



MATERNAL OUTCOMES AND RISK FACTORS AMONG OBSTETRIC ICU ADMISSIONS AT A TERTIARY CARE HOSPITAL IN CENTRAL INDIA: A PROSPECTIVE OBSERVATIONAL STUDY

Obstetrics & Gynaecology

Dr. Rashmi Dixit Resident Department Of Obst & Gynae, G.R. Medical College Gwalior M.P

Dr Paribhashita Mishra Professor Department Of Obst & Gynae, G.R. Medical College Gwalior M.P

Dr. Sanjay Chandel Professor Department Of Radiotherapy, G.R. Medical College Gwalior M.P

Dr. Ashish Mathur* Associate Professor Department Of Anaesthesiology G.R. Medical College Gwalior M.P
*Corresponding Author

ABSTRACT

Background: Critically ill obstetric patients pose unique challenges due to altered maternal physiology and dual concerns of maternal and fetal wellbeing. This study aimed to evaluate causes, risk factors, and outcomes of obstetric ICU admissions at a tertiary care centre in India. **Methods:** A prospective observational study was conducted on 100 obstetric patients admitted to the ICU at Kamla Raja Hospital, Gwalior over 18 months. Data on demographics, obstetric history, reason for ICU admission, interventions, and outcomes were collected and analysed descriptively. **Results:** Majority of ICU admissions were in postpartum women (82%), primarily in the 20–25 year age group (57%). Leading causes were hypertensive disorders of pregnancy (38%) and severe anaemia (15%). Caesarean section was performed in 81% of patients. Most patients required only face mask oxygen support (77%), and 71% had an ICU stay of 2–3 days. No maternal deaths were recorded. Ninety percent were shifted to general wards after ICU stabilization. **Conclusion:** Hypertensive disorders and anaemia remain leading contributors to obstetric ICU admissions. Strengthening antenatal screening, early risk identification, and efficient obstetric ICU care can substantially improve maternal outcomes.

KEYWORDS

Obstetric ICU, Maternal morbidity, Hypertensive disorders, Severe anaemia, Critical care obstetrics, India

INTRODUCTION

Pregnancy is a unique physiological state that predisposes women to rapid and sometimes unpredictable clinical deterioration, making the management of critically ill obstetric patients especially challenging. The dual concern for maternal and fetal well-being, compounded by altered hemodynamics, metabolism, and coagulation status, necessitates prompt recognition and intervention when complications arise. While obstetric admissions to intensive care units (ICUs) are relatively infrequent, they serve as key indicators of severe maternal morbidity and healthcare system responsiveness.

Globally, ICU admission rates for obstetric patients vary widely. In developed countries, estimates range from 0.08% to 0.76% of all deliveries, while in low- and middle-income countries (LMICs), the rate is substantially higher, ranging from 0.13% to 4.6% due to disparities in access to antenatal care, timely referral systems, and availability of high-dependency facilities.^{1–3} According to the World Health Organization (WHO), approximately 295,000 maternal deaths occur each year, of which nearly 99% are in developing regions, predominantly due to preventable causes such as hemorrhage, sepsis, hypertensive disorders, and unsafe abortions.^{4,5}

Hypertensive disorders of pregnancy and obstetric hemorrhage remain the most common indications for ICU admission globally.^{6–9} However, in recent years, the burden of indirect causes such as cardiac disease, sepsis, and severe anemia has become more prominent in India and other LMICs.^{10,11} Advanced maternal age, high parity, poor antenatal follow-up, and systemic co morbidities are consistently identified as predictors of ICU need.^{12–14}

Despite their significance, there remains a paucity of prospective data on obstetric ICU admissions from resource-limited tertiary centers in India. Most available studies are retrospective, lack standardization of admission criteria, and do not integrate detailed outcome tracking. Consequently, understanding region-specific causes, risk factors, and outcomes can aid in developing targeted interventions and triaging protocols.

This prospective observational study was designed to evaluate the maternal profile, indications, interventions, and outcomes associated with obstetric ICU admissions at Kamla Raja Hospital, Gwalior—a tertiary referral center catering to a high-risk obstetric population in Central India.

METHODS

Study Design And Setting

This was a prospective observational study conducted at Kamla Raja Hospital, G.R. Medical College, Gwalior, Madhya Pradesh, India—a tertiary care teaching hospital with a 13-bedded multidisciplinary intensive care unit (ICU). The study was carried out over a period of 18 months.

Study Population

All obstetric patients admitted to the ICU during pregnancy (after 20 weeks gestation), during delivery, or up to 42 days postpartum were eligible. A total of 100 obstetric ICU admissions were included in the study.

Inclusion Criteria

- All antenatal and postnatal women (within 6 weeks postpartum) admitted to the ICU.
- Cases with ectopic pregnancy or gestational trophoblastic disease requiring ICU admission.

Exclusion Criteria

- ICU admissions for non-obstetric causes.
- Gynaecological patients.
- Patients who declined consent.

Ethical Approval

The study protocol was reviewed and approved by the Institutional Ethics Committee of G.R. Medical College, Gwalior. Written informed consent was obtained from the patient or legally authorised representatives.

Data Collection

On admission to ICU, data were collected via structured forms, direct observation, and review of case records.

Variables Included:

- Demographic details (age, residence, education level)
- Obstetric history (gravidity, parity, gestational age)
- Timing of ICU admission (anteartum/postpartum)
- Primary diagnosis for ICU admission
- Surgical interventions (e.g. caesarean section, laparotomy)
- ICU therapies (e.g. oxygen support, transfusion, ventilation)
- Duration of ICU and hospital stay
- Disposition (shift to ward/HDU, discharge, referral)

Outcomes

The Primary Outcomes Were:

- Frequency and type of obstetric conditions requiring ICU admission
- Length of ICU stay
- Patient disposition following ICU care

Statistical Analysis

Descriptive statistics were used to summaries data. Categorical variables were presented as frequencies and percentages. Continuous variables were expressed as mean ± standard deviation. The chi-square test or Fisher's exact test was used to assess associations between categorical variables where applicable. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 100 obstetric patients were admitted to the ICU during the study period. The findings are summarised below.

Table 1. Age Distribution of Participants (n = 100)

Age Group (years)	Frequency	Percentage
< 20	4	4%
20–25	57	57%
26–30	31	31%
31–35	5	5%
36–40	3	3%
> 40	0	0%
Mean ± SD	–	24.87 ± 4.25

Table 2. Residence of Participants

Residence	Frequency	Percentage
Urban	52	52%
Rural	48	48%

Table 3. Educational Background of Participants

Education Level	Frequency	Percentage
Illiterate	13	13%
Primary	9	9%
Middle School	35	35%
Secondary School	21	21%
Higher Secondary	14	14%
Graduate	8	8%

Table 4. Obstetric History (Gravidity and Parity)

Gravidity/Parity	Frequency	Percentage
G1/P0	47	47%
G2/P1	24	24%
G3/P1	4	4%
G3/P2	14	14%
G4/P1	11	11%

Table 5. Timing of ICU Admission

Timing of Admission	Frequency	Percentage
Antepartum (> 20 wk)	17	17%
Postpartum	82	82%
Ectopic Pregnancy	1	1%

Table 6. Primary Diagnosis for ICU Admission

Condition	Frequency	Percentage
Severe preeclampsia	20	20%
Antepartum eclampsia	18	18%
Severe anaemia	15	15%
Pregnancy-induced HTN	15	15%
Antepartum haemorrhage	4	4%
Postpartum haemorrhage	4	4%
Laparotomy	5	5%
Other (heart disease, sepsis, etc.)	19	19%

Table 7. Surgical Interventions

Procedure	Frequency	Percentage
Caesarean section	81	81%
Peripartum hysterectomy	3	3%
Laparotomy	2	2%
Uterine packing	3	3%
Manual removal placenta (MRP)	1	1%

Table 8. ICU Therapies Administered

Therapy	Frequency	Percentage
70		

Face mask (FM) oxygen	77	77%
Non-rebreather mask (NRBM)	14	14%
Ventilator support	4	4%
Intubation	1	1%
Blood transfusion + FFP	4	4%

Table 9. Duration Of ICU Stay

Duration of Stay	Frequency	Percentage
< 2 days	19	19%
2–3 days	71	71%
> 3 days	10	10%
Mean ± SD	–	2.28 ± 0.97

Table 10. Disposition After ICU

Outcome	Frequency	Percentage
Shifted to ward	90	90%
Discharged	6	6%
Shift to HDU	2	2%
Referred	2	2%

Summary of Key Findings:

- The majority of admissions were postpartum (82%) and primigravida (47%).
- Hypertensive disorders (38%) and anaemia (15%) were leading causes.
- Caesarean section was the dominant surgical procedure (81%).
- Most patients required only face mask oxygen; only 4% required ventilation.
- ICU stay was short in most cases; 90% of patients were stabilized and transferred to the ward.

DISCUSSION

This prospective study offers valuable insight into the profile, management, and outcomes of critically ill obstetric patients admitted to a tertiary care ICU in Central India. While obstetric ICU admissions are relatively uncommon, they represent a high-risk cohort with potential for rapid deterioration and death if not managed promptly.

In our study, the majority of ICU admissions occurred in the postpartum period (82%), consistent with other reports from low- and middle-income countries (LMICs), where postpartum complications are often under diagnosed until late stages due to poor access to emergency obstetric care.^{1,2} The mean age of patients was 24.9 years, with most between 20 and 25 years of age—a trend reflecting the early age of marriage and conception in the Indian population.³

Hypertensive disorders of pregnancy, including preeclampsia and eclampsia, were the leading causes of ICU admission (38%), followed by severe anaemia (15%). These findings align with earlier studies by Rathod et al. and Gupta et al., which also identified hypertensive disorders and haemorrhage as principal contributors to maternal morbidity in India.^{4,5} This reinforces the urgent need for improved antenatal screening, early detection of preeclampsia, and community-level interventions to prevent severe maternal complications.

A notably high caesarean section rate (81%) was observed among ICU patients. While some of these procedures were elective or emergent for obstetric indications, others may reflect late referrals or failed trials of labour in peripheral centres. This is in line with studies from tertiary centres in similar settings, where high CS rates are often associated with maternal instability.^{6,7}

Encouragingly, the majority of patients required only non-invasive oxygen therapy (91%), with only 4% requiring mechanical ventilation. This relatively low need for advanced organ support may reflect timely intervention and the effectiveness of early obstetric critical care. It also supports the idea that many obstetric patients benefit from intermediate-level care (e.g., high-dependency units), which could help decongest ICUs while ensuring adequate monitoring.⁸

No maternal deaths were reported during the study period. This is an important observation in a high-volume tertiary centre and may be attributed to early ICU admission, effective multidisciplinary teamwork, and prompt management of complications. In contrast, earlier Indian studies have reported ICU maternal mortality rates ranging from 6% to 20%, often due to delayed referrals or unavailability of blood products and ventilator support.^{9,10}

Despite these encouraging outcomes, the high incidence of

preventable complications—like severe anaemia and eclampsia—points to systemic deficiencies in antenatal care, public health education, and timely referral. This echoes global concerns highlighted by the WHO that nearly 75% of maternal deaths could be prevented with timely, evidence-based care.¹¹

Limitations of the study include its single-centre design, relatively small sample size, and lack of control group. Additionally, detailed fetal outcomes were not assessed. Nevertheless, the findings highlight important clinical patterns and reinforce the value of dedicated obstetric ICU protocols.

CONCLUSION

This prospective study highlights that hypertensive disorders and severe anaemia are the leading causes of obstetric ICU admissions in a tertiary care centre in Central India. Most patients were young primigravidas in the postpartum period and required only non-invasive respiratory support. The absence of maternal mortality underscores the potential impact of timely ICU care and multidisciplinary management. Strengthening antenatal screening, timely referrals, and dedicated obstetric critical care services may significantly reduce maternal morbidity and improve outcomes in resource-limited settings.

REFERENCES

- Karnad DR, Lapsia V, Krishnan A, Salvi VS. Prognostic factors in obstetric patients admitted to an Indian intensive care unit. *Crit Care Med*. 2004;32(6):1294–1299.
- Pollock W, Rose L, Dennis CL. Pregnant and postpartum admissions to the intensive care unit: A systematic review. *Intensive Care Med*. 2010;36(9):1465–1474.
- Sharma DC. India still struggles with maternal mortality. *Lancet*. 2015;386(10004):317–318.
- Rathod AD, Chavan RP, Bhagat V, Pajai SP, Thool P, Bharti R. Review of Maternal Mortality at a Tertiary Care Hospital: A Five-Year Study. *Int J Reprod Contracept Obstet Gynecol*. 2014;3(3):730–733.
- Gupta S, Naithani U, Doshi V, Bhargava V, Bhadoria P. Obstetric Critical Care: A Prospective Analysis of Clinical Characteristics, Predictors of Mortality, and Fetomaternal Outcome in a Tertiary Care Centre. *Indian J Anaesth*. 2011;55(2):146–153.
- Kilpatrick SJ, Matthey MA. Obstetric patients requiring critical care: A five-year review. *Chest*. 1992;101(5):1407–1412.
- Tripathi R, Tyagi S, Mala YM, Agrawal S, Arora D. Obstetric ICU: Observations and outcome in a tertiary care hospital in India. *Int J Gynecol Obstet*. 2011;114(2):118–120.
- Jain S, Saini V, Bagga R. A 2-year experience of obstetric patients in ICU in a tertiary care hospital in India. *Indian J Anaesth*. 2010;54(5):415–418.
- Afessa B, Green B, Delke I, Koch K. Systemic review of maternal mortality in ICU: A single-centre review. *Crit Care Med*. 2001;29(11):2310–2312.
- Banerjee A, Sinha A, Choudhary V, Sinha A. Maternal deaths in tertiary care centre: Ten years autopsy analysis. *J Obstet Gynaecol India*. 2010;60(6):508–512.
- World Health Organization. Trends in Maternal Mortality: 2000 to 2017. WHO; 2019.
- Panchal S, Arria AM, Harris AP. Intensive care utilization during hospital admission for delivery: Prevalence, risk factors, and outcomes in a statewide population. *Anesthesiology*. 2000;92(6):1537–1544.
- Zwart JJ, Dupuis JR, Richters A, Öry F, van Roosmalen J. Obstetric intensive care unit admission: A 2-year nationwide population-based cohort study. *Intensive Care Med*. 2010;36(2):256–263.
- Ashraf N, Ashraf M, Jabeen A, Rasool S. Profile and Outcome of Patients Admitted to Obstetric ICU: A Study from Kashmir, India. *Indian J Crit Care Med*. 2016;20(4):221–223.
- Ramachandra P, Thomas M. Obstetric admissions to the intensive care unit: A one year review. *J Obstet Anaesth Crit Care*. 2014;4(1):18–23.
- Chhabra S, Kakani A. Maternal mortality due to anaemia: A retrospective analysis. *J Obstet Gynaecol*. 2007;27(5):473–475.
- Okafor UV, Efetie ER, Amucheazi A. Risk factors for maternal deaths in unbooked obstetric emergencies in Nigeria. *J Obstet Gynaecol*. 2011;31(8):721–725.
- Rios FG, Riso-Vazquez A, Alvarez J, Vinzio M, Volmer L, Aguerre S, et al. Clinical characteristics and outcomes of obstetric patients admitted to the intensive care unit. *Int J Gynaecol Obstet*. 2012;119(2):136–140.
- Kilpatrick SJ, Matthey MA. Obstetric patients requiring critical care: A five-year review. *Chest*. 1992;101(5):1407–1412.
- Munnur U, Gopal PV, Krishna H, Rani RA, Murthy K, Ramachandran G, et al. Changing trends in obstetric critical care in developing nations. *Int J Obstet Anesth*. 2005;14(4):273–278.