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Original Research Article

Intensive care unit admission of obstetrics cases in a tertiary care center

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ABSTRACT

Background: ICU admissions is on the rise in pregnant women. These must be handled by obstetricians and intensivist.
Methods: This retrospective observational study was conducted at the Gulbarga Institute of Medical Sciences to analyze obstetric outcomes and complications among patients admitted to the obstetric intensive care unit (ICU) from January to June 2024. The study included 69 women out of approximately 3651 deliveries, resulting in an ICU admission rate of 1.88%.
Results: Patient demographics revealed a predominance of younger women under 25 years, with the majority being in their first and second pregnancies. Antepartum admissions comprised 69.5% of cases, with hypertensive disorders of pregnancy and postpartum hemorrhage being the primary reasons for ICU admission. A range of interventions was administered, including anticonvulsants, blood transfusions, and mechanical ventilation. The study recorded 12 maternal deaths, primarily due to hemorrhage, hypertensive disorders, and sepsis, pointing to significant challenges within maternal healthcare management in critical settings.
Conclusions: The findings underscore the necessity for enhanced patient management strategies to address the identified complications and improve maternal outcomes in high-risk obstetric populations.

Keywords: Intensive care, Maternal health, Obstetric ICU, Postpartum hemorrhage, Pregnancy complications

INTRODUCTION

Maternal mortality remains a critical indicator of public health and serves as a reflection of the socioeconomic and healthcare status of women within a society. It is widely recognized that the management of obstetric emergencies plays an important role in reducing maternal and fetal morbidity and mortality rates. Admission to an ICU has recently been identified as: a marker of severe maternal morbidity by the American College of Obstetrics and Gynecology.[1] Obstetric emergencies, consisting a wide range of conditions such as severe pre-eclampsia, hemorrhagic complications, and infection-related disorders, require urgent and specialized medical intervention. The altered physiology of pregnancy, the presence of the fetus, the rapid deterioration of maternal and fetal condition in any complication, and the simultaneous management of two lives with different physiologies are a challenge.[2]

The physiological changes that occur during pregnancy include effects on the cardiovascular,endocrine, urinary, and respiratory systems. These changes may lead to severe pregnancy-related complications, resulting in adverse outcomes for the pregnant woman and the fetus.[3] The establishment of well-equipped obstetric intensive care units (ICUs) is essential for managing these acute situations effectively, ensuring comprehensive care that addresses the intricate needs of both mothers and their newborns.[4]

A small number of women become so acutely unwell during pregnancy or childbirth that they require critical care support. Every pregnancy is different and carries its own risks, there has been an increase in the number of

women who become unwell around the time of childbirth, due to factors including increasing maternal age, increasing rates and levels of obesity and other comorbidities.[5,6]

The percentage of obstetric population requiring admission to the ICU is different in different countries depending on the socioeconomic status, criteria for ICU admission and availability of ICU beds. Pregnant and postpartum women who require ICU are rare distinctive group, constituting less than 1% of all pregnancies and less than 1% of all ICU admissions.[7] It ranges from 0.08 to 0.76% of deliveries in the developed countries and 0.13 to 4.6% in developing countries.[8] Hypertensive disorders and obstetric hemorrhage are the two the commonest risk factors for ICU admission. The other risk factors include sepsis, cardiac disease, and severe anemia.[9-11] This disparity underscores the pressing need for improvements in healthcare infrastructure and access to emergency care in low-resource settings. Furthermore, the establishment of dedicated obstetric ICUs can vastly improve clinical outcomes by providing advanced monitoring and interventions tailored specifically for maternal care.

This study aimed to highlight the significance of specialized maternal care in ICU settings by presenting a detailed account of obstetric emergencies encountered, their management, and outcomes, contributing to the ongoing discourse on maternal health and the necessity for targeted healthcare solutions. With the aim to analyze obstetric admissions to intensive care unit and to identify the risk factors responsible for intensive care admission and maternal outcome.

METHODS

Study design

This investigation is a retrospective observational study conducted at the Gulbarga Institute of Medical Sciences, which features specialized facilities including 6 obstetric intensive care unit (ICU) beds and 10 high-dependency unit (HDU) beds. The study period spans from January 2024 to June 2024, encompassing a comprehensive review of patient records to analyze obstetric outcomes and complications, thereby providing insights into the utilization of critical care resources.

The Gulbarga Institute of Medical Sciences serves as a prominent tertiary referral center located in the city, accommodating approximately 8,500 to 9,000 deliveries annually. This high-volume setting enables an extensive patient population, making it suitable for the examination of various obstetric conditions and the medical interventions employed in critical care environments.

Study population

The study included patients who were admitted to the obstetric ICU during the specified study period. Inclusion criteria encompassed all women who required advanced monitoring and therapeutic interventions due to severe pregnancy-related conditions, including but not limited to eclampsia, severe preeclampsia, postpartum hemorrhage, and sepsis. Patients with incomplete medical records or those who were transferred to other facilities before discharge were excluded from this study to ensure the integrity of the data analysis.

Data collection

Data were extracted systematically from the hospital's electronic medical records database and obstetric admission logs. Relevant demographic information (age, parity, and socioeconomic status), clinical presentation (admission diagnoses, vital signs at admission, and laboratory results), treatment interventions (pharmacological management, surgical interventions, and supportive care), and outcomes (discharge status, complications, and length of stay) were collected. Each case was reviewed in detail, ensuring comprehensive data capture.

Outcome measures

The primary outcome measures include the incidence of specific obstetric complications requiring intensive care, the duration of ICU and maternal morbidity and mortality rates. Secondary outcome measures include the assessment of resource utilization, such as the types of interventions administered and the length of hospital stays.

Statistical analysis

Data were analyzed using appropriate statistical methods, including descriptive statistics to summarize demographic characteristics and clinical outcomes.

Ethical approval for the study was obtained from the institutional review board of the Gulbarga Institute of Medical Sciences. Given the retrospective nature of the analysis, informed consent was not required for individual patient data. Confidentiality and anonymity of patient records were maintained throughout the study by assigning unique identifiers rather than personal identifiers.

RESULTS

This retrospective observational study, spanning from January to June 2024, provides a detailed analysis of the obstetric cases encountered in a critical care setting involving a total of 69 patients admitted to the intensive care unit (ICU) out of 3651 deliveries, yielding an ICU admission rate of 1.88%. The following sections outline the demographic distribution of patients, obstetric indices, gestational ages, indications for ICU admissions, interventions provided, and maternal outcomes, contributing valuable insights for enhancing patient management strategies.

Table 1: Demographic and clinical characteristics of patients admitted to ICU.

Variable	Number	Percentage
Age distribution (in years)		
<25	41	59.4
25-30	16	23.1
31-35	10	14.49
>35	2	2.89
Parity distribution		
G1/P1	33	47.8
G2/P2	36.2	25
G3/P3	6	8.6
G4/P4	4	5.79
G5 or more	1	1.44
Gestational age distribution		
Antepartum	48	69.5
Postpartum	21	30.4
Indication for ICU admission		
Hemorrhage	28	40.58
Hypertensive disorder of pregnancy	33	47.83
Anemia	18	26.09
Placenta acreta spectrum	2	2.90
Heart diseases	12	17.39
Rupture uterus	2	2.90
Medical disorders	12	17.39
Sepsis	3	4.35
ICU interventions		
Ventilation	11	15.94
Ionotropes	16	23.19
Blood and blood products transfusion	22	31.88
Anticonvulsant	34	49.28
Dialysis	4	5.80
Tracheotomy	1	1.45

The distribution of patients according to age illustrates a significant prevalence among younger women, with the largest cohort being those aged <25 years, comprising 59.4% (41 patients) of the ICU admissions. In contrast, patients aged 25-30 years accounted for 23.1% (16 patients), while those between 31-35 years and over 35 years represented 14.49% (10 patients) and 2.89% (2 patients), respectively (Table 1).

Analysis of the parity among the patients indicated that the majority were in their first (G1/P1) and second (G2/P2) pregnancies, with 47.8% (33 patients) and 25% (36 patients) respectively. Higher-order pregnancies (G3/P3, G4/P4, G5 or more) accounted for a smaller proportion of ICU admissions, with 8.6% (6 patients), 5.79% (4 patients), and 1.44% (1 patient) respectively (Table 1).

In terms of gestational age at admission, a notable 69.5% (48 patients) were admitted during the antepartum period, while postpartum cases comprised 30.4% (21 patients), highlighting a critical need for monitoring and management across both stages (Table 1).

The primary indications for admission to the ICU included hypertensive disorders of pregnancy (33 cases) and postpartum hemorrhage (28 cases), which were the leading contributors to the need for intensive care. Other significant indications included severe anemia (18 cases), heart diseases (12 cases), medical disorders (12 cases), sepsis (3 cases), and specific obstetric complications such as placenta accreta spectrum (2 cases) and ruptured uterus (2 cases) (Table 1).

The ICU interventions were varied, reflecting the complexity of care required for these patients. The administration of anticonvulsants was particularly common, required in 34 cases, likely due to the high prevalence of eclampsia. Additionally, 22 patients received blood and blood product transfusions, and inotropes were administered to 16 patients. Other interventions included mechanical ventilation (11 patients), dialysis (4 patients), and one tracheotomy (Table 1).

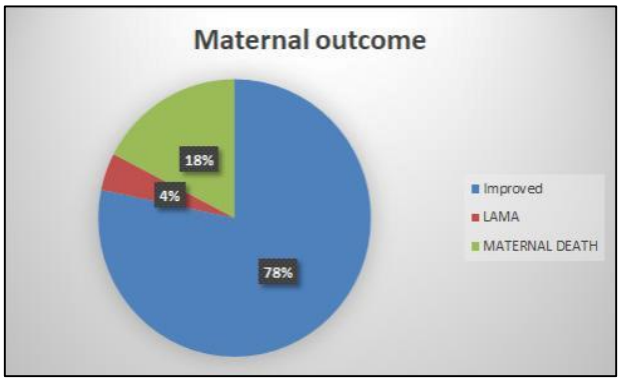

Figure 1: Maternal outcome of the admitted cases.

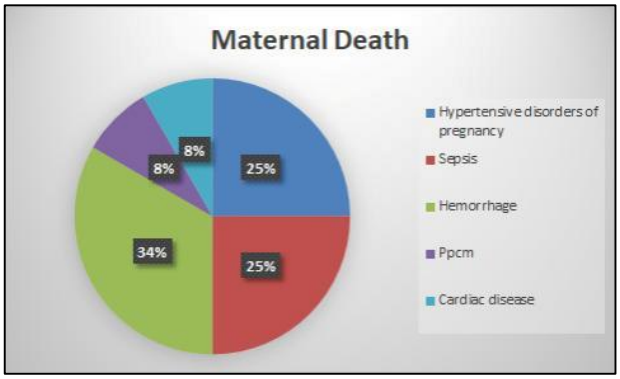

Figure 2: Causes of maternal death.

Among the 69 ICU admissions, there were 12 maternal deaths, highlighting significant challenges in maternal health management in this critical care environment. The leading causes of maternal mortality included hemorrhage (4 cases), hypertensive disorders of pregnancy (3 cases),

and sepsis (3 cases). Other causes included peripartum cardiomyopathy (1 case) and complications related to cardiac diseases (1 case). Only 3 patients left against medical advice (LAMA) (Figures 1 and 2).

This study highlights the critical patterns and severity of complications faced by obstetric patients in a critical care setting. Notably, hypertensive disorders of pregnancy and obstetric hemorrhage emerged as the most common risk factors for ICU admissions, with severe anemia, heart disease, and sepsis also contributing significantly to maternal morbidity. The majority of these complications occurred during the antepartum period, emphasizing the crucial role of proactive monitoring and intervention.

DISCUSSION

This study presented a detailed analysis of critical obstetric cases admitted to the intensive care unit (ICU) over a six-month period, providing vital insights into patient demographics, common indications for ICU admission, and maternal outcomes. With the ICU admission rate at 1.88% of the total deliveries, this study underscores the significance of critical care in managing severe obstetric complications, particularly among younger patients.

The demographic distribution revealed that a substantial majority of ICU admissions were in the age group of less than 25 years, accounting for 59.4% of cases. This finding aligns with prior research indicating younger women being at higher risk for obstetric complications due to factors such as inadequate prenatal care and lower socioeconomic status, which can lead to more severe conditions during pregnancy and delivery.[12] Conversely, the minimal representation of patients over 35 years (2.89%) reflects the changing trends in maternal age, with a general decline in birth rates among older women, particularly in resource-limited settings.[13]

In terms of obstetric indices, our findings indicate that the majority of the patients were primigravida (first-time mothers) or second gravida (G1/P1 and G2/P2), which is consistent with existing literature suggesting that these groups often face unique challenges during pregnancy and delivery that can lead to critical complications. The high rate of antepartum admissions (69.5%) further highlights the need for enhanced prenatal monitoring and intervention to mitigate risks associated with pregnancy-related complications.

The analysis of ICU admissions by indication revealed that hypertensive disorders of pregnancy and hemorrhage were predominant, respectively affecting 33 and 28 patients. These results are corroborated by national and global statistics that identify these conditions as leading causes of maternal morbidity and mortality.[14] The significant association between hypertensive disorders and adverse outcomes necessitates heightened awareness and early intervention strategies to manage blood pressure in pregnant women effectively.

Moreover, maternal mortality rates within this study were notable, with hemorrhage emerging as the leading cause. This finding aligns with the WHO reports indicating that hemorrhage remains a major contributor to maternal death, particularly in low-resource settings.[15] The co-occurrence of hypertensive disorders and sepsis as contributing factors to mortality emphasizes the need for a multidisciplinary approach in managing obstetric patients, involving obstetricians, intensivists, and nursing staff to ensure comprehensive care.[16]

The interventions applied in the ICU, including ionotropes, blood transfusions, and anticonvulsants, reflect the complexity of managing critically ill obstetric patients. The need for advanced supportive measures such as dialysis and ventilation underscores the severity of cases admitted to the ICU. Notably, the high rate of anticonvulsant usage suggests a significant prevalence of eclamptic seizures, demanding continuous education and protocol refinement for timely identification and management of preeclampsia and eclampsia.

In summary, this study elucidates critical patterns in obstetric care within an ICU setting, emphasizing the necessity of focused strategies for the prevention and management of obstetric emergencies, particularly in younger populations. Moving forward, establishing clear clinical guidelines, enhancing patient education, and fostering interprofessional collaboration may significantly improve outcomes for obstetric patients in critical care settings.

CONCLUSION

The findings from this study underscore the significant burden of severe obstetric complications that necessitate ICU admissions, particularly in younger women. The high rate of maternal mortality associated with hemorrhage and hypertensive disorders calls for enhanced protocols for early detection and intervention. A multidisciplinary team approach including obstetrician and intensivist is appropriate in obstetric critical care settings.

Moreover, these insights emphasize the critical need to improve resource allocation and tailored care strategies in similar healthcare settings to optimize maternal and neonatal outcomes. Good antenatal care, timely admissions and referrals, training of health care workers are required for better clinical outcome.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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