

# An Observational Study of Obstetric Patients in a Tertiary Care Hospital Requiring Critical Care

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## ABSTRACT

**Aims and objectives:** Obstetric complications are becoming increasingly common in the present era, despite profound technological and healthcare advancements. The etiology is multifactorial, and our study aimed to review all obstetric patients admitted to the intensive care unit (ICU) in a Tertiary Referral Center over one year to characterize these patients about frequency, timing, and cause of admission and record the outcomes in terms of perinatal and maternal morbidity and mortality.

**Materials and methods:** All antenatal and postnatal obstetric patients admitted to our center over one year in the ICU were reviewed. Obstetric data included gestational age at the time of admission and delivery, parity, type and place of delivery, indications of operative delivery, need for obstetric hysterectomy, and neonatal and maternal outcomes. Intensive care unit admitting diagnoses were divided into three categories respiratory failure, hemodynamic instability, and neurological dysfunction ICU-related data included the number of days in the ICU and the need for mechanical ventilation.

**Results:** During the study period, the incidence of ICU admissions was 0.99%. Among these patients, 46% were aged 21–25 years. Primiparas accounted for 53%, and 61% had a gestational age of 34–42 weeks. Postpartum admissions to the ICU constituted 92%, with 81% due to obstetric complications, primarily eclampsia, and preeclampsia, which represented 46% of admissions. Medical complications accounted for 19% of admissions, with cardiac diseases being the most significant at 64%. Hemodynamic instability was the leading cause of ICU admission, at 50%, followed by neurologic complications at 33%. Of the ICU-admitted patients, 94% had already delivered, with 34% undergoing lower segment cesarean section and 34% having an obstetric hysterectomy for postpartum hemorrhage. Live births were 37% of all neonates, with 18% admitted to the neonatal ICU and subsequently discharged, and perinatal mortality stood at 39%. The overall maternal mortality rate in the ICU was 37%, predominantly due to hemodynamic shock. Ventilator support was successfully weaned in 51% of patients, who were then discharged. A further 12% were transferred to a higher-level facility, with the average duration of mechanical ventilation being 2 days and 6 hours.

**Conclusion:** Eclampsia and preeclampsia were the leading causes of ICU admission. The leading cause of maternal mortality in the ICU was obstetric hemorrhage. The setting up of a high-dependency unit could lead to a decrease in the number of ICU admissions. Additionally, awareness of the importance of regular antenatal visits could help reduce obstetric complications.

**Keywords:** Critical care, Gestational hypertension, Hemodynamic instability, High risk pregnancy, Labor monitoring, Maternal mortality, Mechanical ventilation, Obstetric complications, Perinatal morbidity.

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## INTRODUCTION

Obstetric complications and the requirement for intensive care are areas of rising concern both in developed and developing countries.<sup>1</sup> The most important reasons for the development of such complications in developed countries are delays in planning the first pregnancy, increased use of artificial reproduction technology, and the rising incidence of chronic illnesses.<sup>2</sup> In developing countries, the etiology is multifactorial, spanning from reduced awareness of seeking proper antenatal care to a lack of resources in various healthcare setups. The immense efforts by the Government of India to introduce various health schemes for pregnant women have positively impacted care and reduced maternal complications.<sup>3</sup> A lot remains to be achieved in terms of a reduction in maternal mortality and morbidity, but high-risk obstetrics needs to be identified as a unique threat to the lives of a young cohort of the population, and aggressive protocols and standard operating procedures need to be charted out to ensure

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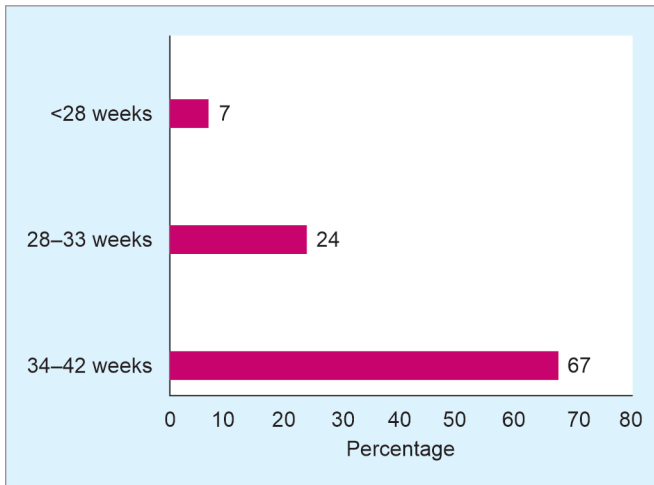


Fig. 1: Gestational age distribution of study patients

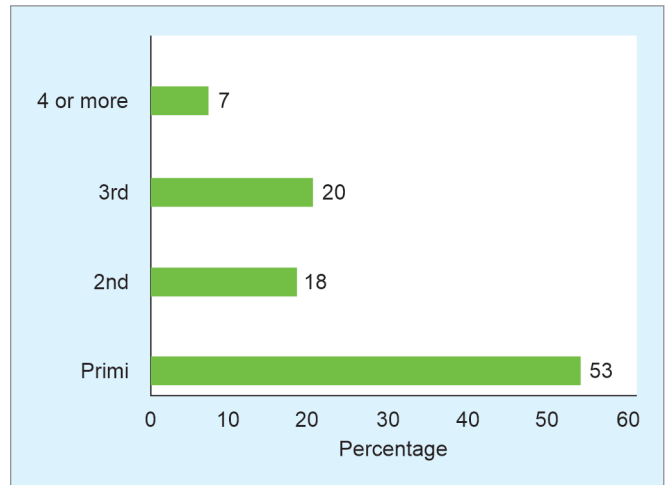


Fig. 2: Parity distribution of study patients

uniformity in managing such cases. This study analyzes obstetric patients who required ICU admissions and breaks down the facts to identify areas for possible improvement.

**MATERIALS AND METHODS**

This retrospective, observational study aimed to review all obstetric patients admitted to the ICU in a Tertiary Care Center over 1 year to characterize those patients with respect to frequency, timing, and cause of admission and record the outcome in terms of perinatal and maternal morbidity and mortality. Ninety patients, including antenatal and postnatal patients (up to 42 days of delivery) requiring ICU care, were included in the study. The ICU admitting diagnosis encompassed three major categories of patients with respiratory failure, hemodynamic instability, and neurologic dysfunction. The data collection instruments were finalized before the retrospective analysis and included sections like demographics, obstetric history, medical and surgical history, the obstetric and medical complications requiring ICU admission, categorization of ICU admitting diagnosis, maternal and fetal outcomes, and causes of maternal mortality in ICU. Statistical analysis was done by calculating the mean, standard deviation, and proportions. All the calculations were done using SPSS software version 20.0, IBM Corporation, New York, USA. The graphs were prepared in Microsoft Excel. The Institutional Ethics Committee approved the study.

**RESULTS**

The incidence of ICU admissions over the study period was 0.99%. About 46% of patients belonged to the age-group of 21-25 years. The mean age of patients was  $23.4 \pm 4.87$  (mean with standard deviation). Figure 1 demonstrates the gestational age distribution of the patients and Figure 2 demonstrates the parity of the patients. There are 53% of study patients in primipara and 61% had a gestational age between 34 and 42 weeks. Figure 3 demonstrates the obstetric complications leading to ICU admissions. Around 92% were admitted to the ICU during the postpartum period, of which 81% were because of obstetric complications, the major being eclampsia and preeclampsia at 46%. Other obstetric complications leading to ICU admissions were obstetric hemorrhage, anemia, peripartum cardiomyopathy, and puerperal pyrexia. Figure 4 demonstrates the medical complications

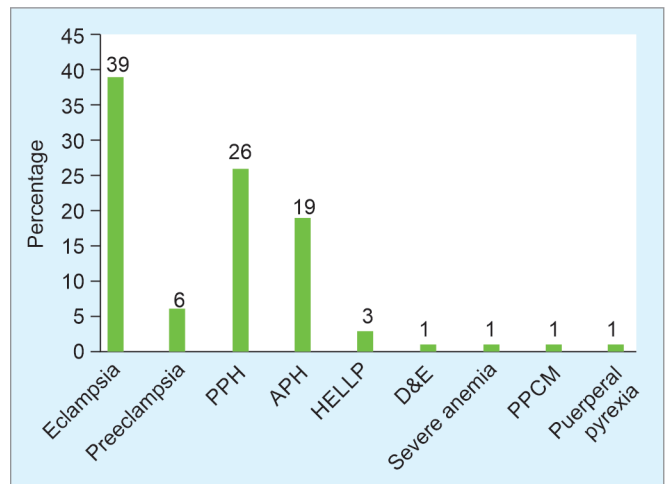


Fig. 3: Obstetric complications leading to ICU admissions

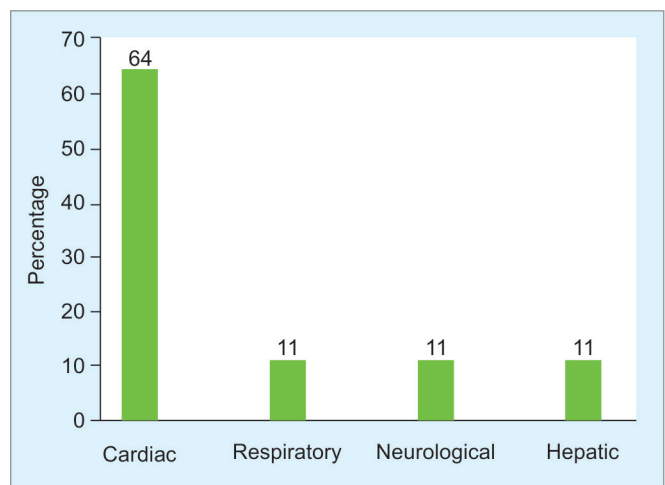


Fig. 4: Medical complications leading to ICU admissions

leading to ICU admission. Due to medical complications 19% were admitted, and the major being cardiac diseases at 64%.

Figure 5 demonstrates the broad categories of the ICU admitting diagnosis. The major ICU admitting diagnosis among all was hemodynamic instability, accounting for 50% of admissions, followed by 30% of admissions for neurologic complications, 13% of admissions for cardiac complications, and 6% of admissions for extubation difficulty. Figure 6 demonstrates the obstetric outcomes of the patients. In ICU, 94% of patients admitted had delivered, of which 34% underwent a lower segment cesarean section and 34% underwent obstetric hysterectomy for postpartum hemorrhage. Figure 7 demonstrates the perinatal outcome of the newborns delivered. About 37% of all neonates were live born, 18% were admitted to neonatal ICU and later discharged, and 39% had perinatal mortality. Figures 8 and 9

demonstrate the maternal outcome and various causes of maternal mortality. The overall maternal mortality in ICU was 37%, of which the major cause was a hemodynamic shock, 51% of

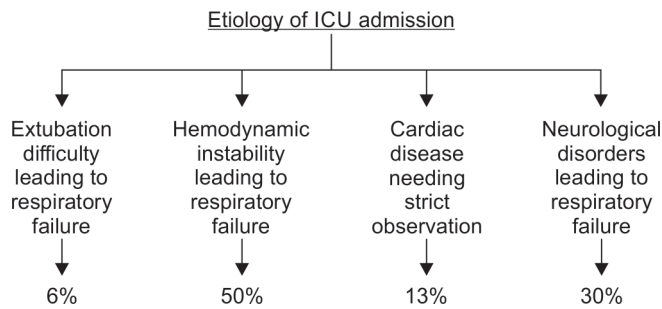


Fig. 5: Etiology of ICU admission

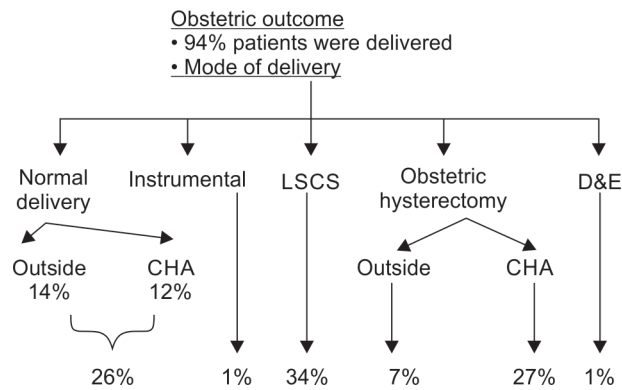


Fig. 6: Obstetric outcome of patients requiring ICU cares

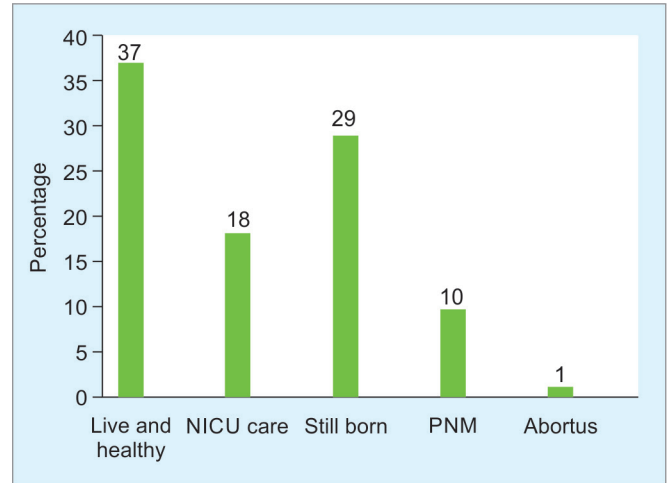


Fig. 7: Perinatal outcomes of patients requiring ICU care

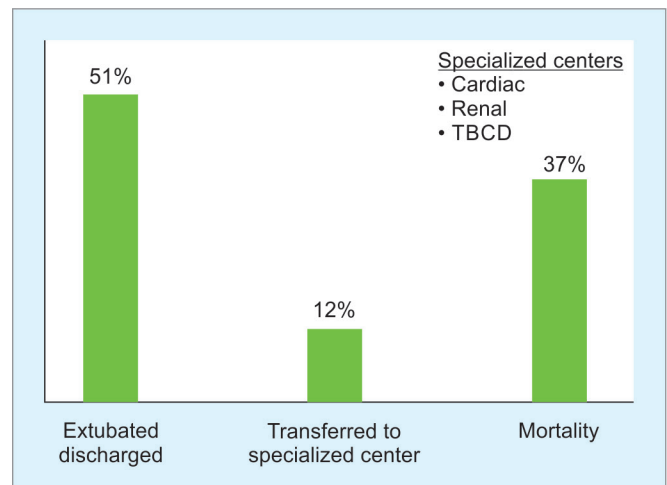


Fig. 8: Maternal outcomes of patients requiring ICU admission

Serial No.	Diagnosis	Number	%
1	Hemodynamic shock after OBS hysterectomy	10	30
2	Hemodynamic shock after PPH	5	15
3	Eclampsia	6	18
4	Severe anemia	3	09
5	Cardiorespiratory arrest	3	09
6	DIC	2	06
7	Puerperal pyrexia	1	01
8	Jaundice	2	06
9	Hepatic encephalopathy	1	01

Fig. 9: Causes of maternal mortality in patients requiring ICU care

patients were weaned off ventilator support and later discharged. Patients (12%) were transferred to a higher center for further management, the mean number of days of receiving mechanical ventilation were 2 days and 6 hours.

## DISCUSSION

During the study period, there were 9,091 deliveries at our institute and ninety patients needed ICU admission for further management making the incidence of ICU admission at 0.99%. The population-based incidence of ICU admission in obstetric patients was 9.89 per 1,000 deliveries, which was considerably higher than in developed countries, as evidenced by a study by Zwart et al. where a 2-year cohort study in a developed nation found the incidence to be 2.4/1,000.<sup>4</sup> Though there is a rising concern that increased maternal age at 1st pregnancy factors as an important determinant of maternal morbidity, our study found that the highest incidence of ICU admissions among obstetric patients was in the age-group of 20–24 years. This differs from other national and international studies where the incidence of obstetric ICU admissions was proportionately higher in patients over 30 years of age.<sup>5,6</sup> This was possibly due the fact that eclampsia and preeclampsia were some of the leading obstetric causes of ICU admission in our studies, and 1st pregnancy and younger age conferred a high risk of eclampsia.<sup>7</sup> The majority of our patients were in the 3rd trimester of pregnancy a finding that concurs with the study by Alex Farr et al.<sup>8</sup> Totally 92% of admissions to the ICU were in the postpartum period, which echoes the findings of a study by Padilla et al. where 62–92% of admissions occurred during this period.<sup>9</sup> The case fatality rate for ICU-admitted patients was 37%, which is nearly similar to that represented by Dasgupta et al. where the CCU mortality rate was estimated at 33.66%.<sup>10</sup> The leading cause of maternal mortality in the ICU was obstetric hemorrhage either stemming from antepartum or postpartum hemorrhage, which constituted 45% of maternal deaths. Eclampsia resulted in 18% of deaths while severe anemia and cardiorespiratory arrest constituted 9% of deaths each. In our study, 72% of patients were unbooked with no previous antenatal visits, and respiratory failure was the leading secondary cause leading to ICU admissions. The average ICU stay per patient was 2 days and 6 hours which is nearly similar to the data projected in national and international studies on obstetric critical care.<sup>11</sup>

## CONCLUSION

The setting up of a high-dependency unit could lead to a decrease in the number of ICU admissions. Additionally, awareness of the importance of regular antenatal visits could help reduce obstetric complications. The study limitations included a retrospective format of the study and a small sample size of ninety patients. Further prospective studies including a large sample population and reporting of institutional data could result in projecting the

nationwide obstetric critical care requirements and help formulate guidelines for managing and caring for these young patients who suffer from life-threatening complications of an otherwise physiological condition that is pregnancy.

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