperal sepsis 21%, ruptured uterus 14% and embolism 11%. The most important pre-existing medical complication was heart disease in 7% cases. The most common mode of delivery was cesarean section (39.7%) Obstetric hysterectomy was required in 5.1%, as a life saving procedure. The most common obstetric cause of ICU admission was obs haemorrhage (44%) of which 6 cases were complicated with disseminated intravascular coagulation.

Majority required mechanical ventilation for <48 hours, (57.7%) Only 11 cases (8.5%) required for 4 days and more. Complications encountered While on Mechanical Ventilation are Multiorgan failure 6%, Pulmonary edema 4%, Renal failure 8%, Seizures 4%, Hepatic failure 6%, Deep-vein thrombosis 2%.

**Keywords:** Obstetric, ICU, Admission & Risk

### 1. Introduction

Critically ill Obstetric patients represent an interesting group with unique characteristics, whose management poses a challenge by the presence of fetus, an altered maternal physiology and disease specific to pregnancy [1-3]. Pregnant patients account for a small number of ICU admissions in developed countries (<2%) but they can reach up to 10% or more in developing countries [4, 5]. Management of such women then becomes multidisciplinary, involving anaesthesiologist, obstetricians, nurses and neonatologists [6-7]. The present study was done to analyze all the obstetric admissions to the intensive care unit of a tertiary care referral hospital for a period of 1 year and to identify the risk factors responsible for admission.

### Material & Method

A retro-prospective analysis of 12 months period of all obstetric ICU admissions was carried out in the Department of Obstetrics and Gynecology and Intensive care unit of MGM medical college and associated M.Y. hospital Indore, M.P. The study was conducted from January 2016 to December 2016 following ethical committee approval. Patients included in the study were critically ill women admitted during pregnancy as well as in the postpartum period. The critical care team included resident doctors from the departments of obstetrics (1), anaesthesiology (1) and 2 nurses in 8 hourly shift.

**Corresponding Author:**  
**Dr. Somen Bhattacharjee**  
Associate Prof., Dept. of Obs. and  
Gynae., M.G.M Medical College and  
M.Y. Hospital, Indore, Madhya  
Pradesh, India

Obstetric consultants and the consultants from the associated departments (anaesthesiology/ medicine/surgery/pediatrics etc.) were available on call 24/7.

#### Admission criteria in obstetric ICU

1. Critically ill obstetric patients requiring ventilatory support.
2. Patients requiring major organ supportive therapy.

Our obstetric ICU is a clean area with 12 ICU beds located in vicinity of labour room and near the operation theatre complex.

Major equipments include:

1. 12 Multiparameter monitors (electro cardio gram (ECG), non invasive blood pressure (NIBP)/ invasive blood pressure (IBP), heart rate (HR), oxygen saturation (SpO<sub>2</sub>), respiratory rate, temperature),
2. 4 microprocessor controlled ventilator with weaning modes for each bed,
3. Crash cart,
4. Defibrillator,
5. Suction machine
6. Electrocardiographic machine.

**Data collection:** An exhaustive proforma was developed to record the various data of patients admitted to obstetric ICU. The data collected included basic demographic data, age, parity, diagnosis on admission, associated medical and surgical condition, reason for ICU admission, any surgical procedure performed, antenatal or postnatal admission, details of treatment given like ventilator support, blood and blood component transfusion, ionotropic support, and dialysis.

Data of total obstetric mortalities and total deliveries during the 12 months period to calculate maternal mortality per 1000 deliveries were also noted from the hospital administration system.

In this hospital, all the services for pregnant women and women in puerperium including ICU admission and investigations are free of cost.

#### Results

In the 12 month period from 1 January 2016 to 31 December 2016, 12828 women delivered in our hospital, with 67 maternal deaths, giving a maternal mortality ratio of 5.22/1000 deliveries. The total admissions in the obstetric ICU were 128 women (ICU utilization rate was 0.99 per 100 deliveries) with 61 (48%) survivors and 67 (52%) non-survivors.

**Table 1:** Gestational age on admission

Gestational Age in Weeks	No. of Cases	Percentage
<14	08	06
15-28	06	05
29-36	13	10
37-40	49	38
40-42	31	23
Puerperium	21	18

**Table 2:** Major obstetric and medical conditions requiring icu admission

Causes	No. of Cases	Percentage
Hypertensive disorders	37	29
Anemia	74	58
Obstetric Haemorrhage	56	44
Puerperal sepsis	21	16
Heart disease	07	05
Jaundice in pregnancy	23	18
Hyperemesis gravidarum	04	03
Ruptured uterus	11	09
Ectopic pregnancy	09	07
Embolism	14	11
Anaphylactic reaction	08	06

Numbers do not add up to 128 because patients had more than one condition.

**Table 3:** Duration of ICU stay

Duration of stay	N=128	Percentage
<=6 HRS	17	13.2
7hrs – 2days	57	44.5
2days- 4days	43	33.5
4-7 days	07	5.4
>7 days	04	3.1

**Table 4:** Therapy provided in ICU

Therapy	N	Percentage
Ventilatory Support	41	32.03
Inotropic Support	46	35.9
Blood Transfusion	48	37.5
Blood Components	57	44.5
Dialysis	08	6.2

Numbers do not add up to 128 because some patients received combination therapy.

**Table 5:** Table 9 Surgical procedures: 78(60.9 %) underwent the following procedures

Surgical procedure	N	Percentage
Cesarean Delivery	31	39.7
Peripartum Hysterectomy	4	5.1
Laparotomy for Ectopic Pregnancy	11	14.1
Hystertomy	9	11.5
Repair of rupture uterus	7	8.9
Vaginal / cervical tear repair	4	5.1
Uterine tamponade by bakri balloon	7	8.9
Manual removal of placenta	3	3.8
Reposition of uterine inversion	2	2.5

Numbers do not add up because only 78 underwent surgical procedures.

#### Discussion

Maternal and perinatal morbidity and mortality are significantly high in obstetrics patients requiring vital organ support. Early

identification of critical illness is essential to provide aggressive support and resuscitation including ventilatory support and reduce maternal mortality.

Total number of ICU admission was 128 and total number of deliveries was 12828 over a period of 12 months. The total no of obstetric admissions during this period was 18281. Thus the

frequency of obstetric ICU admission is 01 in 100 deliveries. Thus ICU admissions accounted for 0.99% of the deliveries and 1.42% of total obstetric admissions. Ashakiran T, K.V. Rathod *et al.*<sup>[8]</sup> reported that ICU cases accounted for 1.19 % of all obstetric admissions and 1.24 % of all deliveries. Niyaz Ashraf, Sandeep Kumar Mishra *et al.*<sup>[9]</sup> reported 0.38% ICU admission in their study. Thus the no. of patients requiring ICU admissions in the present study was comparable to the available literature. Majority of the patients belonged to 20-30 years age group (72.8%) similar to the study of Shaikh *et al.*<sup>[10]</sup> (76%) and Tapan Pattnaik, Sunita Samal *et al* (79.6%)<sup>[11]</sup>.

In our study, 46.8% were primipara, while in the study by Ashakiran *et al* 38.4% were primigravida 82 % were admitted in antepartum period similar to 78% in study by Shaikh *et al.*<sup>[10]</sup> and 76% in the study of Niyaz Ashraf, Sandeep Kumar Mishra *et al.*<sup>[9]</sup>. However, most of cases were post-partum. Most were in the gestational age between 37 and 40 weeks (38%), similar to study by Togal *et al.*<sup>[12]</sup>

In my study obstetric hemorrhage found to be the most important antepartum risk factor (44%) after anaemia 58%, where antepartum haemorrhage were (52%), and post partum hemorrhage were (22%).

In our study ICU maternal mortality were 52%, majority of patients were referred from other peripheral centers and the majority were due to eclampsia and pre-eclampsia (58%) and postpartum hemorrhage (22%). In similar study by Umo-Etuk J *et al.*<sup>[13]</sup> mortality due to hemorrhage was 44.4% and due to hypertension it was 35.2%.

Other disorders included jaundice 23%, puerperal sepsis 21%, ruptured uterus 14% and embolism 11%. The most important pre-existing medical complication was heart disease in 7% cases. 82 percent required transfusion of blood and blood products probably due to the high incidence of postpartum haemorrhage and eclampsia.

The most common mode of delivery was cesarean section (39.7%) similar to study by Shaikh *et al.*<sup>[2]</sup> where it was 49.4%. Obstetric hysterectomy was required in 5.1%, as a life saving procedure which is comparable to the study done by Kanwar *et al.*<sup>[14]</sup> and study by Praneshwari Devi *et al.* since postpartum haemorrhage was an important cause of ICU admission.

## Conclusion

In spite of limitations, some careful conclusions can be drawn. We conclude that obstetric haemorrhage leading to haemodynamic instability remains the leading cause of ICU admission. Anemia still continues to be one of the major killers. Inotropic support and ventilatory support are the main interventions provided in the ICU, providing a better outcome. Duration of ventilation and stay in the ICU, although, were significantly more in the survivors.

In future multicentric studies, focusing on audit of obstetric ICUs in India will help to validate such observations as found in our study. It will also improve patient care and stimulate education in the management of such patients among the resident doctors, consultants and nursing staff. Development of an effective scoring system/App-based softwares, especially applicable to the critically ill obstetric patients in the Indian scenario, can possibly lead to accurate monitoring of quality care and risk stratification for clinical and therapeutic trials.

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