

Evaluation of obstetric admissions to intensive care unit of a tertiary referral center in coastal India

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Abstract

Background and Aim: To evaluate the occurrence, indications, course, interventions, and outcome of obstetric patients admitted to the intensive care unit (ICU). **Design:** Retrospective study. **Setting:** ICU of a Medical College Hospital. **Materials and Methods:** The data collected were age, parity, obstetric status, primary diagnosis, interventions, and outcome of obstetric patients admitted to the ICU from Jan 2005 to June 2011. **Results:** Total deliveries were 16,804 in 6.5 years. Obstetric admissions to the ICU were ($n = 65$) which constitutes 0.39% of deliveries. Majority of the admissions were in the postpartum period ($n = 46, 70.8\%$). The two common indications for admission were obstetric hemorrhage ($n = 18, 27.7\%$) and pregnancy related hypertension with its complications ($n = 17, 26.2\%$). The most common intervention was artificial ventilation ($n = 41, 63\%$). The mortality among obstetric admissions in the ICU was (33.8% (22/65)). The patients appropriate for High Dependency Unit (HDU) care was (32.3% (21/65)). The statistical analysis was done by fractional percentage and Chi-square test. **Conclusions:** Hemorrhage and pregnancy-related hypertension with its complications are the two common indications for ICU admissions. The need for a HDU should be considered.

Keywords: Hemorrhage, intensive care unit, maternal death, maternal morbidity

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Introduction

Management of the critically ill obstetric woman at an ICU is a unique challenge to ICU Physicians and obstetricians. Admission of obstetric patients occur approximately at 0.1-0.9% of the deliveries.^[1-4] Overall maternal death rate in the ICU varies from 3.4-21%.^[5-8] Inadequate knowledge about the illness and infrequent admission of the obstetric patients results in high mortality and morbidity. WHO states that, "there is a story behind every maternal death or life-threatening complication".^[9] So a better knowledge of the spectrum, characteristics, and outcomes of the disease involving this group of patients is the first step towards achieving prevention and hence, reduction of both maternal morbidity and

mortality.^[10] The challenge faced in the treatment of this patient population are even greater due to the fact that sometimes two lives are endangered simultaneously.^[11] From Indian perspective, there are relatively few reports and this study attempts at evaluating the occurrence, indications, course, interventions, and outcome of obstetric patients admitted to ICU of a tertiary referral hospital.

Materials and Methods

This retrospective study was conducted from Jan 2005 to June 2011, in a 1,200 bedded hospital with 20 and 7 beds in medical and cardiac ICU, respectively with no obstetric ICU. It is one of the tertiary referral centers situated in the city having around 2,500-3,000 deliveries in a year. After obtaining clearance from the ethical committee, the medical records of all the patients admitted to ICU during pregnancy or within 6 weeks of delivery were reviewed. The data collected were based on the age of the patient, parity, socioeconomic status using the scale proposed by Kuppaswamy,^[12]

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obstetric status at the time of admission to ICU, the primary diagnosis, complications, the mode of delivery, interventions, maternal outcome, and duration of ICU stay. The data were scrutinized by experienced intensivists and statistical analysis was done by using fractional percentage and Chi-square test. The number of patients requiring high dependency unit (HDU) or ICU admissions were assessed based on the requirement of only basic support as opposed to support for one organ system with acute or acute on chronic single organ failure and step up or step down support between levels of care.^[13]

Results

There were a total of 16,804 deliveries in the hospital during the 6.5-year study period. Obstetric patients admitted to the ICU were 65 which constitute 0.39% of the total deliveries. The total admissions to the ICU were 15,600. Obstetric patients represented 0.41% of all ICU admissions. The mean maternal age was 28 ± 5.7 years. Majority of the patients were multipara ($n = 37$, 56.9%). The total admissions in postpartum period were 46 (70.8%). Most of our patients were from the lower socioeconomic background ($n = 55$, 84.7%), while the remaining were from the lower middle class ($n = 10$, 15.3%). Obstetric indications for ICU admissions were present in 40 (61.5%) of those patients and nonobstetric indications were present in 25 (38.5%) of them. Among the antepartum admissions, 12 (75%) had associated medical disorders. Obstetric disorders were present in 31 (67.3%) of postpartum admissions. Diagnoses leading to ICU admissions are given in Table 1.

During the ICU stay, complications like disseminated intravascular coagulation (DIC) in 12 (18.4%) patients, acute renal failure in 11 (16.9%), acute respiratory distress syndrome (ARDS) in 9 (13.8%), pulmonary edema in 5 (7.6%), hepatic encephalopathy in 1 (1.53%), and deep vein thrombosis (DVT) with pulmonary embolism in 1 (1.53%) patient were observed. The distribution of organ failures is displayed in Table 2. ICU interventions included mechanical ventilation in 41 (63%) patients, transfusion of blood and blood products in 30 (46.2%), inotropes in 27 (41.5%), antihypertensives in 23 (35.3%), anticonvulsants in 9 (13.8%), and dialysis in 5 (7.7%). The indications for mechanical ventilation are shown in Table 3. With respect to the type of deliveries, 28 (43.0%) of them delivered vaginally while 26 (40%) were delivered by cesarean section. Peripartum hysterectomy was done in 8 (12.3%) patients. The indications for hysterectomy were atonic postpartum hemorrhage (PPH) in 7 cases and rupture uterus in one case. Uterine packing was done in 2 (3.07%) patients. Uterine artery embolization

was done in 1 (1.53%) case. Evacuation of products of conception was done in 3 (4.6%) cases. Biliary stenting was done for 2 (3.07%) patients and tracheostomy for

Table 1: Primary diagnosis at the time of admission (n=65)

Diagnosis	Number	Percentage
Obstretic	40	62
Major hemorrhage	18	28
Hypertensive disease	17	26
Preeclampsia	4	6
Eclampsia	7	11
Hellp syndrome	4	6
Cerebrovascular accident	2	3
Sepsis of pelvic origin	4	6
Amniotic fluid embolism	1	1.5
Nonobstretic	25	38
Cardiac disease	10	15
Liver disease	1	1.5
Respiratory failure	4	6
Anesthetic complication	1	1.5
Nonobstretic sepsis	5	8
Hypovolemic shock secondary		
To abdominal wall hematoma	1	1.5
Epilepsy	1	1.5
Acute pancreatitis	1	1.5
TB meningitis	1	1.5

TB: Tubercular meningitis

Table 2: Distribution of organ failures (n=49)

Failing organs	Number (%)
Respiratory	13 (27)
Hematologic	12 (24)
Renal	11 (22)
Cardiovascular	8 (16)
Cerebrovascular	3 (6)
Hepatic	2 (4)

Table 3: Indications for mechanical ventilation (n=41)

Indication	Number (%)
Acute respiratory failure	18 (44)
Hemodynamic failure	15 (37)
Impaired consciousness	6 (15)
Postoperative ventilation	2 (5)

Table 4: ICU interventions

Interventions	Frequency	Percentage
Mechanical ventilation	41	63.00
Blood and blood products	30	46.2
Inotropes	27	41.5
Antihypertensives	23	35.3
Anticonvulsants	9	13.8
Dialysis	5	7.7
Obstetric hysterectomy	8	12.3
Uterine artery embolization	1	1.53
Uterine packing	2	3.07
Dilation and curettage	3	4.6
Stenting	2	3.07
Evacuation of the hematoma	1	1.53
Laparotomy	2	3.07
Tracheostomy	1	1.53

ICU: Intensive care unit

1 (1.53%) patient. Rectus sheath hematoma evacuation was done in 1 (1.53%) patient [Table 4].

The most common diagnosis was obstetric hemorrhage (18, 27.7%). This group of patients developed DIC in 7 (38.8%), acute renal failure in 3 (16.6%), and ARDS in 3 (16.6%). Mechanical ventilation was used in 15 (83.3%) patients, blood and blood products in 18 (100%), and inotropes in 15 (83.3%). In the hemorrhage group, a total of 8 (44.4%) patients died.

Majority of the patients 42 (64.6%) improved. The ICU maternal mortality rate was 33.8%. The death rate was high (17, 77.3%) among patients admitted for obstetric indications compared to the nonobstetric indications (5, 22.7%). The causes of death are shown in Table 5. Majority of the patients were referred from peripheral hospitals 15 (68.2%) [Figure 1], which is statistically significant ($\chi^2 = 3.909$; $P = 0.046$, i.e., <0.05).

Thirty-six (56%) patients stayed for less than 48 h. Only 2 (3.1%) patients, one with respiratory failure and the other with tubercular meningitis stayed for more than 10 days. After analyzing the data, 21 (32.3%) patients were found to be appropriate candidates for HDU care.

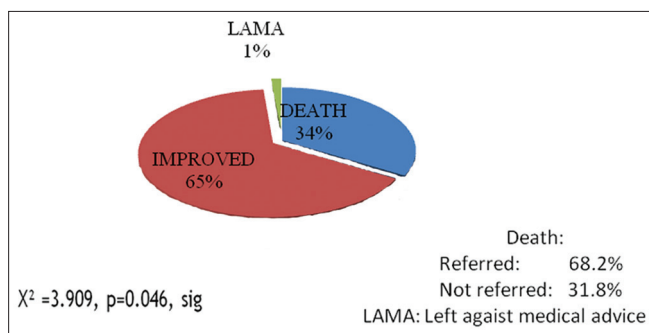


Figure 1: Maternal outcome

Table 5: Causes of maternal death in 22 patients

Primary cause of death	Number of deaths (%)	Primary diagnosis	Number of deaths
Hypovolemic shock	8 (36)	Obstetric hemorrhage	8
Multiorgan dysfunction syndrome	6 (27)	Eclampsia	2
		HELLP syndrome	2
		Sepsis of pelvic origin	2
Intracranial hemorrhage	3 (14)	Intracerebral bleed	1
		Severe preeclampsia	2
Respiratory failure	3 (14)	Pulmonary embolism	2
		Hepatic encephalopathy	1
		Peripartum cardiomyopathy	1
Cardiac failure	2 (9)	Pulmonary edema	1

Discussion

Despite a series of physiological alterations in pregnancy, most women complete pregnancy uneventfully, but a few of them develop complications that may require ICU admissions. During the 6.5-year study period, obstetric admissions to the ICU represented 0.39% of all deliveries and 0.41% of all those admitted to the ICU. This is comparable with other studies (0.1-0.9%).^[1-4] These variations might be due to differences in defining major morbidity criteria for ICU admission and availability of an alternative facility for intermediate care. The relatively high admission rate in our study might be due to the lack of a HDU, where patients not suitable for ward observation were transferred to the ICU. Only 24.6% of admissions were antepartum which is in agreement with earlier observations (22.1-62.4%).^[14] Majority of the admissions are due to obstetric as compared to nonobstetric indications. This is similar to the study reported by Vasquez *et al.* in 2007.^[15] It was observed that the associated medical disorders contributed to 75% of the antepartum admissions while obstetric disorders comprised 67.3% in the postpartum period. These observations are comparable to an earlier study by Karnad *et al.* in 2004.^[16]

As in other reports,^[14,17] major obstetric hemorrhage 18 (27.7%) and pregnancy-related hypertension with its complications 17 (26.2%) were the two main primary diagnoses at the time of admission. Both are associated with increased risk of maternal morbidity and mortality. The mortality rate was found to be higher in the hemorrhage group (44.4%) as compared to the hypertension group (35.2%). Early detection and timely appropriate intervention might avoid or minimize the effects of such complications. Among patients with obstetric hemorrhage, majority had postpartum as compared to antepartum hemorrhage. Most of the cases had severe PPH which necessitated surgical interventions like emergency peripartum hysterectomy in 8 (12.3%) cases, uterine packing in 2 (3.1%), and uterine artery embolization in 1 (1.5%). A number of ICU scoring systems were used to determine the degree of severity and risk of mortality. These include the simplified acute physiology score (SAPS), the mortality prediction model, the standardized hospital mortality ratio, and the acute physiology and chronic health evaluation (APACHE II).^[18,19] The most frequently used scores were simplified acute physiological score (SAPS II) and APACHE score. Both were not able to accurately predict the mortality in obstetric population. This was explained by the fact that obstetric patients are relatively young and the physiological alteration in pregnancy causes higher scores in the absence of any pathology.^[14] Therefore, it was not used in our study.

A total of 41 (63%) of our patients received mechanical ventilation which was comparable to the study done in China.^[10] The most frequent indications were acute respiratory failure (44%) and hemodynamic failure (37%).^[15] The proportional death rate among obstetric patients in our ICU was 33.8% which is higher than reported in other studies 3.4-21%.^[5-8] The death rate was high (77.3%) among patients admitted for obstetric as opposed to nonobstetric indications (22.7%). In contrast in another study there were no such differences.^[15] Hypovolemic shock and multiorgan dysfunction (MOD) are the two common primary causes of death in comparison with MOD and intracranial hemorrhage.^[15] Among the dead patients, 15 (68.2%) were referred from peripheral medical centres. This high mortality rate could be due to late referral from the peripheral centers, lack of awareness about the disease severity by the community, delay in transportation, and delay in initiation of the treatment. Mortality rate may be reduced by health education, training care-givers to identify high risk cases, training obstetricians in basic emergency care, and early referral to higher centers where multidisciplinary personnel are available. Majority of the patients in our study belong to the lower class of socioeconomic status who cannot afford ICU care. Twenty-one (32.3%) patients could have been the candidates for high dependency care unit. Setting up high dependency unit could be useful in reducing the psychological and financial burden to the patients and their families.

Conclusion

Hemorrhage and pregnancy-related hypertension with its complications are the two common indications for ICU admissions in this study. Studying the near miss cases may help to modify the hospital processes for timely and better obstetric or medical interventions. Establishment of HDUs may help in earlier admission of moderately ill patients for better observation and may also reduce ICU admissions. The need for a HDU should be considered in every tertiary referral center. Early recognition of high-risk cases and appropriate referral may improve clinical outcome. A multi-disciplinary team approach is mandatory in the care of obstetrical emergencies.

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