ORIGINAL RESEARCH ARTICLE

Analysis of Clinical Profile of the Obstetric High Dependency Unit admissions in a Tertiary Care Centre

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Abstract

Background Obstetric high-risk cases pose a challenge in management. The role of the High Dependency Unit is to provide adequate care and management. This study aimed to analyse the clinical profile of patients admitted to the HDU in various facets, including socio-demographic characteristics, admission indications, and outcomes.

Methods This is a descriptive, retrospective observational study of 72 cases that required HDU admission between January 2022 and June 2022. A descriptive method and univariate analysis were used for statistical analysis.

Results The HDU admission rate was calculated to be 8.9%. The majority (43%) of women belonged to the 20-30 age group, had a lower socio-economic status (57%), and were un-booked (78%). Obstetric complications accounted for 65% of the admissions, with anaemia being the major contributing cause in 18% of the cases. The majority (53%) of the women were discharged after a complete recovery. The mortality was zero. Socioeconomic status, antenatal booking status, and type of complication showed significance for outcome with a $p < 0.05$.

Conclusion HDU serving as an intermediate level of care could facilitate earlier admission of high-risk cases from the time of detection, thereby promoting proper monitoring and care.

Keywords High-Dependency care, Critical care, Obstetrics, Maternal morbidity, Pregnancy complications

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1 Introduction

Pregnancy is one of the most precious stages of a woman's life. However, this could have deleterious effects on the woman's life at times. Hence, women with morbid signs and symptoms need a timely address to prevent fatal mortality. The roles of the Obstetric High Dependency Unit (HDU) and the Intensive Care Unit (ICU) in providing specialized care to women are crucial.[1]

An HDU, as described by the Critical Care Forum of the British Association, is referred to as a median point-of-care unit that provides distinctive care with a 1:2 nurse-to-patient ratio. The health guidelines also require a vigilant, accurate, and timely analysis of the patient's status to ensure that appropriate management is delivered adequately.[2]

The prevalence of Severe Acute Maternal Morbidity (SAMM), as described in a WHO systematic review analysis, varies within a range of 8.3%.[3] Recent studies have reported obstetric hemorrhage (31.5%) and hypertensive disorders (25%) as the major contributing factors for HDU/ICU admissions.[1] HDU intervention can significantly reduce maternal morbidity and prevent ICU overburdening. However, despite their growing relevance, there is limited literature analyzing the clinical profiles, indications, and outcomes of patients admitted to obstetric HDUs in such environments.

This study was undertaken to evaluate the demographic characteristics, clinical indications, and immediate outcomes of patients admitted to the obstetric HDU of a tertiary care centre. Additionally, it aims to identify associations between patient-related factors and clinical outcomes. The findings are expected to inform future policy, triage protocols, and resource allocation strategies, and to underscore the importance of early risk identification and multidisciplinary care in enhancing maternal outcomes.

2 Methods

This is a retrospective observational study that included both antenatal and postnatal women from the indoor unit of the Department of Obstetrics and Gynaecology at Shrimant Rajmata Vijayaraje Scindia Medical College and Hospital, Shivpuri, Madhya Pradesh, India, who were admitted to the HDU between January 2022 and June 2022. The obstetric HDU of our hospital is a four-bedded unit with two dedicated nursing staff and is located near the Labour Room and the Operating Theatre complex. The hospital protocol is that, after well-informed consent and an initial examination in the triage room, the women requiring HDU care, such as those with obstetric complications, which include both the antepartum and postpartum complications, and the women with associated complicated medical co-morbidities, are triaged and shifted to the HDU. A proper case sheet is maintained, documenting all events from admission to discharge. During the study period, 813 obstetric admissions were recorded, of which 72 cases requiring admission to the HDU were included in the study. All the cases for the study were included consecutively. The case sheets of all these HDU admissions were collected and analyzed in various aspects, including socio-demographic characteristics, indications for HDU admission, and outcomes. The variables included age, socio-economic status, and antenatal booking status. The reasons for admissions included various causes, which were grouped under two categories: obstetric and medical causes. The outcome was assessed in terms of step-up to ICU, step-down to the general ward, discharge, and mortality. This study was conducted in accordance with the ethical standards outlined in the Declaration of Helsinki. Ethical clearance was obtained from the Institutional Ethics Committee of our Institute. The statistical analysis was conducted using descriptive statistical methods, including frequencies and percentages. A univariate analysis was done using SPSS software 24.0. Chi-square and Fisher's exact tests were applied, and a $p < 0.05$ was considered significant.

3 Results

The HDU admission rate was calculated to be 8.9%. Upon analysing the distribution of cases by age, the majority (43%) of women belonged to the 20-30 years age group (Table 1).

The analysis based on the socio-economic status revealed that the majority (57%) of the women belonged to the lower socio-economic group (Figure 1).

Table 1 Distribution of cases according to age

Age (years)	Number of cases (%) (n = 72)
< 20 years	12 (17)
20-30 years	31 (43)
30-40 years	23 (32)
> 40 years	6 (8)

The antenatal booking status evaluation suggested that

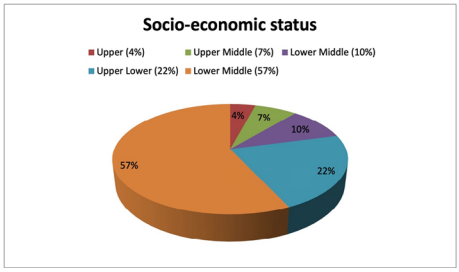

Figure 1 Distribution of cases based on socio-economic status (Modified Kuppuswamy Socioeconomic scale)

the majority (78%) of the women were unbooked cases (Figure 2).

Analysis of admission indications in the HDU revealed that obstetric complications accounted for most cases, representing 65% of admissions. Of admissions, 35% were due to non-obstetric causes. Among the obstetric complications, anaemia was the primary cause contributing to 18% of the admissions, followed by hypertensive disorders of pregnancy contributing to 13% of the admissions. Among the medical co-morbid conditions, cardiac disease was the major contributing cause, leading to 7% of the admissions (Table 2).

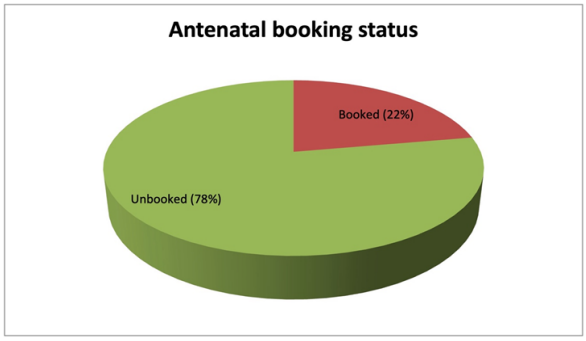

Figure 2 Distribution of cases according to the antenatal booking status

In terms of outcome, the majority (53%) of the women were discharged after a complete recovery. Of women who had a partial recovery with a further requirement of monitoring and treatment, 22% were shifted to the general ward. Furthermore, 18% of the women who were unresponsive to HDU management were stepped up to the ICU for further management. Fortunately, the mortality in our HDU was 0% (Table 3).

Outcomes were categorized into two groups: good outcomes and poor outcomes for analysis. Discharge and step-down to the ward were grouped as a good outcome, while step-up to the ICU, discharge against medical advice, and mortality were grouped as a poor outcome. A comparative analysis was performed using Chi-square and Fisher's exact tests to examine the relationship between outcomes and key demographic and clinical variables. Socioeconomic status, antenatal booking status, and type of complication showed significance

Table 3 Distribution of cases based on the outcome

Outcome	Number of cases (%) (n = 72)
Step up to the ICU	13 (18)
Step down to the general ward	16 (22)
Discharge	38 (53)
Discharged against medical advice	5 (7)
Mortality	0 (0)

Table 2 Distribution of cases according to the indication of HDU admission

Complications requiring HDU admission	Indications	Number of cases (%) (n = 72)
Obstetric complications (65%)	Anemia	13 (18)
	Antepartum hemorrhage	7 (10)
	Postpartum hemorrhage	5 (7)
	Hypertensive disorders of pregnancy	9 (13)
	Molar pregnancy	2 (3)
	Multiple gestation with complications	3 (4)
	Sepsis	5 (7)
	Ruptured ectopic pregnancy	3 (4)
	Ruptured uterus	1 (1)
	Post-operative complications	4 (6)
Non-obstetric complications (35%)	Diabetic ketoacidosis	2 (3)
	Cardiac disease (NYHA III/IV)	5 (7)
	Thyroid complications	2 (3)
	Jaundice	2 (3)
	Renal disease	1 (1)
	Bronchial asthma	1 (1)
	Pulmonary edema	3 (4)
	Disseminated Intravascular Coagulation	2 (3)
	Vector-borne diseases (Dengue/ Malaria)	1 (1)
	Trauma	1 (1)

for outcome with a $p < 0.05$. The type of complication was revealed to be a strong predictor, with non-obstetric causes leading to poor outcomes (Table 4).

Table 4 Comparison of the studied variables with the outcome

Variable	Category	Good outcome (%) (n = 54)	Poor outcome (%) (n = 18)	P-value
Age (years)	< 20	8 (14.8)	4 (22.2)	0.94
	20-30	25 (46.3)	6 (33.3)	
	30-40	17 (31.5)	6 (33.3)	
	> 40	4 (7.4)	2 (11.1)	
Socio-economic status	Upper	2 (3.7)	1 (5.6)	0.04
	Upper middle	3 (5.6)	2 (11.1)	
	Lower Middle	7 (13)	0 (0)	
	Upper Lower	14 (25.9)	2 (11.1)	
	Lower	28 (51.9)	13 (72.2)	
Booking status	Booked	19 (35.2)	1 (5.6)	0.002
	Unbooked	35 (64.8)	17 (94.4)	
Complication type	Obstetric complications	44 (81.5)	3 (16.7)	< 0.001
	Non-Obstetric complications	10 (18.5)	15 (83.3)	

4 Discussion

This study aimed to analyse the clinical profiles of patients admitted to the HDU in various distinct categories, including socio-demographic characteristics, the indications warranting HDU admission, and the outcomes measured in terms of discharge in a healthy state.

Our study revealed that the majority of the cases belonged to the 20-30 years age group (43%). This is in accordance with a similar survey of Dattaray et al., where the age of the HDU admissions ranged from 18 to 34 years.[4] The sexually active reproductive age factor is attributed to this pattern of age distribution.

The majority (57%) of the women belonged to the lower socioeconomic group, indicating a significant association with poor outcomes. This, in comparison with a similar study by Panda et al., reveals that critical care admissions are more common among the lower (64.13%) to the middle (30.45%) socioeconomic group, which is similar to the findings of our study.[1] This may reflect disparities in health-seeking behaviour, delayed presentation, and reduced access to quality care.

In our study, 78% of the cases were unbooked. This unbooked status is revealed to be strongly associated with poor outcomes. This is in accordance with the fact mentioned by de Lima et al. in their study on the maternal near miss (MNM) determinants, that fewer prenatal visits are a significant factor associated with MNM.[5] The prenatal visits are the salient requirement for every antenatal woman for the early identification of the associated high-risk and timely referral to a centre where the complication could be managed.[6]

Upon analysis of the indications that prompted an HDU admission, it was revealed that obstetric factors accounted for the majority (65%). Interestingly, our study showed that patients with obstetric complications had better outcomes compared to those of the non-obstetric causes. Anemia (18%) was the major obstetric cause. This finding is comparable to the results of a study by Liyew et al., which assessed the causes of maternal near misses, identifying anemia as the major contributing factor. A nutritional deficiency factor was suggested as the attributable reason.[7] Secondly, obstetric hemorrhage, including antepartum (10%) and postpartum hemorrhage (7%), was seen in 13% of the cases. Gupta et al. studied 127 patients and found obstetric hemorrhage as the common cause (47.5%). Postpartum admissions were higher in their study, which is contrary to our research. The proposed reason was changes in hemodynamics during the postpartum phase, including an increase in cardiac output and a decrease in plasma oncotic pressure.[8] Hypertensive disorders contributed to 13% of the cases. Mufti et al. studied 112 patients and reported hypertensive causes such as severe preeclampsia and eclampsia to be the major contributing ones.[9] A few similar other studies on severe maternal morbidity and critical care admissions reveal hypertension and obstetric hemorrhage as the major contributing causes.[10,11] This is in contrast to the order of contributing indications in our study, where anemia was the first. Anemia is highly prevalent in the Indian population of our study region.

This might be due to the geographic distinctions and differences.

Sepsis is reported as a direct contributing factor for the morbid maternal outcome in 7% of the cases of our study, similar to the findings of the study by Rathod et al.[12] The reasons are indirectly attributed to massive obstetric hemorrhage, puerperal infections, and chorioamnionitis.[4] Anemia is reported to increase the susceptibility to sepsis.[11]

The cesarean section rates have recently been on an upsurge. Hence, the associated postoperative complications also rise accordingly, as stated in the study by de Lima et al., where the surgical procedure of cesarean section was identified as a risk factor for maternal morbidity.[5] Accordingly, our study also identified postoperative complications as a contributing factor for HDU admissions in 6% of the patients.

A few medical comorbidities also contribute to HDU admissions, among which the cardiac causes play a majority role (7%). This finding is similar to that of the study by Dattaray et al., which reported cardiac comorbidities in half of the patients. The most common causes include cardiomyopathy and valvular disorders, which can progress to NYHA (New York Heart Association Classification) III or IV heart failure, often necessitating admission to HDU.[4] Cardiac diseases increase maternal mortality and fetal morbidity, thereby increasing the hospital stay and the need for vigorous monitoring of the patients.[13] Other causes like diabetes mellitus, thyroid disorders, bronchial asthma, jaundice, and vector-borne diseases like dengue and malaria are also associated with significant adverse maternal outcomes, warranting HDU care. These diseases collectively contribute to complications like preeclampsia, abruption, anemia, and adverse fetal outcomes. The physiological and immunological modulations in pregnancy contribute to the exacerbations of pre-existing diseases and the acquisition of infections.[14–18]

A study by Bhadade et al. reported indirect causes (77.1%) like viral hepatitis and malaria contributing to critical obstetric admissions. However, this is in contrast to our study, where vector-borne disease contributed to only a minimal part of 1%. The reason for their high contrasting values might be due to their study background, which was from a medical intensive care unit.[19] However, it can be inferred that the treatability of obstetric emergencies can be accomplished smoothly in a structured setting, as opposed to medical complications, which are often complex, multi-systemic, and require ICU-level care.

It was found that 18% of the patients required a step to the ICU from the HDU. The causes included eclampsia and an uncompensated state of obstetric hemorrhage requiring mechanical ventilatory support and critical monitoring. It is reported in the literature that effective management through HDU care could reduce ICU admissions by 53% so that ICU beds are readily available during times of need.[1] Fortunately, there were no mortalities in the HDU during the study period. This was due to timely ICU transfers for patients needing critical care.

The findings of our study reinforce the need to strengthen referral systems, expand antenatal coverage, and integrate medical specialties into obstetric HDU care, particularly in resource-limited settings. The advantage of this study is that it is based at a tertiary care centre. The key weaknesses of this study include its retrospective nature, single-centred focus, and lack of multivariate analysis.

5 Conclusion

Based on the findings of our study, the major causes identified were anemia, obstetric hemorrhage, and hypertensive complications. Proper awareness, antenatal visits, and an early approach to medical facilities could alleviate the burden of maternal morbidity and mortality. It is found that HDU can promote the earlier admission of high-risk cases from the time of detection, thereby facilitating proper monitoring and care. HDU serves as an intermediate level of care between the general care wards and the ICU, thereby reducing the burden of mishaps among high-risk cases and promoting a timely step-up and reduction of high-risk instances based on their health status.

Declarations

Acknowledgments
None.

Authors' Contributions
All authors contributed significantly to all stages of writing the article. Dr. Japhia David primarily did the study under the guidance of Dr. Shikha Jain. Dr. Japhia David contributed to the conception of the work, preparation of the manuscript, and revision of the manuscript critically for intellectual content. Dr. Shikha Jain contributed to the critical evaluation of the manuscript.

Availability of Data and Materials
Data and material can be provided on request.

Conflict of Interest
The authors declare that they have no conflicts of interest.

Consent for Publication
All the authors give consent for publication.

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Ethical Considerations
This study was designed retrospectively and conducted

using existing patient records. No direct patient interaction or intervention was involved, and all data were anonymized before analysis. The Institutional Ethical Committee reviewed the study protocol and waived the requirement for formal ethical approval.

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