

Retrospective Analysis of Obstetric ICU Admissions in a Tertiary Care Hospital

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Abstract:**Aim:** The objective of this study is to analyze the cause and risk factors in obstetric patients admitted to the intensive care unit of a tertiary care.**Materials and Method:** It is a retrospective study of obstetric cases (pregnant & postpartum <42days) admitted to the obstetric ICU over a period of 2years from January 2020 to December 2021 in a tertiary care center in West of India.**Results:** During the study period about 251 patients were admitted to obstetric ICU. Maximum patients were admitted in age group of 21 - 30 years, 55.37% patient were referred from other centres apart from parent place, both primi & multigravida were admitted which was approx. 43%, majority of patients were admitted in 3rd trimester followed by in postpartum period. Amongst the admitted patient highest number of patients were admitted due to anemia followed by eclampsia, septicemia, APH, covid 19 infection and PPH. Maximum patients required blood transfusion which was 80.07%, followed by surgical intervention, inotropic support & ventilatory support. Maximum number of maternal mortalities were due to septicemia followed by Hemorrhagic shock & COVID 19 pneumonia.**Conclusion:** Common risk factors for ICU admission are severe anemia, hypertension, septicemia, APH, PPH, Heart disease & COVID 19 pneumonia due to COVID 19 pandemic.**Keywords:** Obstetric Intensive Care Unit, Obstetric Admissions, Maternal Mortality.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Obstetrician faces a unique challenge while managing critically ill pregnant mothers. Simultaneously managing two lives with distinct physiologies at the same time poses difficulties because of the different maternal physiology, developing fetus, rapid worsening of feto-maternal state in case of a catastrophe. Due to their current pregnancy state, these young, apparently fit pregnant women either demonstrate quick deterioration of their previous comorbidity or develop serious difficulties without warning indications, sometimes even catastrophically, which results in maternal mortality. For better outcomes for the mother and the fetus, these emergency circumstances should be treated in an intensive care unit (ICU) solely specialized to obstetrics. In advanced nations, 0.08 to 0.76% of

deliveries among pregnant women require ICU admission; in nations that are developing, the rate ranges from 0.13 to 4.6%, the figures in India are approx. 7%. [1,2,3]

The common causes of morbidity and mortality in these patients are anemia, hypertensive disorder, hemorrhage and septicemia.[4,5] Every maternal death or life-threatening complication has a story, according to the World Health Organization (WHO). To prevent such occurrences, it can be helpful to comprehend the lessons to be learned.6 These patients recover in a short period of time and most of such deaths can be prevented if the complications and their management are carried out effectively at the earliest in obstetric ICU. Despite the large number and varied strata of pregnant patients, there are few studies on critically ill

obstetrics patients from India. The current data was gathered to better understand the factors affecting maternal outcomes and to pinpoint those aspects that might be avoided and were the cause of unfavorable mother outcomes. The study's goal is to examine all obstetric admissions to a tertiary care facility's intensive care unit.

Materials & Methods

This study includes all the obstetric cases (pregnant and postpartum 42 days) that were admitted to the obstetric ICU over a two-year period, from January 2020 to December 2021, in a tertiary care center in Western India. The patient's case records were carefully examined once the admissions were discovered in the obstetric ICU register.

The variables that were observed included age, religion, referred cases, parity, antenatal and postnatal admission, diagnosis at admission, associated medical and surgical conditions, type of delivery, surgical procedure carried out, details of treatment like blood transfusion, ventilatory support, inotropic support & dialysis, maternal mortality & cause of death, near miss cases, and length of ICU stay. Both live births and stillbirths were documented as the neonatal outcome. The Obstetric ICU of hospital is 6 bedded & managed by the obstetrician & intensivist. 24hours laboratory & blood bank facilities are available. All the services inclusive of ICU admissions are free of cost for pregnant women & postpartum women.

Results

A total of 251 obstetric cases were admitted in Obstetric intensive care unit between Jan 2020 - Dec 2021. From the admitted patients about 93.22% patient were Hindu & 6.7% patients were Muslim, 55.37% patients were referred from another centre, maximum no. of patients were admitted during third trimester which was 50.19% followed by during postpartum period which was

35.58%, followed by during second trimester which was 9.16% followed by during first trimester which was 4.78%. 46.90% patients were normally delivered (Table 1), 50.51% patients delivered by LSCS, 2.57% delivered by assisted vaginal delivery (Table 2). 77.88% baby was live delivered & 22.11% baby was still born. 47.41% patients were near miss cases, 15.13% patients died (Table 3). Most of the cases 81.27% of cases were in 21-30years of age group. Primigravida (43%) & Multigravida (43%) both were equally admitted & grand multipara were 13.54% (Table 1). The different condition diagnosed on admission were anaemia including sickle cell Anaemia, Pregnancy induced hypertension (Severe PIH, Eclampsia, HELLP syndrome), Postpartum haemorrhage (Atonic PPH, Traumatic PPH), Heart disease, Septicaemia, Ectopic pregnancy, Abortion, Antepartum haemorrhage, COVID-19 Infection, Ruptured Uterus, Medical & Surgical Condition.

Highest no. of patient diagnosed with anaemia which was 39.84% out of that 11.15% patients were due to sickle cell anaemia followed by Eclampsia which was 17.92% followed by septicaemia which was 11.15% followed by PPH which was 8.75% (Table 4). Among the admitted patients 80.07% patients required blood transfusion, 21% patients required Inotropic support, 18.32 patients required ventilatory support, 21.07% required surgical intervention other than LSCS.

Various causes of death were Haemorrhagic shock, Septicaemia & MODS, COVID-19 Pneumonia, Acute pulmonary oedema, Congestive cardiac failure & DIC. 34.21% died due to Septicaemia & MODS which was highest. (Figure 1) Maximum patients about 50.59% patients were admitted for less than 7days duration.

Table 1: Baseline Characteristics of ICU Admission

ICU Admission Diagnosis		
AGE (N=251)	No of patients (n)	Percentage (%)
>20	8	3.18
20-25	133	52.98
26-30	71	28.28
31-35	25	9.96
36-40	13	5.17
>40	1	0.03
Time of Admission (N=251)		
1st Trimester	12	4.78
2 nd Trimester	23	9.16
3rd Trimester	126	50.19
PNC	90	35.85
GRAVIDA (N=251)		
PRIMI	108	43.02
MULTI	109	43.42

GRAND-MULTI	34	13.5
Hospital Admission (N=251)		
Direct	112	44.62
Referral	139	55.37

Table 2: Outcome of Delivery

Mode of Delivery	Live Birth	IUFD	N (%)
Emergency C Section	62	15	77 (30.67)
Vaginal	58	23	91 (36.25)
Elective C Section	21	0	21 (8.36)
Instrumentation	4	1	5 (1.99)
	145	49	251 (100)

Table 3: Outcome of ICU Admissions

Outcome	(N=251)	Duration		
		<2	2 TO 7	>7
Stable	94	43	46	5
Near Miss	119	27	79	13
Death	38	12	17	9

Table 4: Causes of ICU Admission

	Causes of ICU Admission		ICU Admission	
	(N=177)		Non-Obstetrics	(N=208)
Obstetrics				
Severe PIH	22		Anaemia	100
ECCLAMPSIA	45		Sickle Cell	28
HELLP	10		Heart DS	16
Atonic PPH	15		COVID	27
Traumatic PPH	7		Others	31
Septicemia	28		Surgical Condition	6
Ectopic	4			
Abortion	9			
APH	28			
Ruptured Uterus	9			

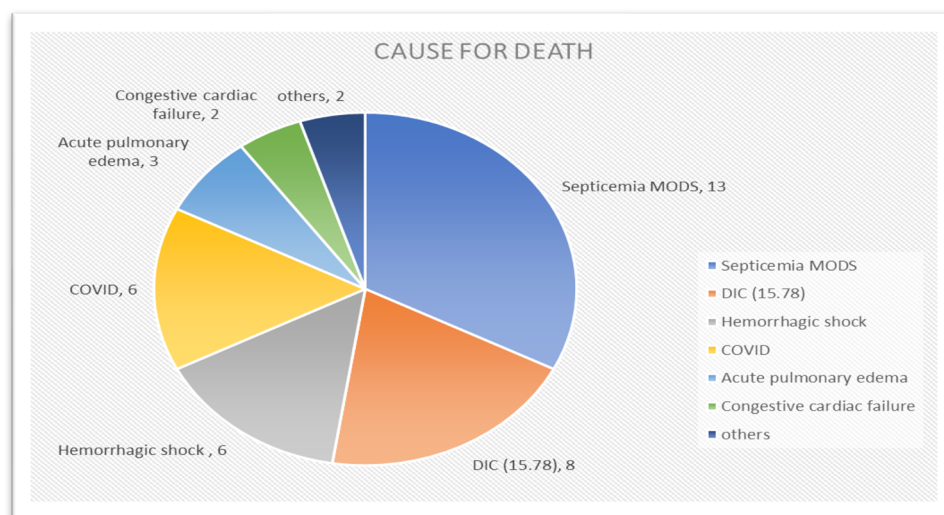


Figure 1: Cause for ICU Death

Discussion

Obstetric medicine is distinctive and challenging. Due to the multiple physiological changes that occur during pregnancy, it differs from general medicine, and only a skilled obstetrician with a

solid understanding of obstetric medicine can evaluate and comprehend complex problems in pregnancy. When compared to the population of people who are not pregnant, in patients who are pregnant, the threshold of an insult required for

ICU admission is lower. [7,8] We have observed women who experience obstetric complications such as bleeding and hypertensive problems develop disseminated intravascular coagulation very quickly. In pregnancy, the threshold for ventilator assistance is also low. These are only observations and experiences; more study is needed to back them up.

Even though pregnancy and birth are physiological processes, any disorder that may arise during these time periods could have fatal repercussions for both the mother and the fetus. Admissions of obstetric patients to intensive care units are a sign of severe maternal morbidity. [9,10] ICU admissions comprised 5% of all obstetric admissions and 6.9% of all deliveries in this study. Recent research indicates that the incidence varies across developed and developing nations. It varies between 0.08 and 4.6% of deliveries. [11] The rate is higher than in other studies because 90% of the ICU cases in this study were scheduled elsewhere and referred to our center for tertiary care. [12,13] The age group from 21 to 30 years old was the most severely affected, making up 81.27 %. It is interesting to note that there were an equal number of primiparous and multiparous women in our studied group. Inadequate antenatal care highlights the importance of good care in preventing antenatal complications and, if they do occur, in early detection of those complications. Prompt referral to a tertiary medical center significantly lowers the risk of morbidity and mortality for patients who are sent to the intensive care unit (ICU) for additional treatment and stabilization.

Gestational age: The majority of our patients (50%) were at term gestation, showing that problems are frequent at this gestational age and just before delivery. Other studies have found that the average gestational age is between 31 and 36 weeks. [14,15]

Antenatal period: Admissions for pregnancy were 64.15 %. These patients were either extremely ill or were not yet at term with gestation. Patients who were unwell and needed to give birth were moved to the labour room and, unless they needed ventilator support, admitted to the ICU following delivery. Given that these patients may require ventilator support at any time and that moving them later would waste time, the ICU should have capabilities for carrying out labour. Postpartum admissions are reported to be the majority in studies done thus far. A high rate, although not a majority, of antepartum hospitalizations and delivery admissions have both been observed in several studies. [16] Research on the epidemiology of antepartum admissions is needed.

Postpartum period: 35.85 % of patients were admitted in puerperium which included deliveries

from other hospitals. The management of the third stage of labour might be utilised as an indicator of treatment in outlying hospitals. Therefore, there is a need for junior doctors and nurses at peripheral hospitals to get education in the active management of the third stage of labour as well as in the identification and prompt referral of at-risk cases. The following are some potential motives: the most common postpartum complication was postpartum haemorrhage. [17] Other postpartum complications included cases that were referred from outside sources, patients who required caesarean sections were moved to the intensive care unit after the procedure. While few high-risk patients were already in active labour when they were moved to the ICU, and some patients who underwent caesarean sections experienced complications. [13,18,19] Only 2.39% of postoperative admissions were due to surgical conditions such as bladder rupture, peritonitis, or intestinal blockage; the majority were related to prenatal morbidity, for which a caesarean was performed. For instance, situations that necessitate surgical delivery, such as placental abruption, obstructed labour, HELLP syndrome, severe preeclampsia, and eclampsia, are more likely to cause postpartum haemorrhage and disseminated intravascular coagulation. Patients with severe preeclampsia are more likely to develop pulmonary edema following caesarean delivery. An ICU admission risk factor for surgical delivery is the existence of a medical or obstetric problem.

Co-morbidities: The quantity of coexisting circumstances on admission, 42.23 % of patients had multiple diagnoses. Any medical or obstetric risk factor has the ability to predict ICU admission. The risk rises as more conditions are identified at admission. 40.39 % of women could be managed in an HDU. [20] There should be a HDU in all tertiary obstetric care hospitals. It will minimize the burden on ICU staff. The most prevalent condition among significant risk factors requiring ICU hospitalization was anaemia (39.84%), followed by hypertensive disorder of pregnancy (26.68 %). Sepsis (11.15 %), antepartum haemorrhage (11.15 %), and COVID-19 were the other three serious disorders (10.75 %). According to some studies, hypertensive disorders are the most prevalent ailment, however obstetric haemorrhage is the most prevalent condition according to other studies. From 24 researches, the range for hypertensive diseases is 7–73.6 %, with a mean of 34.85 %. The range for obstetric haemorrhage is between 11 and 62.5 %, with a mean of 27.90 % based on 23 researches. According to Small MJ, cardiac dysfunction is the most frequent ailment and occurs in 36% of cases. [21] In addition, Mirghani reported a higher prevalence of heart illness than this study did (6.37%), at 21.6%. [22] In other research, the percentage of heart illness varies from

3.5 to 18.3. In other trials, sepsis was observed in the range of 2.4–18.3. Similar sepsis rates to our analysis were reported in three studies. [23] A high percentage of 30.9 % is reported by Yuel. According to one study conducted in India, anaemia is the most common risk factor and has a high prevalence rate (38.18 %).

Cesarean delivery: Women underwent surgery in 58.56 % of cases. The emergency caesarean section was the most popular surgical operation (39.04 %). Compared to this study, other studies find higher rates of caesarean sections among ICU patients: 78.5 %, 50.7 %, 52.9 %, and 67.27 %. This suggests that the majority of the ladies required surgical delivery. Further study is required since caesarean deliveries, particularly when there are obstetric and medical comorbidities can be a risk factor for ICU admission. Cesarean delivery is a modified risk factor for ICU hospitalisation, according to Zwart. [24]

Maternal Mortality: 38 women died from pregnancy-related causes, making up 15.13 percent of obstetric patients admitted to intensive care units and 19.58 percent of deliveries among these patients. The high percentage of death in antenatal compared to other studies was majorly due to COVID 19 (40%). 25 50% of maternal death was seen in primigravida while 8% seen in grand-multipara. In our study, 20% of patients with mortality underwent delivery outside and were referred postpartum and 80% patients were referred antenatally in critical condition with obstetrics complications. As high as 82% of referred patient expired during the ICU stay, which infers to lower the incidence of maternal mortality, early detection, and prompt referral to a tertiary care facility with intensive care capabilities should be encouraged. The maternal mortality was higher among caesarean delivery (34%) compared to normal delivery (26%). Multiorgan Dysfunction Syndrome (34.21%), hemorrhagic shock (15.78%), and COVID (15.78 %) were the leading reasons for maternal mortality. [26] Our study has shown a high mortality in comparison to previous studies but low in comparison to those conducted in India. According to several researches, the most common cause of death is multiorgan dysfunction. [27] Regardless of the underlying condition, multiorgan failure is a typical side effect of pregnancy. Pregnancy-related hypertension disorders are the most frequent cause. The main causes of multiorgan failure were sepsis, HELLP syndrome and AFLP. In our study 5% of deliveries needed intensive care. The small patient population prevented the differentiation of prognostic variables between survivors and non-survivors. However, given the small sample size and short study time, we infer that other risk factors for ICU admission include severe anaemia, hypertension,

sepsis, the requirement for a caesarean delivery, and more than one diagnosis at admission. HDU is required in tertiary care facilities. Training in emergency obstetrics is required in order to handle the difficulty as soon as it arises. Junior physicians working in peripheral health facilities must also receive training in recognizing at-risk patients and making prompt referrals.

Conclusion

The purpose of the study was to provide an insight to characteristics of admission of obstetrics patients in to an intensive care unit. The results in this study can help to identify the high-risk cases at early stage and improve the outcomes. Our effort to compile data on the ICU admissions of pregnant females can contribute to a nationwide study on the causes of maternal mortality and morbidity. Further helping in policy making to decrease the maternal mortalities.

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