

Study of Obstetric Patients Admitted To Intensive Care Unit (ICU) In a High Volume Tertiary Care Center

*Dr. Anuragamayi Yelamanchili, MD (OBG)¹, Dr. Karunakumari Cherukuri, MS (OBG)², Dr. Priyanka .K³

Associate Professor¹, Assistant Professor², Junior Resident³,
Dept of Obst & Gynaec, Rangaraya Medical College, Kakinada 'AP., India.
Corresponding Author: Dr. Karunakumari Ch.

Abstract: Pregnancy though physiological and can be associated with major maternal morbidity with potential catastrophic consequences requiring utilization of facilities of Intensive Care Unit (ICU) Reports regarding such admissions are few from developing countries.

Objective: To study the indication for admission, intervention and outcome of obstetric patients admitted to intensive care unit and also to identify risk factors for admission to intensive care unit at Government General Hospital, Kakinada, AP, India.

Methods: A hospital based descriptive observational study was conducted in month of April and May 2017. All obstetric admissions to the ICU up to 42 days postpartum were included. Data obtained included demography, obstetric history, pre-existing medical problems, indication for ICU admission, intervention in ICU and outcome. Risk factors were assessed by comparing cases with control which included women who delivered before and after the indexed cases.

Results: A total of 200 obstetric patients admitted in ICU during the study period. This accounts for 20% of total hospital deliveries and 12.5% of all ICU admissions. Eighty Five percent of the patients were admitted due to hypertensive disorders of pregnancy. Fourty Seven percent patients were of obstetric haemorrhage. Heart diseases topped the list with 8% in non-obstetric group. Risk factors for admission included lesser gestational age, Caesarean-section, blood loss and co-morbid conditions of the patient. Mean age was 24.5±4.8 years; Inotropic support was received by six patients (6%), CVP monitoring was done in three patients (3%). Ventilator support was needed in six (6%). There were three cases (3%) of mortality which accounts for 2.09% of total ICU mortality. Twenty Eight patients (28%) were referred from other centres.

Conclusion: Hypertensive disorders of pregnancy, Obstetric haemorrhage and Heart disease were the most common indications of ICU admissions. Risk factors for admission included lesser gestational age, caesarean section, blood loss, and co- morbid conditions of the patients. Optimal outcome was achieved with combined effort of multidisciplinary team.

Keywords: Eclampsia, Intensive care unit, obstetrics, obstetric haemorrhage.

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I. Introduction

Despite the drastic decrease in maternal morbidity over the last few decades because of improvements in obstetric care, maternal mortality remains to be a challenge in the developing countries. Although patients receiving obstetric care are young and healthy in general, there is an indisputable potential for catastrophic complications related to the pregnancy and the delivery. An indicator of pronounced maternal morbidity is intensive care unit (ICU) admissions of obstetric patients. Only a few studies have been published concerning ICU admissions of obstetric patients in the developing world, in which maternal mortality rates have ranged from 28% to 60%^{1,2}, as compared to the rates ranging from 3% to 20% in studies concerning ICU admissions of obstetric patients in the developed world³. Based on the fact that the risk factors defining pronounced maternal morbidity and maternal mortality in the developing world are not well established, the present study was conducted to evaluate the obstetric admissions to the ICU in the setting of a tertiary referral hospital in an attempt to identify the risk factors influencing maternal outcome. Most critically ill parturients may also be admitted in High Dependency Care Units (HDU) and may not be reported.^{4,5} The incidence of high dependency unit admissions is 10 in 100 deliveries and ICU admissions is 1 in 100 deliveries approximately. Although obstetric patients form a significant proportion of ICU admission in developing countries, there are only few studies reporting on critical illness during pregnancy^{6,7,8}. Scarpinato et al (as cited in Richa et al)⁸ identified serious lack of knowledge on obstetric care and called for increasing⁸ reporting of data. The aim of this study was to determine the ICU utilization by obstetric patients, to know different reasons for ICU admission, the

intervention required and outcome of such admission in ICU in the setting of tertiary care hospital and also to assess risk factors for admission to ICU.

II. Methods

A hospital based descriptive observational study was conducted in the Department of Obstetrics and Gynaecology, Government General Hospital, Kakinada, AP, India, in the month of April and May 2017. Government General Hospital, Kakinada is a tertiary care hospital with ICU facilities of 10 beds and HDU of 10 beds, not only to its own patients but also to referrals from periphery to center of the district. The unit has facilities for ventilator support, non-invasive cardio-vascular monitoring and is close to dialysis unit. The admission criteria into our ICU to any patient include the need for respiratory support or intensive therapy. All obstetric patients admitted to ICU either from the emergency room, the operating rooms or from the wards were enrolled in the study. The patients included are who admitted to the ICU during pregnancy or within 42 days of delivery. Data retrieved included age, parity, co-morbidity, obstetric history, mode of delivery, vital signs. Other data retrieved for each patient pertaining to ICU interventions were mechanical ventilation, use of control or artificial lines, blood products/transfusions, haemodialysis, radiological examination, anti-hypertensive treatment, inotropic support, and use of magnesium sulphate, length of ICU stay and outcome of such patients. Risk factors were assessed by comparing the cases with controls. Controls included the women who delivered before and after the indexed case.

III. Statistical Analysis

The quantitative variables are presented by their frequency along with percentages. The quantitative variable (scale measurements) is presented by their mean± SD values.

IV. Results

A total of 200 patients were admitted which was 12.5% of total ICU admissions and 20% of total deliveries. Twenty Eight (28%) patient were referred from outside. Most of cases were post-partum and that too after lower segment Caesarean section (LSCS) i.e. 64.5% (Table 2). The mean gestational age varied significantly ($P<0.001$) for obstetric ICU (cases) and non ICU patients (control) Pre eclampsia was the most common (60%) indication for ICU admission followed by postpartum haemorrhage (45%) for obstetric cause as shown in Table 3. Similarly for the non-obstetric cause heart disease (8%) was most common indication for ICU admission followed by epilepsy disorder (6%) as shown in Table 4. Most of the cases (61%) were shifted back to the ward and three (3%) cases had mortality.

Table 1: Characteristics of the ICU Obstetric admission (Mean±SD)

Characteristics	Cases (n=200)	Control (n=400)	P value
Age (Years)	24.5±4.8	25.9±5	0.291
Parity	1.46±1.2	1.55±0.67	0.178
Gestational Age (Weeks)	35.28±4.6	39.04±1.7	<0.001

p value calculated by t test.

Table 2: Mode of delivery among the study participants in two groups.

Mode of delivery	Cases (n=200)	Control (n=400)
Lower segment Caesarean section	129 (64.5%)	58 (14.5%)
Normal delivery	71 (30.5%)	342 (85.5%)

P value (calculated by chi-square test) <0.001

Table 3: Obstetric Indications for ICU Admissions (N=133).

Obstetric Indications	Number	Percentage (%)
Hypertensive disorder of Pregnancy		
• Eclampsia	8	8
• Pre-eclampsia	60	60
• Gestational hypertension	15	15
• HELLP syndrome	0	0
• Abruptio placenta	2	2
Obstetric haemorrhage		
• Post-Partum haemorrhage	45	45
• Ectopic pregnancy	3	3

*HELLP syndrome: Haemolysis, Elevated enzymes and Low platelets

Table 4: Non-Obstetric Indications for ICU Admissions (N=67).

Obstetric Indications	Number	Percentage (%)
Heart disease	8	8
Neurological		
• Epilepsy	6	6
• Meningoencephalitis	0	0
Respiratory		
• Pulmonary edema	3	3
• Suspected pulmonary embolism	1	1
Hepatic disorder		
• Jaundice	3	3
Renal disorder	3	3
Systemic lupus erythematosus	1	1
Sepsis	2	2
Anaemia	40	40

Table 5: Intervention required after ICU Admissions (N=200).

Interventions	Number	Percentage (%)
Oxygen supplementation	200	100
Blood transfusion	55	55
Inotropic support	6	6
Mechanical ventilation	6	6
Haemodialysis	3	3
Antibiotics	200	100
Magnesium sulphate	15	15
Antiepileptic drugs	6	6

Table 6: Outcome of the obstetric patients admitted in ICU (N=200).

Outcome	Number	Percentage (%)
Mortality	3	3
Shifted to ward	171	61
Shifted to other ward	10	10
Left against medical advice	26	26

V. Discussion

Goals in the management of critically ill obstetric patients involve intensive monitoring and physiologic support for patients with life threatening but potentially reversible conditions^{8,9}. ICU admission is management based criterion and therefore by definition leads to inclusion bias⁹. This is especially the case for tertiary care centres, where the threshold for ICU admission is high due to presence of obstetric high care units⁹. A total of 200 patients were admitted during the study period with incidence of ICU admission of 20% of all deliveries during the study period and 12.5% of all ICU admission. Threshold for ICU admission is low in low-volume maternity units due to the fact that local protocols require intravenous therapy for pre-eclampsia to be monitored at an ICU due to logistic reasons⁹. This probably also explains the relatively long duration of ICU stay in low volume and the relatively high share of admission for hypertensive disorder of pregnancy⁹. The 12.5% admission of all deliveries was quite comparable to the literature reviewed⁶⁻¹³ i.e. <1% of total deliveries as in developed countries. The major indications of admission were hypertensive disorder of pregnancy i.e. 85% followed by obstetric haemorrhage i.e. 47%. All the studies reviewed⁶⁻¹³ had similar results. Surprisingly heart disease in pregnancy (8%) was the top most indication for non-obstetric reasons. Majority of the patients were admitted post-partum and that too after caesarean section (64.5%). This again suggests that operative deliveries are associated with high chances of complication which may necessitate ICU admission¹⁰. Risk factors for admission included lesser gestational age, blood loss and associated medical and surgical illness. Selo-Ojeme et al¹¹ also in their study found black race, emergency caesarean section and those with primary postpartum haemorrhage as risk factors for admission to ICU. Okafor et al¹² in their series found organ dysfunction, massive blood loss, and late presentations as risk factor for mortality. Bouvier Colle et al¹³ concluded no antenatal consultation, serious past medical history, non-European origin and current multiple pregnancy as risk factors for admission to ICU. 6% of the patients required mechanical ventilation during their stay in hospital ICU, a rate similar to that reported elsewhere⁶⁻¹¹. The most common indication for mechanical ventilator was acute respiratory failure and haemodynamic instability. Of the six patients three survived, two left against medical advices in spite of poor prognosis explained and one was given supportive ventilation after caesarean section for eclampsia. Three patients expired. All these patients also required intensive monitoring. Ventilator therapy in developing countries is associated with very high mortality except for mechanical ventilation in the immediate post-operative patients 6.

Three (3%) mortality were noted among the admitted patients. Two patients expired due to direct obstetric reasons: Resulted from pulmonary oedema after caesarean section and normal vaginal delivery, those were referred from periphery. The third case of ectopic pregnancy and which had more than three liters haemo peritonium with irreversible shock. Most of the cases cited in their series were un booked and did not attend prenatal care. Upadhyaya et al¹⁴ reported 2.5% of maternal death resulting from obstetric cause. Though hypertensive disorders of pregnancy was the top most common cause of admission but then there was less mortality and this could be due to use of magnesium sulphate which is the anticonvulsant of choice for treating eclampsia. It reduces cerebral ischemia and results in significant reduction in the need of mechanical ventilation and ICU admission¹⁵. Optimum care of the circulation and respiration at early stage can clearly minimize the incidence of multi organ failure and late mortality in all critically ill obstetric patients. PPH is the second most common cause for ICU admission and which is the leading cause for maternal mortality and morbidity world wide¹⁶.

VI. Conclusion

This study concludes that 12.5% of all the deliveries required critical care which is quite comparable to western world. The need of ICU admission has not changed over the past years. Pattern is same all over the world with hypertensive disorders and obstetric haemorrhage being the most common obstetric reasons for admission. Risk factors for admission included lesser gestational age, caesarean section, blood loss and comorbid conditions. The 3% mortality was within acceptable range with pulmonary oedema topping the list. It also concludes that a close follow up of high risk pregnancy and an optimal stabilization of their condition before intervention improved the outcome of these patients, Safe transport with appropriate organ support ex: Oxygen support, IV fluids may minimise the end organ damage. Every unit conducting delivery should have a HDU situated near the LW or OT. Early Warning Chart (EWC) would help to flag a patient may minimize ICU admissions. To reduce the mortality early referral to ICU so as to provide optimum care of circulation, blood pressure and ventilation was necessary so that the prevalence of multi organ failure can be minimized. To achieve all of these a team effort of all disciplines is required.

6.1 Limitation of the study

We did not follow any scoring system to flag a patient at critically ill. We followed clinical findings, lab findings and need for intensive monitoring.

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