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Original Research Article

A two year review of indications and outcomes of obstetric admissions to ICU of a tertiary care hospital

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ABSTRACT

Background: Managing critically ill obstetric patients presents a unique challenge. The outcomes of these cases not only serve as a measure of the quality of patient care but also aid in refining risk stratification for pregnant patients and evaluating new therapeutic approaches. This study aims to review a series of critically ill obstetric patients admitted to our ICU, examining the spectrum of diseases, necessary interventions and maternal outcomes, while identifying factors linked to maternal mortality.
Methods: This retrospective observational study was conducted in 7-bed obstetric ICU in a 300 bedded tertiary care hospital over 2-year period (August 2022-July 2024) at 1200 Bed Medicity Hospital, B. J. Medical College, Ahmedabad, Gujarat, India.
Results: Only obstetric patients were admitted to the ICU. The leading obstetric indication for ICU admission was hypertensive disorders (28.8%). Maternal mortality was 3.03%. The main cause of maternal death was due to medical disorders (32.7%). ICU interventions included mechanical ventilation, blood products transfusion, inotropes, anti-hypertensives and dialysis.
Conclusions: The demand for ICU management of obstetric conditions is increasing. Hypertensive disorders of pregnancy and hemorrhage have been the leading reasons for obstetric ICU admissions over the past two years. To improve outcomes for mothers and babies, it is essential to involve a multidisciplinary team early, including intensivists, obstetricians and physicians, to provide coordinated care. Obstetric teams should also develop basic skills in managing high-dependency unit (HDU) cases. This study highlights the importance of screening and preventing preeclampsia, providing antenatal education and encouraging early reporting and referral of complications.

Keywords: Obstetric ICU, High risk pregnancy

INTRODUCTION

Maternal mortality is a critical indicator of a country's healthcare quality. In India, it remains significantly high at 93 per 100,000 live births, despite the introduction of various safe motherhood programs.[1] As noted by the WHO, "every maternal death or life-threatening complication has a story behind it." The primary causes of maternal mortality include hemorrhage, sepsis, hypertensive disorders of pregnancy, unsafe abortion and obstructed labor. A thorough understanding of the characteristics, treatment strategies and outcomes of these high-risk cases is essential for reducing maternal mortality and morbidity. Pregnancy and delivery in high-risk cases often result in complications requiring admission to critical care units.

Managing critically ill obstetric patients is particularly challenging for healthcare providers, accounting for up to 7% of ICU admissions in developing countries, compared to a smaller proportion in developed nations.[2] This study seeks to evaluate the incidence, indications and outcomes

of obstetric patients requiring ICU care in a tertiary care hospital.

METHODS

This was a retrospective observational study, conducted at 1200 Bed Medicity hospital at Civil Hospital Ahmedabad, B. J. Medical College, Ahmedabad, Gujarat, India over a two-year period (August 2022 to July 2024).

Inclusion criteria

All patients admitted in ICU as emergency obstetric admissions at civil hospital Ahmedabad were included. The patients admitted were either antenatal or were within 42 days of their postpartum period.

Data were collected retrospectively from the ICU database, including baseline demographics such as age, parity and gestational age. The indications for ICU admission were documented, along with details of interventions like the use of vasopressors and mechanical ventilation (MV). Patients were monitored until hospital discharge or death, whichever occurred first. The analysis covered all obstetric cases admitted to the ICU during this period and was compared to the total ICU admissions and deliveries during the same timeframe. Ethical approval was not required.

Statistical analysis

Statistical analysis was performed using percentages in excel sheet.

RESULTS

Over the two-year study period, there were 20,765 emergency obstetric admissions and 17,469 deliveries. A total of 1,913 obstetric patients were admitted to the ICU, accounting for 9.21% of all emergency obstetric admissions. The ICU operates as a closed unit, staffed by full-time obstetricians, board-certified intensivists, general physicians. The majority of patients (68.3%) were aged between 20 and 30 years (Table 1) and multigravida cases (61%) were more common than primigravida cases (39%) (Table 2). Antepartum admissions were rare, comprising only 0.57% of cases, while the vast majority (99.43%) were admitted during the postpartum period (Table 3).

The leading obstetric indications for ICU admission were pregnancy-induced hypertension (28.8%), followed by antepartum hemorrhage (10.92%), laparotomy (8.89%) and heart disease (7.42%) (Table 4).

Additional indications for ICU admission included severe anemia (6.37%), postpartum hemorrhage (PPH) (3.55%) and jaundice (1.25%). In this study, the maternal mortality rate among women admitted to the ICU was 3.03%. The primary cause of maternal death was medical disorders, including cardiac, renal and hepatic conditions (32.7%), followed closely by sepsis (31.1%) (Table 5). Hypertensive disorders of pregnancy accounted for 20.6% of maternal deaths, while obstetric hemorrhage contributed to 15.5% of mortality.

During ICU stays, mechanical ventilation was required in 2.87% of cases. Other interventions included blood and blood product transfusions in 1,253 cases (65.5%), inotropic support in 68 cases (3.55%), antihypertensive therapy in 551 cases (28.8%), anticonvulsant therapy in 142 cases (7.42%) and dialysis in 15 cases (0.78%).

The ICU mortality rate was 3.03% (58 patients), while 1,798 patients (93.98%) showing improvement after treatment. A small proportion of patients (31, 1.62%) left the hospital against medical advice and 26 patients (1.23%) were referred to specialty hospitals for further care.

Table 1: Age wise distribution of patients admitted to Obstetric ICU.

Age (in years)	Number of patients (n=1913)	(%)
<20	94	4.9
20-30	1037	54.2
>30	782	40.87

Table 2: Parity wise distribution of patients admitted to Obstetric ICU.

Parity	No. of patients (n=1913)	(%)
Primigravida	746	39
Multigravida	1167	61

Table 3: Pregnancy outcome wise distribution of patients admitted to Obstetric ICU.

Pregnancy outcome	No. of patients (n=1913)	(%)
Antepartum	11	0.57
Postpartum	1902	99.43

Table 4: Causes of ICU admissions.

Diagnosis	No. of patients (n=1913)	(%)
Hypertensive disorders of pregnancy (eclampsia/severe preeclampsia/preeclampsia)	551	28.8
APH	209	10.92
Laprotomy (ectopic pregnancy)	170	8.89
Cardiac disease	142	7.422
Severe anemia	122	6.37
PPH	68	3.55
Jaundice	24	1.25
Abortion	15	0.78
Obstructed labour	9	0.47
Rupture uterus	4	0.21
Sepsis	3	0.156
Others	596	31.55
Total	1913	100

Table 5: Maternal mortality and its causes.

Cause	No. of patients (n=1913)	(%)
Sepsis	18	31.1
Medical disorders	19	32.7
Obstetric hemorrhage	9	15.5
Eclampsia/PIH	12	20.68
Total	**58**	100

Table 6: Interventions.

Intervention	No. of patients (n=1913)	(%)
Mechanical ventilation	55	2.87
Blood and blood product transfusion	1253	65.5
Inotropes	68	3.55
Anti-hypertensives	551	28.8
Anticonvulsants	142	7.422
Dialysis	15	0.78

Table 7: Maternal outcome.

Outcome	No. of patients (n=1913)	(%)
Referred to kidney hospital/cardiac centre	26	1.23
LAMA	31	1.62
Death	58	3.03
Improved	1798	93.98

DISCUSSION

The vast majority of maternal deaths (99%) occur in developing countries.[2] Although only a small proportion of obstetric patients require ICU admission, the management of critically ill obstetric patients necessitates a multidisciplinary approach. In this two-year study, obstetric patients represented 9.21% of all emergency ICU admissions. deliveries. In a study conducted by Farr et al admission rate was 64 per 1000 deliveries, corresponding to 1 admission per 156 deliveries.[3] Notably, 1,902 of these patients (99.43%) were admitted during the postpartum period. This finding is consistent with the studies by Kilpatrick et al and Matthay et al who reported that 66% of obstetric ICU admissions occurred postpartum. The predominance of postpartum admissions may be attributed

to the profound hemodynamic changes that occur after delivery.[4] Majority of patients i.e., 54%, in our study group belonged to age group 20-30 years. Similar results were found in study done by Panda et al where 73.9% of patients were in age group 20-35 years.[5] Advanced maternal age seems to be associated with increased rate of obstetric ICU admission. Bhadade et al and Goldman et al found that increased maternal age is associated with hypertensive disorders of pregnancy, eclampsia, placental problems and maternal mortality.[6,7] Majority of patients (61%) were multigravida. Similar observations were made in studies done by Joseph et al.[8]

In the study, pre-existing medical conditions such as severe anemia, heart disease and jaundice accounted for only 14.94% of ICU admissions, with the majority stemming from direct obstetric complications. This trend mirrors the results of Vasquez et al.[9] Hypertensive disorders of pregnancy emerged as the leading cause of ICU admission, accounting for 551 cases (28.8%). Major obstetric hemorrhage including postpartum hemorrhage (PPH), antepartum hemorrhage (APH), abortion-related bleeding and uterine rupture were the second most common cause, contributing to 305 cases (15.94%). Similarly, Aldawood's study also identified pregnancy-induced hypertension (PIH) as the primary obstetric indication for ICU admission, followed by hemorrhage.[10]

In terms of critical care interventions, 55 patients (2.87%) in our study required mechanical ventilation (MV), primarily due to acute respiratory failure and hemodynamic instability. This is markedly lower than the 27% reported in the study by Osinaike et al and Olievera et al.[11,12] In the study, the maternal mortality rate among ICU-admitted women was 3.03%, significantly lower than the 31.91% reported by Ghike et al and Asegaonkar et al and also lower than that recorded in the national statistics.[13,14] This comparatively lower mortality may be attributed to the provision of timely and effective medical care, a multidisciplinary approach and the availability of comprehensive tertiary care services. Maternal mortality serves as a key indicator of women's overall health status, access to healthcare services and the responsiveness of the healthcare system to their specific needs.

Being a government institution, our facility offers pregnant women free antenatal care, including routine ultrasounds and blood and urine tests, which contributes to early detection and management of complications. Notably, most of the mortalities in our study occurred among women who had not attended antenatal check-ups, particularly during the critical third trimester. Several ICU scoring systems are available to assess illness severity and predict mortality risk, including the Simplified Acute Physiology Score (SAPS), Mortality Prediction Model, Standardized Hospital Mortality Ratio and Acute Physiology and Chronic Health Evaluation (APACHE II). Among these, SAPS II and APACHE II are most commonly used. However, these tools were found to be unreliable in obstetric populations, primarily because pregnancy-related physiological changes can artificially elevate scores in otherwise healthy young women.[15] Due to this limitation, such scoring systems were not applied in our study.

CONCLUSION

Over the past two years, hypertensive disorders of pregnancy and obstetric hemorrhage have been the primary drivers of ICU admissions among pregnant women. Women aged 25 and above, particularly those requiring mechanical ventilation, are at a significantly increased risk of mortality following ICU admission. To enhance maternal and neonatal outcomes, early involvement of a multidisciplinary team including intensivists, obstetricians and physicians is critical to ensure well-coordinated care. Strengthening obstetric teams' capacity to manage high-dependency unit (HDU) cases is also essential.

This study underscores the urgent need for improved screening and prevention of preeclampsia, as well as comprehensive antenatal education on hypertensive disorders and hemorrhage. Promoting early recognition, timely reporting and prompt referral of complications can substantially reduce risks. Additionally, experienced obstetricians can play a pivotal role by mentoring healthcare providers at smaller or less-resourced facilities, offering support and guidance in complex cases. Prompt recognition of illness severity, multidisciplinary team assessment, judicious decision-making concerning ICU admission and accessibility of care are key factors in maintaining low maternal morbidity and mortality.

To address the limitations of this study, future research should include a prospective, multicenter approach across diverse regions of the country, incorporating all relevant clinical and systemic factors. Such an approach would provide a more comprehensive understanding of the challenges surrounding obstetric ICU admissions and inform more effective strategies for prevention and care.

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