

Profile of Obstetric Patients in Intensive Care Unit: A Retrospective Study from a Tertiary Care Center in North India

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ABSTRACT

Background: Critically ill obstetric patients constitute a small number of intensive care unit (ICU) admissions. Physiological changes in pregnancy along with certain pregnancy-specific diseases may cause a rapid worsening of the health status of the patient necessitating ICU care. The present study aims to study the clinical profile of the obstetric patients requiring ICU care.

Materials and methods: It was a retrospective analysis of pregnant/postpartum (up to 6 weeks) admissions over a period of 18 months.

Results: Over these 18 months, 127 women required ICU admission. The most common reasons for ICU admission were obstetric hemorrhage (37.79%) and (pre)eclampsia (28.35%). Ten patients presented with antepartum hemorrhage (placenta previa, placenta accreta, placenta increta). The rest of the patients ($n = 38$) had atonic postpartum hemorrhage with five having severe anemia. Among the nonobstetric causes ($n = 26/127$), ICU admission was the most common among those with preexisting heart diseases ($n = 10$; 7.87%). Forty-nine patients were ventilated mechanically (38.58%), with eclampsia being the most common primary diagnosis ($n = 23$). We observed 10 maternal deaths (7.87%) with septicemia being the most important cause of death.

Conclusions: Maternal and child health has become an important measure of human and social development. Early diagnosis and prompt treatment of high-risk obstetric patients in a dedicated obstetric ICU in tertiary hospitals can prevent severe maternal morbidity and improve maternal care.

Keywords: Intensive care units; Maternal mortality; Pregnancy; Pregnancy complications.

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INTRODUCTION

Obstetric patients constitute a small proportion of intensive care unit (ICU) but present a challenge to the attending intensive care specialists owing to the concerns of fetal viability, altered maternal physiology, and diseases specific to pregnancy.¹ Admission to an ICU may be considered an objective marker of severe maternal morbidity.² Various studies have reported the percentage of pregnant or puerperal women who require ICU admission between 0.7 and 13.5% with a large variation among different countries and institutions.³ The reasons for ICU care in critically ill obstetric patients can be categorized into three groups. The first group comprises patients who present with illnesses specific to the pregnant patients like preeclampsia/eclampsia, thromboembolic disorders, peripartum/postpartum hemorrhage (PPH), and puerperal sepsis. The second group comprises patients who present with the existing illnesses resulting from medical conditions aggravated due to pregnancy like hypertension, rheumatic heart disease, and diabetes. The third group includes patients with preexisting medical conditions, which may not be as critical in a nonpregnant state, but which directly correlate with high mortality rates in pregnant women like hepatitis E.⁴

The aim of this study was to determine the incidence, epidemiological characteristics, morbidity, and mortality of pregnant and postpartum women who required admission to the ICU.

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MATERIALS AND METHODS

A retrospective record analysis of all obstetric admissions in the ICU of Government Medical College, Jammu, during the 18-month period from October 2018 to March 2020 was made. We included all pregnant women or women admitted within 6 weeks after delivery admitted to the obstetric ICU over this period.

Readmissions within 30 days were counted only once. Research data included patient demographics, obstetric/medical history and diagnosis at admission, ICU course and length of stay, and treatment given and outcome. The clinical indications responsible for ICU admission were also recorded and categorized as obstetric and nonobstetric.

Data were collected from the patient's files that were available in the Medical Record Section of our hospital and entered in a computerized database using MS Office Excel 2007 (Microsoft, Redmond, Washington, USA).

RESULTS

There were a total of 127 admissions in the ICU over a span of 18 months with 117 survivors and 10 deaths. The mean age of the patients was 26 ± 2.31 years. The demographic profile of patients is given in Table 1. The majority of patients (79.52%, $n = 101/127$) were admitted due to obstetric reasons, and 20.48% ($n = 26/127$) were due to nonobstetric causes. The most common causes of ICU

admission were obstetric hemorrhage followed by hypertensive disorders of pregnancy, comprising 37.79% ($n = 48/127$) and 28.35% ($n = 36/127$) of all ICU admissions, respectively (Table 2). Ten patients presented with antepartum hemorrhage (placenta previa, placenta accreta, placenta increta). The rest of the patients ($n = 38$) had atonic postpartum hemorrhage with five having severe anemia. Out of these, hysterectomy was performed in seven patients and balloon tamponade inserted in three patients as a life-saving procedure to stop bleeding.

Among the nonobstetric causes ($n = 26/127$), ICU admission was the most common among those with preexisting heart diseases ($n = 10$; 7.87%). All had a routine checkup done from a cardiologist during their antenatal visit to the gynecologist, and no maternal mortality was observed in this group.

Intrauterine death with sepsis ($n = 6$) was another major reason for maternal admission in our center. Forty-nine out of 127 patients required a mechanical ventilation (38.58%); the rest of the patients were kept for an intensive monitoring purpose only (Table 3). The mean duration of mechanical ventilation was 1.7 ± 1.3 days. Only one patient of glioma required tracheostomy. Culture and sensitivity was done in all six patients having septicemia.

Eleven patients were put on a renal replacement therapy. Patients had acute kidney injury following hemorrhagic shock, sepsis, systemic lupus erythematosus (SLE), and multiorgan dysfunction syndrome (MODS). Central venous line was placed in all 34 patients requiring an inotropic support. Blood and blood products were transfused in 83.5% of ICU admissions ($n = 106$). Transfusion-related allergic reactions were seen in only three patients. The mean length of ICU stay was 4 days.

There were 10 deaths reported (7.87%) in our study (Table 4). MODS following septicemia was the commonest cause ($n = 4$) followed by acute heart failure ($n = 3$).

DISCUSSION

The mean age of obstetric patients in our study is similar to that in other Indian studies⁵⁻⁷ contrary to the higher maternal age seen in developed countries.^{8,9} Multigravida constituted the majority of the admissions in our ICU (84%) as was seen in other studies.^{6,10} However, Dasgupta et al. found a higher percentage of primigravida admitted in their ICU.¹¹ Similar to other studies, postpartum females represented a higher proportion of ICU

Table 1: Patient characteristics

Parameter	Total patients (n = 127)
Age	26 ± 2.31 years
Background	
Urban	57 (44.88%)
Rural	70 (55.11%)
Parity	
Primigravida	20 (15.7%)
Multigravida	107 (84.25%)
Antenatal Care	
Provided	114 (89.76%)
Not provided	13 (10.23%)
Gestational age	36 ± 2.3 weeks
Time of admission to ICU	
Antepartum	6 (4.7%)
Postpartum	117 (92.12%)
Postabortal	4 (3.14%)
Mode of delivery	
Vaginal	10 (7.87%)
Caesarean	107 (84.25%)
Instrument-assisted	2 (1.57%)
Abortion/ectopic	8 (6.29%)

Table 2: Diagnosis at the time of ICU admission

Obstetric complications (n = 101, 79.52%)		Nonobstetric complications (n = 26, 20.48%)	
Hemorrhage	48 (47.5%)	Valvular heart disease	6 (23.07%)
Antepartum hemorrhage	10	Peripartum cardiomyopathy	4 (15.38%)
Postpartum hemorrhage	38	Restrictive lung disease	5 (19.23%)
Post-LSCS	29	Epilepsy	3 (11.53%)
Postvaginal	9	Others	8 (30.76%)
Hypertensive disorders	36 (35.64%)	Glioma	1
Preeclampsia	3	Takayasu arteritis	1
Eclampsia	31	Organophosphorus poisoning	1
HELLP syndrome	2	Snakebite	1
Rupture uterus	3 (2.97%)	Systemic lupus erythematosus	1
Ectopic pregnancy	4 (3.96%)	Pemphigus vulgaris	1
Intrauterine death with sepsis	6 (5.94%)	Head injury	1
Abortion with shock	4 (3.96%)	Anesthetic complication	1

Table 3: Interventions done in the intensive care unit

Interventions	Number of patients (n = 127)
Mechanical ventilation	49 (38.58%)
Inotropic support	64 (50.39%)
Arterial line insertion	6 (4.72%)
Central venous catheter	52 (40.94%)
Echocardiogram	12 (9.44%)
Ultrasound abdomen	24 (18.89%)
CT brain	7 (5.51%)
Renal replacement therapy	11 (8.66%)
Tracheostomy	1 (0.78%)
Blood and blood products	106 (83.5%)

Table 4: Causes of mortality

ICU admission diagnosis	Cause of death
Intrauterine death with sepsis (n = 4)	Sepsis, multiorgan failure
Severe anemia with postpartum hemorrhage (n = 3)	Acute heart failure
Pemphigus vulgaris (n = 1)	DIC, multiorgan failure
HELLP syndrome (n = 1)	DIC, multiorgan failure
Glioma (n = 1)	Hemorrhage in tumor

DIC, disseminated intravascular coagulation

admission than antepartum females in our study.^{12,13} Changes in hemodynamics during postpartum period such as 65% increase in cardiac output, acute blood loss during delivery, and a decrease in plasma oncotic pressure could be the major factors for higher incidence of postpartum admissions. Second, until absolutely necessary, pregnant women are generally not moved from the domain of an obstetrician. Bhadade et al.¹⁴ reported a very high antepartum admission percentage of 66.39%, but their study was from a medical ICU where they took into consideration indirect obstetric indications for admission as well.

The most common primary diagnosis for ICU admission in our study was obstetric hemorrhage, constituting 37.47% of all the patients. This was the most common reason for critical care admission in other studies from India and abroad as well.^{5,6,8-10} Severe anemia, atonic PPH, and antepartum hemorrhage were the common diagnoses, and most of them were managed with pharmacological interventions, blood transfusions, or inotropic support. Hysterectomy was the last resort opted as a life-saving procedure in a few patients (n = 7). Early diagnosis and prompt referral, well-equipped dedicated blood bank facility, and ICU in our tertiary care hospital have been the major contributing factors for decreasing mortality in young obstetric patients. Only five out of 48 patients required a mechanical ventilation, but despite the best measures, three patients of severe anemia with postpartum hemorrhage succumbed due to acute heart failure.

Hypertensive disorders of pregnancy were the second most common primary diagnosis of ICU admission in our report with eclampsia the most frequent obstetric complication as observed in other studies.¹³⁻¹⁵ In the study by Togal et al.,¹⁵ the main primary diagnosis for ICU admission was pregnancy induced hypertension. These patients mostly presented with refractory seizures or pulmonary edema, but three patients also had PPH. These were the set of patients that required the mechanical ventilation the most.

Pregnancy with preexisting heart disease was another set of population admitted in our ICU for an invasive monitoring. All

had good maternal and fetal outcomes except in one patient with Eisenmenger syndrome where perinatal mortality was seen.

Out of 127 patients, 49 required the mechanical ventilation in our obstetric ICU. Eclampsia was the most common indication of assisted ventilation (n = 23), followed by sepsis and PPH. Sepsis, obstetric or nonobstetric, is a great challenge to the intensivists and obstetrician. There is a variable incidence of sepsis in studies from developed and developing nations (5%⁸; 7.1%¹⁶; 10%¹⁷). Incidence of sepsis in the most of Indian studies was around 10 to 13%.^{5-7,10,11,18} In our series, sepsis was seen in 5.94% of patients and was the major cause of maternal mortality.

Snake bite, organophosphorus poisoning, and head injury were the other nonobstetric causes in which females required the mechanical ventilation in their antepartum period. One near-term patient in our study with a road traffic accident on CT scan showed hemorrhagic contusions. She was mechanically ventilated for a week's time, and periodic ultrasonography was done for fetal well-being. Pregnancy was electively terminated at 36 weeks. Both maternal and fetal outcomes were satisfactory.

To determine the degree of severity and risk of mortality in obstetric population, a number of scoring systems have been proposed. These include simplified acute physiology score (SAPS), the mortality prediction model, the standardized hospital mortality ratio, and the acute physiology and chronic health evaluation (APACHE II).¹⁹ The most commonly used scores are SAPS II and APACHE score, but both are not able to accurately predict the mortality in obstetric population as physiological alteration in pregnancy causes spuriously higher scores in the absence of any pathology. Owing to controversy in their applicability on obstetric population, like some other studies, we also did not use these scoring systems in our ICU patients.^{5,11}

Maternal mortality reveals women's overall status, access to health care, and the responsiveness of the health care system to their needs. Since ours is a government institution, pregnant women are provided special, free antenatal checkups in their pregnancy, including ultrasounds, blood, and urine tests. Mortality noted in our study was mostly among those who did not pay antenatal visits to any gynecologist especially during the last trimester. The maternal mortality rate in our study was 7.87%, which was less than the other studies done in India.¹¹⁻¹³

Early breastfeeding was initiated even in the ICU to facilitate maternal bonding and lower the lactation failure rates. This is particularly important in developing nations like India.

Our study had a few limitations. We included the patients admitted in obstetric ICU only. Since ours is a tertiary institute with high referral rate, a few of the obstetric patients were admitted into the medical ICU due to limited number of beds in obstetric ICU and were not included in our study. As it was a single-center study so the results are not indicative of the overall antenatal care provided at the peripheral health care centers.

CONCLUSION

Reduction in maternal mortality is an important healthcare parameter, and it requires the involvement of the whole health care system from the primary to tertiary level. Strengthening of the critical care is also important for saving the high-risk obstetric patients. A structured ICU with an interdisciplinary approach is necessary to reduce the high-risk obstetric mortality.



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