Prospective Evaluation of Maternal Morbidity and Mortality in Post-Caesarean Section Patients Admitted To Post Anaesthesia Intensive Care Unit

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Abstract: *Introduction: The pregnant woman is usually young and in good health before she becomes critically ill; hence, her prognosis will be hopefully be better if she receives timely intensive care intervention. The objective was to analyze all, consecutive critically ill obstetric patients admitted to Post Anaesthesia Intensive care unit after caesarean section with respect to the obstetric intensive care utilization rate, their clinical course, treatment, ICU interventions, prediction of maternal mortality by APACHE II score, and maternal outcome.*
AIMS: *To know the indications of transfer of post Lower Segment Caesarian Section (LSCS)patients to post anaesthesia care unit, To know the Post anaesthesia intensive care unit utilization rate, To know the clinical course, treatment and ICU interventions, To predict the mortality by APACHE II score.*
RESULTS: *Admissions were higher in multipara (n=30, 60%) when compared to primipara (n=20, 40%) but mortality was higher in primipara. Duration of stay on ventilator and number of days in ICU is significantly higher among non survivors than survivors (p value < 0.0001).*
CONCLUSION: *Risk of complications increases with increasing age. Admission rate is more in multipara but mortality rate is more in primipara. Most common indication of transfer to ICU were obstetric causes, PIH being the most common indication for transfer to ICU. Patients who were for longer duration on ventilatory support , ionotropic support, and longer duration of stay in ICU have poorer outcomes. The predicted mortality is more than the observed mortality.*
Key Words: *Lscs Patients, Maternal Morbidity And Mortality, Apache Ii Score*

I. Introduction

The pregnant woman is usually young and in good health before she becomes critically ill; hence, her prognosis will be hopefully be better if she receives timely intensive care intervention. The term maternal morbidity has been proposed to refer to life-threatening complications that occur during pregnancy, delivery or postpartum. Most pregnant women delivered by caesarean section gets complicated post operatively due to many causes like hemorrhage, hypertensive disorders, sepsis, amniotic fluid embolism etc

The objective was to analyze all, consecutive critically ill obstetric patients admitted to Post Anaesthesia Intensive care unit after caesarean section with respect to the obstetric intensive care utilization rate, their clinical course, treatment, ICU interventions, prediction of maternal mortality by APACHE II score, and maternal outcome.

II. Aims And Objectives

The present prospective study was conducted at Government General Hospital Guntur, a tertiary care institute affiliated to Guntur Medical College, Guntur from May 2017 to May 2018 with the following aims and objectives

- To know the indications of transfer of post Lower Segment Caesarian Section (LSCS)patients to post anaesthesia care unit
- To know the Post anaesthesia intensive care unit utilization rate
- To know the clinical course, treatment and ICU interventions
- To predict the mortality by APACHE II score
- To know the maternal outcomes

III. Patients And Methods

The study was conducted in the post anaesthesia intensive care unit attached to tertiary care teaching hospital during the period May 2017 to May 2018. Study protocol was approved by institutional ethical committee. Patient consent has been taken.

PACU/SICU is the post anaesthesia intensive care unit or post surgical intensive care unit in which patients needing intensive care management in the post operative period are admitted while all other post operative patients were observed in recovery room outside each OT.

This study included all consecutive post LSCS patients admitted to PACU. Obstetric patients developing complications ante partum/ post vaginal delivery were transferred to medical ICU and were not included in the study. PACU is managed by anesthesiologist. Medical, surgical and other expert opinions are sought for assuring co-ordinated care of patients. Data collected: obstetric and medical history, Indications for ICU transfer, Duration of stay in ICU, Treatment and interventions in ICU, Maternal outcome.

IV. Observations And Results

A total of 50 post caesarean patients were admitted in ICU in Government General Hospital Guntur .All patients were mostly aged between 15-32 yrs. They were again classified in to Survivors and Non-Survivors.

TABLE 1- AGE DISTRIBUTION

Age	SURVIVORS	NON SURVIVORS
15-19	12	1
20-25	23	10
25-32	0	4
Total	35	15

Out of total 50 post caesarean patients admitted in ICU, 35 survived and 15 were nonsurvivors.

TABLE 2 - MEAN AGE DISTRIBUTION

AGE	SURVIVORS	NON SURVIVORS	P VALUE
MEAN	20.86+/-0.38	24.33+/-0.8	<0.0001(significant)

The mean age among survivors is 20.86+/-0.38 and in Non survivors is 24.33+/-0.8.The p-value is <0.0001(significant) which indicates there is no significant difference in age between survivors and non survivors. Majority of patients are between 20-25 in both survivors(35) and Non survivors(15).

Parity And Mortality

Out of the total 50 post caesarean patients admitted in ICU 20 patients were primipara and 30 patients were multi para.i.e., primipara accounts for 40% of total admissions and multipara accounted for 60% of total admissions. Of the 20 primipara 5 died and of the 30 multipara 10 **die**d.

Graph 1 : Parity And Mortality
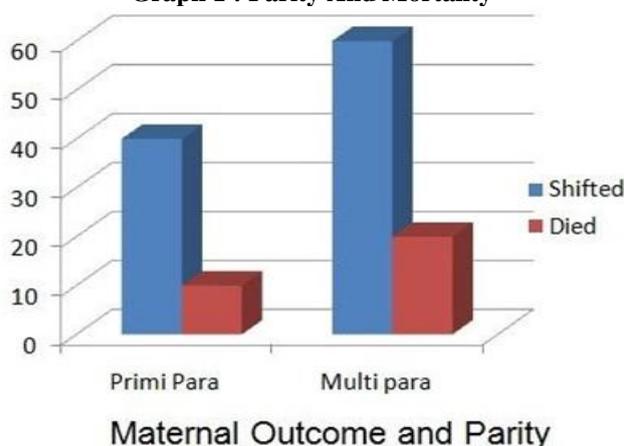
INDICATIONS FOR ICU TRANSFER

Obstetric indications ($n = 40$, 80%) were the most common cause of ICU admission as compared to nonobstetric indications ($n = 10$,20%).

Obstetric Indications for ICU transfer
1. Pregnancy Induced Hypertension (46%)
2. Hemorrhage (30%)
3. Aspiration (2%)
4. Amniotic Fluid Embolism (2%)

Non Obstetric Indications for ICU transfer
1. CVS disorders (10%)
2. Sepsis (4%)
3. Liver disorder (2%)
4. Endocrine Disorders (2%)
5. Anemia (2%)

       Of all the patients transferred to ICU, Pregnancy Induced Hypertension (46%) is the most common indication. The second most common condition is hemorrhage. Hypertensive disorders of pregnancy and hemorrhage are the most common post operative patients to be admitted in ICU in developing countries. Hypertensive disorders of pregnancy admitted in ICU included Pre eclampsia, Eclampsia and patients with HELLP syndrome. Main cause for patients admitted for Hemorrhage includes uterine atony. The other obstetric causes include amniotic fluid embolism which accounts for 2% and aspiration also called Mendelsons syndrome which accounts for 2%.Placenta Accreta and Uterine rupture are the conditions accounted for amniotic fluid embolism in patients admitted in the ICU.

       CVS disorders account for the majority of non obstetric post caesarean patients admitted in ICU in GGH, Guntur. They account for 10% of the total post caesarean patients in ICU. Of the 5 cases admitted valvular lesions accounted for 3 cases. Mitral Stenosis complicating Rheumatic heart disease is the main cause. The other main non obstetric condition includes post operative sepsis. Of the 5 0 cases 2 cases were admitted due to sepsis. The other conditions include Diabetes complicating pregnancy, jaundice in pregnancy and anemia in pregnancy.

Indications of ICU transfer

- PIH
- Hemorrhage
- CVS Disorder
- Sepsis
- AFA
- Aspiration
- Endocrine Disorder
- Liver Disease
- Anaemia
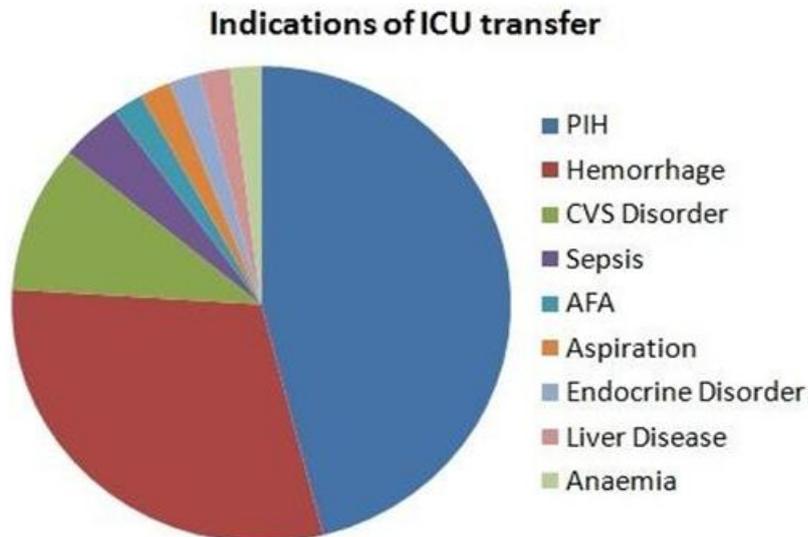
ICU UTILIZATION RATE
       In the span of our study period 2000 cases were admitted in Intensive Care Unit in Government General Hospital, Guntur. Of the 2000 cases 50 cases were post caesarean cases which include both obstetric and non obstetric causes. This accounts for ICU utilization rate of 2.5%

APACHE SCORE AND PREDICTED MORTALITY
       After the patients were admitted in ICU APACHE II score was calculated for each patient and mortality is predicted.
The point score is calculated from a patient's age and routine physiological measurements
1. AaDO2 or PaO2 (depending on FiO2)

2. Temperature (rectal)
3. Mean arterial pressure
4. pH arterial
5. Heart rate
6. Respiratory rate
7. Sodium (serum)
8. Potassium (serum)
9. Creatinine
10. Hematocrit
11. White blood cell count
12. Glasgow Coma Scale

These were measured during the first 24 hours after admission, and utilized in additional to information about previous health status (recent surgery, history of severe organ insufficiency, immunocompromised state) and baseline demographics such as age.

TABLE 3 APACHE II AND PREDICTED MORTALITY

	SURVIVORS	NON SURVIVORS	P VALUE	Z VALUE
% PREDICTED MORTALITY	12.37%	64.30 %	<0.0001	-5.493

% Predicted mortality is calculated approximately using APACHE II score

TABLE 4 PREDICTED MORTALITY

APACHE II SCORE	Non- Operative	Post- Operative
0- 4	4%	1%
5- 9	8%	3%
10 -14	15%	7%
15 – 19	24%	12%
20- 24	40%	30%
25- 29	55%	35%
30 – 34	73%	73%
35 – 100	85%	85%

GRAPH 2 – PREDICTED MORTALITY
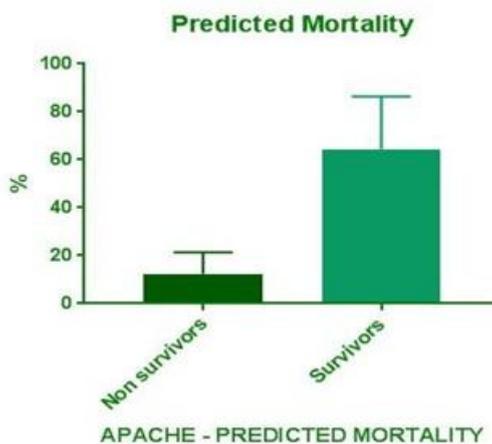
TABLE 5 HOURS ON VENTILATORY SUPPORT

	Survivors	Non Survivors	P value
Mean +/- SD	91.83 +/- 1.98	168.9 +/- 3.57	<0.0001

Non survivors were kept on ventilator for longer periods i.e.,
168.9 hours which is significantly more than survivors.

GRAPH 3:HOURS ON VENTILATOR
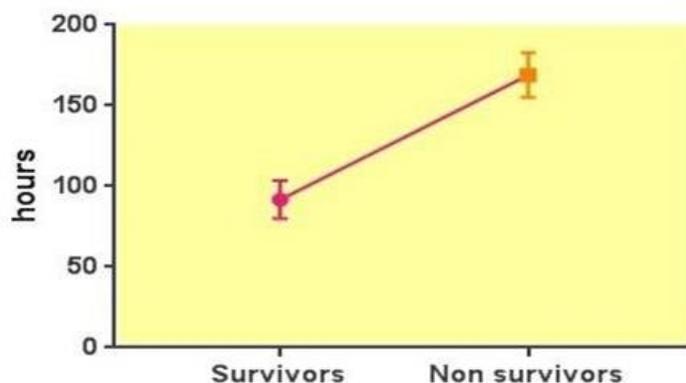
TABLE 6 NUMBER OF DAYS IN ICU

	Survivors	Non Survivors	P value
Mean +/- SD	3.143 +/- 0.21	8.0 +/- 0.33	<0.0001

Non survivors stayed in ICU for longer periods i.e., 8.0 +/- 0.33 days which is significantly   more   than survivors.

GRAPH 4 : STAY IN ICU
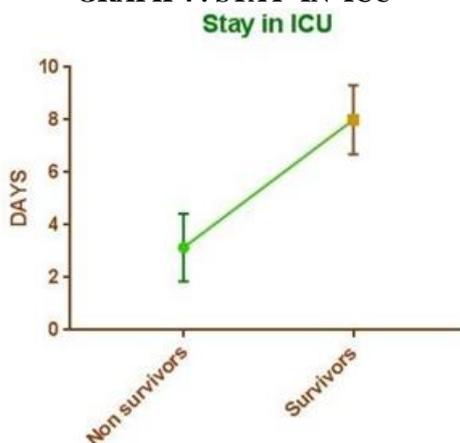
TABLE 7. COMPARISON OF DIFFERENT VARIABLES BETWEEN SURVIVORS AND NON SURVIVORS

	Survivors	Non survivors	P value	
AGE	20.86+/-0.38	24.33+/-0.8	<0.0001	Significant
PREDICTED MORTALITY	12.37%	64.30 %	<0.0001	Significant
HOURS ON VENTILATOR	91.83 +/- 1.98	168.9 +/- 3.57	<0.0001	Significant
STAY IN ICU	3.143 +/- 0.21	8.0 +/- 0.33	<0.0001	Ignificant

To summarize , admissions were higher in multipara (n=30,60%) when compared to primipara (n=20, 40%) but Mortality was higher in primipara. Duration of stay on ventilator and number of days in ICU is significantly higher among non survivors than survivors (p value < 0.0001) Of 35 survivors 15 patients needed ionotropic support when compared to 12 out of 15 in non survivors which is significantly higher in non survivors. Of 35 survivors 15 patients needed transfusions when compared to 7 out of 15 in non survivors which is significantly higher in non survivors. Transfusions included fresh frozen plasma, platelets , whole blood and packed red blood cells. Predicted mortality was statistically significantly higher in non survivors (64.3%) when compared to survivors (12.37%) (TABLE 3 and 4). Of the 50 post caesarean patients admitted in ICU in Government General Hospital, Guntur observed mortality is 30 %

V. Discussion

Clinical recognition of the unique needs of the critically ill obstetric patients have received much attention in an attempt to assess the need for dedicated critical care facilities. Reasons for ICU admission of obstetric patients can be categorized into one of the following groups:[1] Conditions related to pregnancy-hypertensive disorders of pregnancy, hemorrhage, aspiration syndromes, amniotic fluid embolus, acute fatty liver, infections etc; Medical diseases that may be aggravated during pregnancy-congenital heart diseases, rheumatic and non rheumatic valvular diseases, Cardiomyopathies, pulmonary hypertension, anemia, renal failure etc. Out of 2000 patients operated for LSCS patients, there is higher rate(80%) of obstetric indications for ICU transfer compared to non obstetric causes(20%). This is favourable to the study conducted by Harde et al and Lapinsky et al[2,3]. In The study conducted by Harde[2] the 67.2% cases were due to obstetric causes and 32.8% were due to non-obstetric causes. In the study conducted by Lapinsky[3] et al the obstetric causes were 71% and non obstetric causes were 29%.

	% of obstetric indication	% of nonobst indication
Harde et al	67.2	32.8
Lapinsky et al	71	29
Our study	80	20

In our study out of 50 patients 40 were admitted due to obstetric causes and 10 due to non obstetric causes. Among obstetric complications PIH is the most common indication for transfer (57.5%) and the second most common is postpartum haemorrhage (37.5%). Similar observations were seen in the studies conducted by Selo-ojeme et al[4] where PIH is the most common cause for admission. Whereas in the studies conducted by Suleiman et al.[5] PPH is the most common cause for obstetric ICU admission.

Obstetric haemorrhage is the second most indication for ICU transfer in our study. Total 15 haemorrhage cases were admitted. Most common cause of haemorrhage noticed in our study is uterine atony. This is in favour of the study conducted by Al-zirgi et al[6]. Their study concluded that uterine atony (30%) is the most common cause for PPH and the risk is higher for emergency caesarean delivery than elective surgery.

Other obstetric causes are amniotic fluid embolism and 1 due to aspiration. In our study Rheumatic heart disease is the most common cardiac problem seen among pregnant women. This result is contrasting with the study conducted by Van mook et al[7] where CHD is the most common heart disease seen among pregnant women. multidisciplinary team should be available to attend to women with cardiac disease once pregnancy is established. The minimum team requirement should be a cardiologist, an obstetrician and an anaesthesiologist with experience in cardiac disease. This approach decreases the risk of mortality in these patients.

In the study conducted by Harde et al[2] the utilization rate is 3.22% and in the study conducted by Osiniake et al[8] the utilization rate was 4.6% which is consistent with our study. Delay in identification of critically ill obstetric patients, unavailability of dedicated obstetric critical care, limited beds for obstetric patients in ICU are the causes for underutilization for ICU services. But now a days the ICU utilization is increasing but comparatively it is low in the developing countries.

	ICU utilization rate
Harde et al	3.22%
Osiniake et al	4.6%
Our study	2.5%

Age is an important prognostic factor. Mean age of our study is 22+/-5 yrs. Mean age in survivors is 20.8+/-0.38 and mean age among non survivors is 24.33+/-0.8 with a P value of <0.0001 which indicates there is poor outcome with increased maternal age. In the studies conducted by Bhadade et al[9] they observed that the advanced maternal age is associated with an increased incidence of obstetric complications, including LSCS, hypertensive disorders of pregnancy, eclampsia, placental problems and maternal mortality

Parity : In the current study out of 50 patients 30 were mutipara(60%) and 20 were primipara(40%). More number of cases admitted were multipara.But the prevalence of PIH and other non obstetric causes for ICU admission is more in primipara. So the overall mortality rate was more in primi, this is in favour to the study conducted by Harde et al[2] but when compared to other studies conducted by Bhattacharya et al[10] there is increased mortality was seen among multipara.

Duration Of Stay: In our study mean duration of stay is 5+/-2 days. However the duration of stay in ICU for nonsurvivors is more (8.0 +/- 0.33) which indicate longer duration of stay predicts poor outcome. These results are favourable to the studies conducted by Harde et al[2] where mean duration of stay in the PACU was 3.34 ± 3.511 days (range: 1-18 days) however duration of stay in nonsurvivors (10.25 ± 5.315 days) was longer. This is

compared to the average duration of critical care required in the majority of the patients which was around 5-10 days in the studies by Bhadade *et al.*[9] panchal et al[11]. In the study conducted by knaus et al[12] the mean length of stay is 3.3 to 7.3 days

	Mean duration of stay
Knaus et al	3.3-7.3 days
Harde et al	3.34+/-3.51 days
Our study	5+/- 2 days

EMERGENCY Vs ELECTIVE: in total 50 patients admitted in ICU 33(66%) patients were admitted after emergency LSCS and 17(34%) after elective LSCS. This indicates emergency caesarean increases the risk of morbidity. There is relatively poor outcome in patients admitted after emergency section. This is consistent with the studies conducted by selo- ojeme et al[13]

ICU INTERVENTIONS: Ventilatory support, central line placement, ionotrope support, transfusion therapy are the common interventions in the current study. Ventilatory support was given to total 20 patients out of which 13 were nonsurvivors and 7 are survivors. Mean duration of stay on ventilator was more for nonsurvivors 168.9 +/- 3.57 hrs compared to survivors 91.83 +/- 1.98 hrs. Ionotropic support was given to 18 patients out of which 11 are nonsurvivors. These results indicates patients on longer duration on ventilator and on ionotropic support had poor outcomes. These results are favourable with the study conducted by Harde et al[2] where mean duration of stay in nonsurvivors is 114 hrs and in survivors it was 36 hrs. Transfusion therapy was given to 15 cases out of which 8 are haemorrhagic cases. Munnur *et al.*[14] showed that prompt treatment with blood and blood products in patients with obstetric hemorrhage helped in reducing mortality in these patients. Overall most common ICU intervention made was ventilator support and central line placement which is consistent with the study made by Leung et al[15].

MORTALITY PREDICTION: Accurate predictive scores ICU guide in providing better management in those predicted for poor outcome and also lead to better productive utilization of the limited resources. El-solh et al[16] conducted a comparative study to evaluate the predictive ability of three scoring systems, Acute Physiology and Chronic Health Evaluation (APACHE II), Simplified Acute Physiology score (SAPS II), and Mortality Probability Models (MPM II) in critically ill obstetric patients compared to a control group of non-obstetric female patients of similar age group (range, 17 to 41 years). He concluded that Out of many scores available for mortality prediction there were no significant differences in the c-index for APACHE II, SAPS II, and MPM II within or between the obstetric group ([mean +/- SE], and the nonobstetric group. They concluded that APACHE II, SAPS II, and MPM II assess the ICU outcome of critically ill obstetric patients as accurately as nonobstetric critically ill female patients of similar age group. In our study in ICU I have selected APACHE II score as it seems to better for critically ill obstetric patients. In APACHE II, there are 12 physiological variables the reason for ICU admission is, therefore an important variable in predicting mortality, even when previous health status and the degree of acute physiological dysfunction are similar. It also includes GCS score. Acute Physiology and Chronic Health Evaluation (APACHE II), the world's most widely used severity of illness score is best fit for obstetric patients and has better calibration. GCS is best to assess neurological status of a patient ,so it is more useful in eclamptic patients.

An increasing score (range 0 to 71) was closely correlated with the subsequent risk of hospital death When APACHE II scores are combined with an accurate description of disease, they can prognostically stratify acutely ill patients and assist investigators comparing the success of new or differing forms of therapy. In my study the observed mortality rate was 30% and predicted mortality was 38%. Findings in the current study is comparable to studies done by Harde et al[2] which is similar to our study i,e predicted mortality is more compared to observed mortality. In the study done by Karnad et al[17] they showed that the APACHE II score, over-predicts the mortality in obstetric patients. However, in a study by Bhadade *et al*[9] observed mortality was comparable to the predicted mortality, ascertaining the fact that the APACHE II score is a good predictor of mortality in critically ill obstetric patients. It has been observed that when obstetric patients are admitted for medical disorders, the Predicted Mortality Rate (PMR) correlates with the Observed Mortality Rate (OMR). However, in patients with obstetric disorders, the OMR is much lower than the PMR. This over estimation of the risk could be attributed to reversibility of certain obstetric pathologies like preeclampsia and hemorrhage if there is effective and timely management. In our study the predicted mortality is more in nonsurvivors 64.3% when compared to survivors 12.3%. Hence the present observational study concludes that timely intervention and appropriate ICU utilization will reduce morbidity and mortality for high risk obstetric cases.

	Predicted mortality	Observed moratlity
Harde et al	15.6%	6.5%
Our study	38%	30%

The conditions requiring intensive care tend to mirror the causes of maternal deaths and are similar in all of the studies reviewed. Any obstetric unit must be able to provide initial critical care for obstetric emergencies which will be best done if there is dedicated obstetric ICU or high dependency unit (HDU). Full adoption of safe motherhood initiative that is close observation of pregnancy, improvement in antenatal care, early identification of complications, outlining protocols for admission to ICU as well as for management of severe hypertension, hemorrhage and common co morbid conditions and prompt intensive care will be a major step to decrease maternal morbidity as well as mortality.

VI. Summary And Conclusion

Q   In the present study 50 high risk post LSCS cases shifted to ICU and their outcome was assessed and the following conclusion was made. ICU admission rate is 0.62%. ICU utilization rate is 2.5% .Mean age of survivors is 20.86+/-0.38 and mean age of nonsurvivors is 24.33+/-0.8 .Mean duration of stay is 5+/-2 days . The predicted mortality by APACHE II score for this patients is 38% and overall mortality rate is 30%.
        The final conclusions of our study were
➢ Risk of complications increases with increasing age
➢ Admission rate is more in multipara but mortality rate is more in primipara
➢ Most common indication of transfer to ICU were obstetric causes
➢ PIH is the most common indication for transfer to ICU
➢ Patients who were for longer duration on ventilatory support ,ionotropic support, and longer duration of stay in ICU have poorer outcomes.
➢ The predicted mortality is more than the observed mortality

Outcomes are always best achieved by closed ICU system with a dedicated obstetric care and when multidisciplinary approach is adopted in managing critically ill obstetric patients. The continuous monitoring and revaluation on a regular basis, by multidisciplinary team consisting intensivist, obstetrician, physician goes a long way in decreasing the maternal morbidity and mortality.

References

[1]   Trikha A, Singh P. The critically ill obstetric patient-recent concepts. Indian J Anaesth.2010;54:421–7.
[2]   Minal Harde, Sona Dave, Sachin Wagh, Pinakin Gujjar, Rakesh Bhad de, and Aarati Bapat Prospective evaluation of maternal morbidity and mortality in post-cesarean section patients admitted to postanesthesia intensive care unit J Anaesthesiol Clin Pharmacol 2014 Oct-Dec; 30(4): 508–513.doi: 10.4103/0970- 9185.142844.
[3]   Lapinsky SE, Kruczynski K, Seaward GR, Farine D, Grossman RF. Critical care management of the obstetric patient. Can J Anaesth. 1997;44:325–9.
[4]   Selo-Ojeme DO, Omosaiye M, Battacharjee P, Kadir RA Risk factors for obstetric admissions to the intensive care unit in a tertiary hospital: a case- control study. Arch Gynecol Obstet. 2005 Sep; 272(3):207-10.
[5]   Al-Suleiman SA, Qutub HO, Rahman J, Rahman MS Obstetric admissions to the intensive care unit: a 12-year review. Arch Gynecol Obstet. 2006 Apr;274(1):4-8. Epub 2006 Jan 24.
[6]   Al-Zirqi I, Vangen S, Forsen L , Stray-Pedersen B Prevalence and risk factors of severe obstetric haemorrhage. BJOG. 2008 Sep;115(10):1265- 72. doi: 10.1111/j.1471-0528.2008.01859.x.
[7]   Van Mook WN, Peeters LSevere cardiac disease in pregnancy, part II: impact of congenital and acquired cardiac diseases during pregnancy. Curr Opin Crit Care. 2005 Oct;11(5):435-48.
[8]   Osinaike B, Amanor-Boadu S, Sanusi A. Obstetric intensive care: A developing country experience. The Internet Journal of Anesthe siology. 2006;10 .
[9]   Bhadade R, De" Souza R, More A, Harde M. Maternal outcomes in critically ill obstetrics patients: A unique challenge. Indian J Crit Care Med. 2012;16:8–1.
[10]   Dattaray C, Mandal D, Shankar U, Bhattacharya P, Mandal S. Obstetric patients requiring high-dependency unit admission in a tertiary referral centre. Int J Crit Illn Inj Sci.2013;3:31–5.
[11]   Panchal S, Arria AM, Labhsetwar SA. Maternal mortality during hospital admission for delivery: Anesth Analg.2001;93:134–41.
[12]   Knaus WA, Wagner DP, Zimmerman JE, Draper EA. Variation in mortality and length of stay in intensive care units. Ann Intern Med. 1993;118:753– 61.
[13]   Selo-Ojeme DO, Omosaiye M, Battacharjee P, Kadir RA Risk factors for obstetric admissions to the intensive care unit in a tertiary hospital: a case- control study. Arch Gynecol Obstet. 2005 Sep;272(3):207-10.
[14]   Munnur U, Bandi V, Guntupalli KK. Management principles of the critically ill obstetric patient. Clin Chest Med. 2011;32:53–60.5 . Leung NY, Lau AC, Chan KK, Yan WW. Clinical characteristics and outcomes of ob stetric patients admitted to the intensive care unit: A 10- year retrospective review. Hong
[15]   Kong Med J. 2010;16:18–25.
[16]   El-Solh AA, Grant BJA comparison of severity of illness scoring systems for critically ill obstetric patients. Chest. 1996 Nov;110(5):1299-304.
[17]   Karnad DR, Lapsia V, Krishnan A, Salvi VS. Prognostic factors in obstetric patients admitted to an Indian intensive care unit. Crit Care Med. 2004;32:1294–9.