

Review of Critically Ill Obstetric Patients Requiring Intensive Care: A Retrospective Study

Sumitra Bachani*, Vijay Zutshi**, Nidhi Gupta***, Swati Shivhare****

Abstract

Objective: The objective of this study was to review the indications for admission, demographics, clinical characteristics, course, interventions and outcome of obstetric patients admitted in intensive care unit of a tertiary care hospital and medical college in India. *Methods:* It is a retrospective study done on obstetric patients admitted to the ICU in the intensive care unit of VMMC & Safdarjung hospital, New Delhi from Jan 2015 to Dec 2015 over a period of one year. Patients included were critically ill women requiring ventilatory support or major organ supportive therapy admitted during pregnancy as well as in first 6 weeks of the postpartum period. *Results:* In the study period, Total obstetrics admissions were 33809. 129 obstetric patients were admitted in ICU. Amongst the total ICU admissions 36 (28%) were maternal deaths. Maternal mortality ratio in the present study was 1.4/1000 deliveries. The most common indication was obstetric haemorrhage (31, 24%) followed by pregnancy induced hypertension (30, 23.2%). Mostly women stayed in ICU for 2-5 days. *Conclusion:* Early recognition of high risk cases and appropriate referral may improve the clinical outcome.

*Specialist **Professor & Consultant ***Senior Resident ****Post Graduate, Vardhmann Mahavir Medical College & Safdarjung Hospital, New Delhi, Delhi 110029, India.

Corresponding Author:
Nidhi Gupta,
Senior Resident,
Vardhmann Mahavir
Medical College &
Safdarjung Hospital, New
Delhi, Delhi 110029, India.
E-mail:
drnidhigupta19@gmail.com

Received on 07.09.2017,
Accepted on 25.09.2017

Keywords: Intensive Care Unit; Maternal Mortality; High Risk Pregnancy.

Introduction

Maternal mortality is still a very important issue in developing countries in spite of near attainment of other Millennium Development Goals (MDG) [1,2].

Physiological changes of pregnancy, foetal well-being and pregnancy related diseases make the care of the critically ill pregnant women a real challenge to the attending obstetricians and intensive care unit (ICU) Physicians [3,4].

Pregnancy, delivery and puerperium can be complicated necessitating intensive care unit admission. Approximately 0.1%-0.9% of antenatal women are admitted to ICU for various complications during pregnancy and puerperium [4,5]. In India the figure is as high as 7% [4].

The profile of critically ill obstetric patients admitted to intensive care unit has been shown to be similar worldwide; however, there is a clear divide in the mortality rates from 0% to 9.4% [6,7] in the developed compared to 33% to 52% in developing countries [8-10]. To narrow this wide gap it is necessary to identify the areas for improvement and the predictors of maternal mortality and morbidity in developing countries.

There are several studies on critically ill obstetric patients, but data from India is scarce despite huge number and wide stratum of obstetric population.

The objective of this study was to review the indications for admission, demographics, clinical characteristics, course, interventions and outcome of obstetric patients admitted in intensive care unit of a tertiary care hospital in India.

Materials and Methods

This is a retrospective study done on obstetric patients admitted to the intensive care unit (ICU) of VMMC & Safdarjung hospital, New Delhi from Jan 2015 to Dec 2015. Patients included were critically ill women admitted during pregnancy as well as in first 6 weeks of postpartum period. The critical care team included resident doctors from anaesthesiology, intensivists and nurses. Medical and surgical consultants were available on call.

Inclusion criteria were admission in ICU of critically ill obstetric patients requiring ventilatory support or major organ supportive therapy. Exclusion criteria were non-obstetric patients, women admitted after 42 days from the termination of last pregnancy and obstetric patients whose complete management data were not available for review. The data collected was analysed according to the age of the patient, parity, socioeconomic status, obstetric status, primary diagnosis, associated risk factors and outcome in these women. The main outcome measures were maternal death or survival at the end of the ICU admission. The statistical analysis was done by fractional percentage and Chi-square test.

Results

Total obstetrics admissions were 33809 from Jan 2015 to Dec 2015, amongst these 25400 women delivered in Safdarjung hospital and the rest were outside referrals (Table 1).

129 obstetric patients were admitted in ICU. A major portion (70%) of the women did not seek any antenatal care (figure1). And those who were

registered at any medical facility were not aware of high risk factors and various danger signs during pregnancy. Only 30.2% of admissions were antepartum and 69.8% were in postpartum period.

Demographic data shows 68% patients were of younger age (24-28 years). 62% were illiterate, 63% were multipara and 86% were of lower socioeconomic class. These details are illustrated in Table 2.

The most common indication for ICU admission was obstetric haemorrhage (24%) followed by pregnancy induced hypertension (23.2%), complicated heart disease (18%) and septic shock (13.9%). Other indications were Jaundice and its complications, severe anaemia in failure, uterine rupture, severe pneumonia, complicated Dengue and DIC which constituted around 20%.

Amongst disease category specific ICU admissions, 7% of the women admitted for haemorrhagic shock expired. 3.1% women amongst those with PIH, 5.4% of those with septic shock and 3.8% of women with hepatic encephalopathy did not survive. Table 3. Hepatic encephalopathy was not a common cause for ICU admission but had a high (55.5%) mortality rate carrying the worst prognosis. Hypertension and its complications had better prognosis among all indications of ICU admission and resulted in 13.3% mortality.

The most common intervention done in ICU was artificial mechanical ventilation (n = 90). 100% recovery was seen in women who required hemodynamic and vasoactive support. Amongst 26 women who required both ventilation as well as hemodynamic support, 18 of them survived. Dialysis was required in 80% of women whose kidney function was impaired but only one woman survived though this data is very small (Table 4).

Table 1: Admission status

Parameters	ICU admissions (N =129)	
Total obstetric admissions	33809	0.38%
Total deliveries	25400	0.51%

Table 2: Socio-demographic data

Age	<30 years	68%
	>30 years	32%
Literacy status	Illiterate	62%
	Educated	38%
Parity	Primipara	37%
	Multipara	63%
Socioeconomic status	Lower	86%
	Upper	14%

Table 3: Indications of ICU admission, mortality and prognosis

Indications of ICU Admission	Number (%Age)	Mortality Number (%Age)	Prognosis
Obstetric Haemorrhage and Its Complications	31(24%)	9 (7%)	29% expired
Pregnancy Related Hypertension	30(23.2%)	4 (3.1%)	13.3% expired
Heart Diseases	24(18%)	-	
Septic Shock	18(13.9%)	7 (5.4%)	38.9% expired
Jaundice and Its Complications	9(6.9%)	5 (3.8%)	55.5% expired
Severe Anaemia in Failure	6(4.6%)	-nil	-nil
Uterus Rupture	5 (3.6%)	- -nil	-nil
Pneumonia and Pleural Effusion	4 (3%)	- -nil	-nil
Complicated Dengue	2 (1.5%)	- -nil	-nil
DIC	1 (0.77%)	- -nil	-nil

Table 4: Interventions in ICU

Interventions	Number	Survived
Mechanical Ventilation	90	89
Hemodynamic Support with vasoactive drugs	53	53
Both mechanical ventilation and hemodynamic support	26	18
Dialysis	5	1
Defibrillation	2	0

Table 5: Duration of ICU stay

Duration	Number (%age)	Survived
< 5 hours	5 (3.9%)	0
5-48 hours	45 (34.9%)	32
48-120 hours	84 (65.1%)	79
> 120 hours	17 (13.2%)	15

Table 6: Causes of maternal mortality

Cause	Number (%age)
MODS	15 (60%)
Hemodynamic failure	7 (28%)
Aspiration	2 (8%)
Pulmonary embolism	1 (4%)

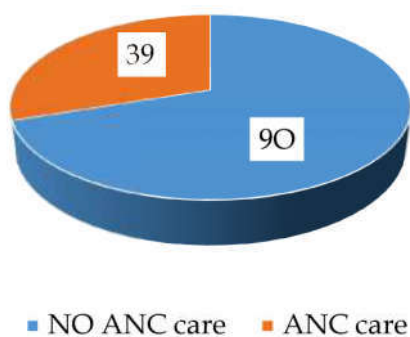


Fig. 1: Women who seek antenatal care

All the five patients who remained in ICU for less than 5 hours expired. They had presented to the tertiary care in a state of irreversible shock. 65% women stayed in the ICU for 2-5 days. More than 5 days ICU stay was observed in 13% of the women (Table 5). The duration of ICU stay would reflect the severity of the patient’s clinical situation.

Amongst the total ICU admissions maternal death occurred in 28%. Maternal mortality ratio in the present study was 1.4/1000 deliveries. The commonest cause of maternal mortality in ICU was due to multiple organ dysfunction syndrome (MODS) (60%). Other causes of mortality were hemodynamic failure, aspiration and pulmonary embolism (Table 6).

Discussion

In the present study of one-year duration critically ill obstetric patients constituted 0.38% of total obstetric admissions and 0.51% of total deliveries. In a retrospective study by Ghike et. al [11] over a period of 2 years, 47 obstetric patients required ICU admission constituting 0.77% of all obstetrics admissions and 1.04% of all deliveries [11]. Our results were comparable to other studies where ICU

admissions represented 0.39% and 0.37% of all deliveries [12,13]. In contrast one retrospective study of 55 obstetric patients done in JIPMER found that the obstetric ICU admissions represented 11.6% of total admissions [14]. JIPMER Pondicherry is a referral centre for all parts of South India which can account for this high admission index.

Almost two thirds of the women were less than 30 years of age which is like reports from other authors [7,15,16]. This is a cause of concern as these young women are also productive members of the population. A study from Nigeria analysed 90 ICU admissions and reported a positive correlation between increased maternal age and higher risk of morbidity [1].

Sixty-two per cent of women in the present study were illiterate and 86% belonged to lower socioeconomic strata. Various authors have reported that low literacy levels and poor socioeconomic status contribute to poor maternal outcome [1,15]. In contrast to this Sunanda et al did a prospective study over the period of one year and 24 obstetric patients were admitted to ICU but did not report any correlation with the level of literacy and severe morbidity in women admitted in intensive care. This study was of a small group and the author has commented on underutilisation of ICU services in their set up [16].

Majority of the patients (69.8%) admitted to the ICU were in the post-partum period whereas 31.2% admissions were antepartum in present study This is in concordance with other studies which have that reported 58% to 74% patients were in the postpartum period [5,16,17]. This high percentage of postpartum patients requiring ICU admissions is generally due to the haemodynamic changes in the postpartum period which shows a 65% increase in cardiac output, acute blood loss during delivery and decrease in plasma oncotic pressure.

In the present study 70% women did not avail of any antenatal care. Many women are not aware that blurring of vision, generalized oedema, previous multiple induced abortions, previous scarred uterus are indicators of high risk factors for their present pregnancy. Sujata et al in their study over a period of 18 months wherein 25 patients were admitted to obstetrics ICU, reported a significant correlation between lack of antenatal care and poor maternal outcome [4]. In a study by Fawole et al 42.3% had no antenatal care with 45.6% mortality, in contrast to 0% non-antenatal care and 0% mortality in Canada [15]. Another study by Sunanda et al comprising 24 women reported no relationship between lack of antepartum care and ICU admissions which could be attributed to reasons cited earlier as a small group study with underutilisation of ICU services [16].

Obstetrical haemorrhage was the most common reason for admission to ICU followed by spectrum of hypertensive diseases (pre-eclampsia and eclampsia). It represented 24% and 23.2% of all deliveries respectively which is comparable to other studies [12,16,16]. Studies done by Lataifeh [13], Niyaz [14], and Ghike [11] found that hypertensive spectrum of diseases were the most common indications for ICU admissions. Chawla [19] in their retrospective study over the period of three years and in another retrospective study over period of 12 years by Keizer [20] also reported that pre-eclampsia was the major reason for ICU admission. In all these studies, obstetric haemorrhage was the second most common cause for ICU admission. Saif in their prospective study over period of two years reported sepsis as the most common cause of maternal death [18]. One study from Florida reported more than 50% women had underlying medical disorders mainly respiratory and cardiac diseases mainly illicit drug abuse, hypertension and diabetes. Their most common cause for ICU admission was respiratory and haemodynamic instability in 80% women [5].

Almost 69% of the women in our study needed artificial ventilation and 41.3% required haemodynamic support. The patient profile in our study comprised of women haemorrhagic shock closely followed by complications of pre-eclampsia thus necessitating inotropic and ventilatory support. Sunanada et al reported need for inotropic support in 91.66% and ventilator support in 70.83% [16]. Niyaz reported a higher rate of mechanical ventilation (85%) [14]. Majority of their admissions were cases of obstetric haemorrhage. Fawole observed that most common interventions at the ICU were oxygen administration in 37 (71.2%) and mechanical ventilation in 36 (69.2%) [15]. Afessa et al reported pulmonary oedema and pneumonia as the most common cause of respiratory insufficiency needing ventilator support in 60.8% and PPH as the most common cause for haemodynamic instability in 84% women [5]. This highlights the severity of the illness in these obstetric patients at presentation, the need for adequate equipment and skills for patient care. In contrast, a study by Sujata et al reported that 24% needed ventilatory support and 56% needed haemodynamic support. It was a small study group of 25 women only and main cause for ICU admission were hypertensive disorders.

In most of the patients (60.1%) stayed in ICU for 2-5 days with 94.1% survival rates. Similar results of average ICU stay up to 5 days have been reported by other studies [4,5]. In contrast Sunanda et al reported 2-144 hours as mean duration of stay in ICU with longer stay in survivors [16]. This was attributed to a

higher maternal mortality of 41.67%. Longer duration of ICU would reflect the severity of the patient's clinical situation.

In the present study, maternal mortality was 28%. Highest mortality was associated with hepatic encephalopathy although it was not a common indicator for ICU admission. It was followed by MODS, obstetric haemorrhage and hypertensive disorders. Ghike [11] in their study found that the maternal mortality among the women admitted to ICU was 31.91%, the leading cause in their study was dengue & malarial fever (33.33%) followed by severe anaemia (20%). Adeniran et al found severe PIH and post-partum haemorrhage, in their study over 3 years as leading causes for maternal mortality however it was not statistically significant. They also reported 100% mortality with amniotic fluid embolism, unsafe abortions and peripartum cardiomyopathy [1]. Lataief reported a maternal death rate of 6.9% while it was 13% in a study by Niyaz [13,14]. Osianke et al [21] reported 50% mortality in ICU admissions due to lack of equipment and inability to diagnose the illness. Sunanda et al reported a maternal mortality of 41.67% and found multi-organ failure to be the leading cause of maternal mortality (80%) [16]. Thus it is a combination of antenatal and intensive obstetric-medical care which is essential for reducing maternal mortality. Early detection and prompt referral to a tertiary centre with intensive care facilities could minimise the prevalence of multiorgan failure and mortality in critically ill obstetric women.

Conclusion

The major determinant of the outcome of ICU care is the clinical state of the critically ill obstetric patients at the time of admission into the ICU. The leading cause of ICU admission is obstetric haemorrhage leading to haemodynamic instability. The main interventions provided in the ICU are inotropic and ventilatory support which were associated with a favourable outcome. Duration of ventilation and stay in the ICU were significantly more in the survivors.

Early recognition of high risk cases, adequate pre-ICU resuscitation and appropriate referral can improve the clinical outcome. This study reiterates universal basic education of the girl child and 100% antenatal coverage in the country.

Establishment of high dependency units (HDUs) will help in earlier admission of moderately ill patients for better observation and thus reduce ICU admissions. The need of HDU should be considered

in every tertiary referral centre. Health personals should strengthen their awareness creation activities in the community with emphasis on the awareness of predictors of high risk pregnancy.

Abbreviations

ICU: Intensive Care Unit

MODS: Multiple Organ Dysfunction Syndrome

PIH: Pregnancy Induced Hypertension

DIC: Disseminated Intravascular Coagulation

Declarations

- Ethics approval and consent to participate: Not Applicable
- Competing interests: The authors declare that they have no competing interest.
- Author's Contributions: Dr. Swati Shivhare collected the whole data. Dr Nidhi Gupta analysed all the data, performed the statistical analysis and formulated the manuscript. Dr. SumitraBachani participated in the design of the study and helped to draft the manuscript. Dr. Vijay Zutshi reviewed the manuscript and helped to draft it.

References

1. Adeniran AS, Bolaji BO, Fawole AA Oyedepo OO. Predictors of maternal mortality among critically ill obstetric patients. *Malawi Medical Journal*. 2015; 27(1): 16-9.
2. Pollock W, Rose L, Dennis C. Pregnant and postpartum admission to intensive care unit: a systematic review. *Intensive Care Med*. 2010;36(9):1465-74.
3. Rajab KE, Skerman JH. Obstetric condition requiring intensive admission: A five-year survey. *The Middle East J Emerg Med*. 2004;5:1-8.
4. Sujata P, Sahoo J, Sahoo G, et al. Evaluation of Obstetric Admissions to Intensive Care Unit (ICU) of a Tertiary Care Indian Teaching Hospital. *Int. J. Pharm. Sci. Rev. Res*. 2016;36(1):264-6.
5. Afessa B, Green B, Delke I. Systemic Inflammatory Response Syndrome, Organ Failure, and Outcome in Critically Ill Obstetric Patients Treated in an ICU. *CHEST*. 2001;120(4).
6. Muench MV, Baschat AA, Malinow AM, Mighty HE. Analysis of disease in the obstetric intensive care unit at a University referral center: a 24-month review of prospective data. *J Reprod Med*. 2008;53(12):914-20.
7. Siriam S, Robertson MS. Critically ill obstetric patients in Australia: a retrospective audit of 8-year experience

- in a tertiary intensive care unit. *Crit Care Resusc.* 2008;10:120-4.
8. Fapronle AF, Adenekan OT. Obstetric admissions into the intensive care unit in a sub-urban University Teaching Hospital. *NJOG.* 2011;6(2):33-6.
 9. Okafor VU, Efetie ER, Amucheazi A. Risk factors for maternal deaths in unplanned obstetric admissions to the intensive care unit- Lessons for sub-Saharan Africa. *Afr J Reprod Health.* 2011;15(4):51-4.
 10. Githae F, Mung'ayi V, Stones W. Course and outcome of obstetric patients admitted to a University hospital intensive care unit. *East Afr Med J.* 2011;88(10):356-60.
 11. Ghike S, Asegaonkar P. Why Obstetric patients are admitted to Intensive care unit? A Retrospective study. *J South Asian Feder Obst Gynae.* 2012;4(2):90-2.
 12. RamachandraBhat PB, Navada MH, Rao SV, Nagarathna G. Evaluation of obstetric admissions to intensive care unit of a tertiary referral centre in coastal India. *Indian J Crit Care Med.* 2013;17:34-7.
 13. Lataifeh I, Amarin Z, Zayed F, Al-Mehaisen L, Alchalabi H, Khader Y. Indications and outcome for obstetric patients' admission to intensive care unit: A 7-year review. *Journal of Obstetrics & Gynaecology.* 2010;30(4):378-82.
 14. Ashraf N, Mishra SK, Kundra P, Veena P, Soundaraghavan S, Habeebullah S. "Obstetric Patients Requiring Intensive Care: A One Year Retrospective Study in a Tertiary Care Institute in India. *Anaesthesiology Research and Practice.* 2014; Article ID 789450, 4 pages, 2014. doi:10.1155/2014/789450.
 15. Fawole AA, Bolaji BO, Oyedepo OO, Adeniran AS. Critically ill obstetric admissions into a tertiary hospital's intensive care unit. *J Med InvestigPract* 2015; 10:16-9.
 16. Gupta S, Naithani U, Doshi V, Bhargava V, Bhavani VS. Obstetric critical care: A prospective analysis of clinical characteristics, predictability, and fetomaternal outcome in a new dedicated obstetric intensive care unit. *Indian J Anaesth* 2011;55:146-53.
 17. Kulkarni S, Khatib KI. Obstetric admission to the Intensive Care Unit: A retrospective study. *Indian Journal of Applied Research.* 2015;(5):2.
 18. Saif KM, Tahmina S, Maitree P. A prospective study of clinical profile and outcome of critically ill obstetric patients in ICU at a tertiary level hospital in India. *Anaesth Pain & Intensive Care,* 2013;17(3): 243-247.
 19. Chawla S, Nakra M, Mohan S, Nambiar BC, Agarwal R, Marwaha A. Why do obstetric patients go to the ICU? A 3-year-study. *Medical Journal. Armed Forces India.* 2013;69(2):134-7. doi: 10.1016/j.mjafi.2012.08.03.
 20. Keizer JL, Zwart JJ, Meerman RH. Obstetric intensive care admissions: a 12 -year review in a tertiary care centre. *Eur J ObstetGynaecolReprodBiol.* 2006; 128:152-6.
 21. Osinaike B, Amanor-Boadu S, Sanusi A. Obstetric Intensive Care: A Developing Country Experience. *The Internet Journal of Anesthesiology.* 2006;10 (2):1-5.
-