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Double Trouble – Study on Obstetric Admissions to the Intensive Care Unit of Tertiary Care Hospital

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ABSTRACT –
This study was done to analyze the obstetric admissions to the Intensive care unit of tertiary hospital. It helps to identify the risk factors leading to ICU admission, correlate APACHE II score and causes with outcome and to study the outcome of cases admitted to ICU. it was a prospective observational study,conducted over a period of 12 months. The study included all obstetric cases admitted to ICU during Pregnancy and Puerperium – till 6 weeks after delivery. Obstetric morbidity and mortality is an important predictor of the healthcare system in a country, and continuous vigilance is required to assess the drawbacks and rectify them at the earliest. The most common reasons for ICU admission in this study were obstetric hemorrhage, hypertension and its complications. The causes of maternal mortality were cardiac arrest due to dilated cardiomyopathy secondary to severe anemia, and pulmonary edema with DIC (disseminated intravascular coagulation).

I. INTRODUCTION

Pregnancy and child birth are physiological events in a woman's life, but it can become pathological at any point of time.
Complications in pregnancy and childbirth can be obstetric or due to coexistent medical or surgical disorders. These may occur at any period of gestation, requiring multidisciplinary management.
Pregnant patients account for <2% of ICU admissions in developed countries , but they can reach up to 10% or more in developing countries.
Access to quality maternal health services that can detect and manage life threatening obstetric complications is very crucial for favourable outcome. Timely intervention along with young age factor improves the prognosis of critically ill patients.
AIM
To analyze the obstetric admissions to the Intensive care unit .

OBJECTIVES :
Identify the risk factors leading to ICU admission
Correlate APACHE II score and causes with outcome
Study the outcome of cases admitted to ICU
SOURCE OF DATA : The study was performed on all obstetric cases admitted in Intensive Care Unit of KIMS hospital under the Department of Obstetrics and Gynecology after taking the informed consent .

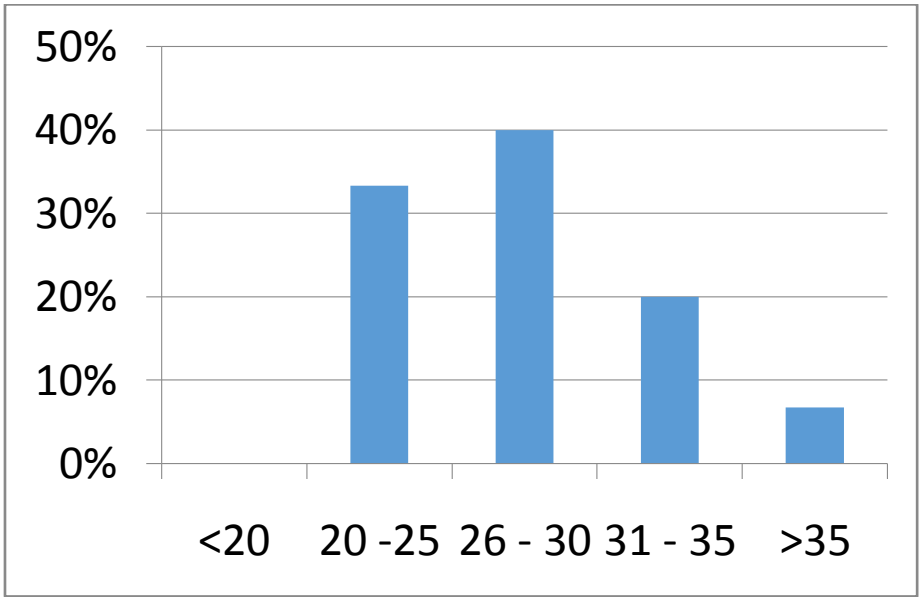
METHOD AND PROCEDURE
All women admitted in ICU, after taking informed consent of the patient or the attender and fulfilling inclusion criteria were enrolled in the study.
Detailed history elicited from the patient / attender and from the antenatal records to identify risk factors.
The patient was assessed by APACHE II - acute physiology and chronic health evaluation score and the chances of mortality predicted by the score.
The general and specific investigations according to the patient's condition was analyzed.
The cause of admission in ICU, outcome of pregnancy and maternal outcome was studied.

II. RESULTS

AGE

AGE (YRS)	NO. OF CASES	PERCENTAGE

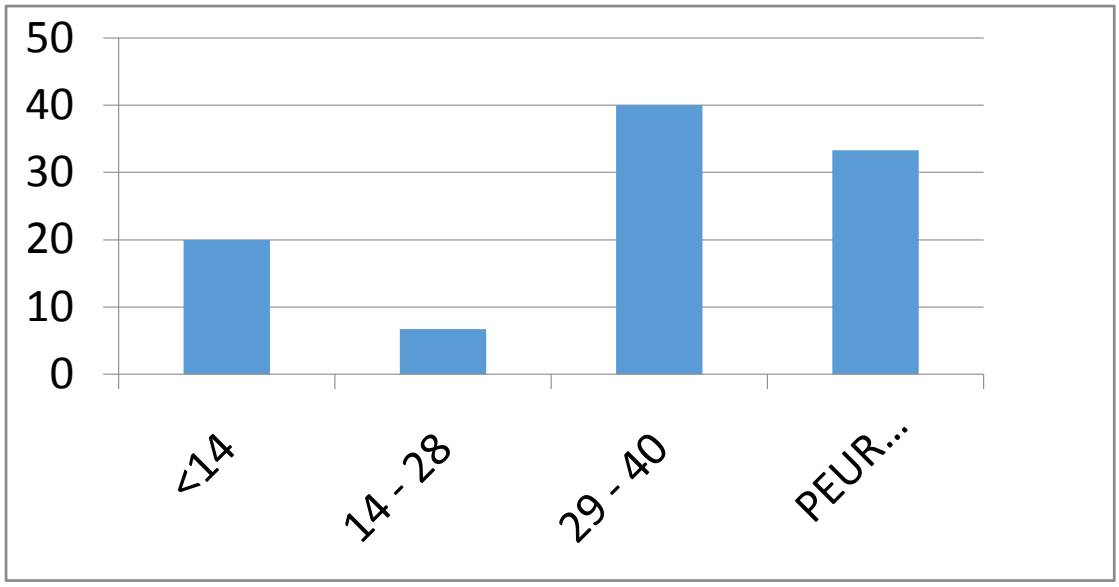
<20	0	0
20 – 25	5	33.3%
26 – 30	**6**	**40%**
31 – 35	3	20%
>35	1	6.7%
TOTAL	15	100



During a 1 year period, out of 724 admissions, total of 15 patients were admitted to ICU. Mean age group of the patients admitted to ICU was 26 – 30years.

GESTATIONAL AGE AT ADMISSION

GA	**NO OF CASES**	**PERCENTAGE**
<14 wks	3	20
14 – 28wks	1	6.7
29 – 40 wks	**6**	**40**
PEURPERIUM	5	33.3



The most common period at admission to ICU was in third trimester – 40%, followed by postpartum period – 33.3%.

DIAGNOSIS AT ADMISSION AND COMPLICATIONS

DIAGNOSIS AT ADMISSION	**COMPLICATIONS REQUIRING ICU ADMISSION**	**NO OF CASES**	**PERCEN-TAGE (%)**
RUPTURED ECTOPIC	HYPOVOLEMIC SHOCK	2	13.3
RUPTURE UTERUS	DIC	1	6.7
UTERINE PERFORATION	HYPOVOLEMIC SHOCK	1	6.7
HYPERTENSIVE DISORDER OF PREGNANCY	**HELLP , PRES**	**6**	**40**
SEVERE ANEMIA IN CCF	CCF	1	6.7
SEPSIS	SEPSIS, AKI	2	13.3
SEVERE ANEMIA IN FAILURE + PTB +AKI	CCF	1	6.7

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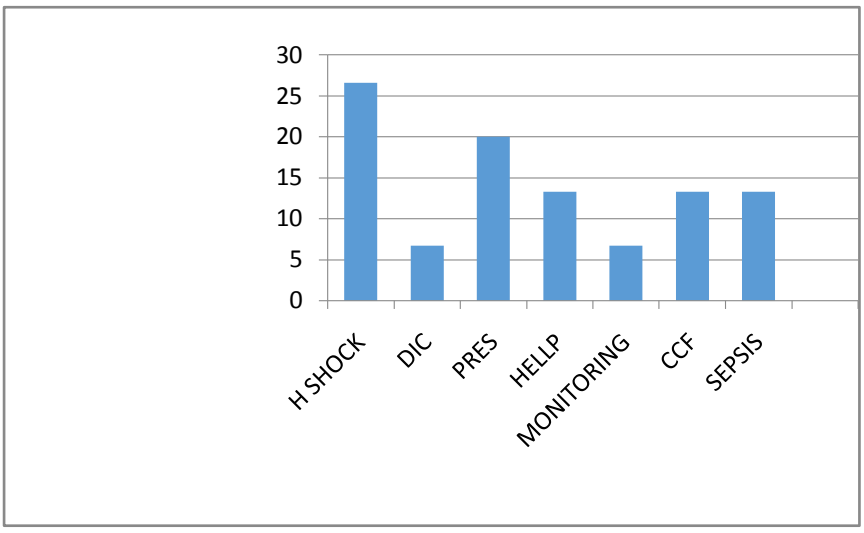
POSTPARTUM HEMORRHAGE + HYPOVOLEMIC SHOCK	HYPOVOLEMIC SHOCK	1	6.7

RISK FACTORS

RISK FACTORS	**NO OF CASES**
Anemia	10
Delayed referral	6
Unbooked case	7

It was found that anemia was the most common risk factors among the cases getting admitted to ICU, accounting for 66.6% .
7 out of 15 i.e 46.7% cases were unbooked.
6 patients (40 %) cases were referred at end stage .

INDICATION FOR ICU ADMISSION



INDICATION	**NO**	**PERCENTAGE%**
HYPOVOLEMIC SHOCK	**4**	**26.6**
DIC	1	6.7

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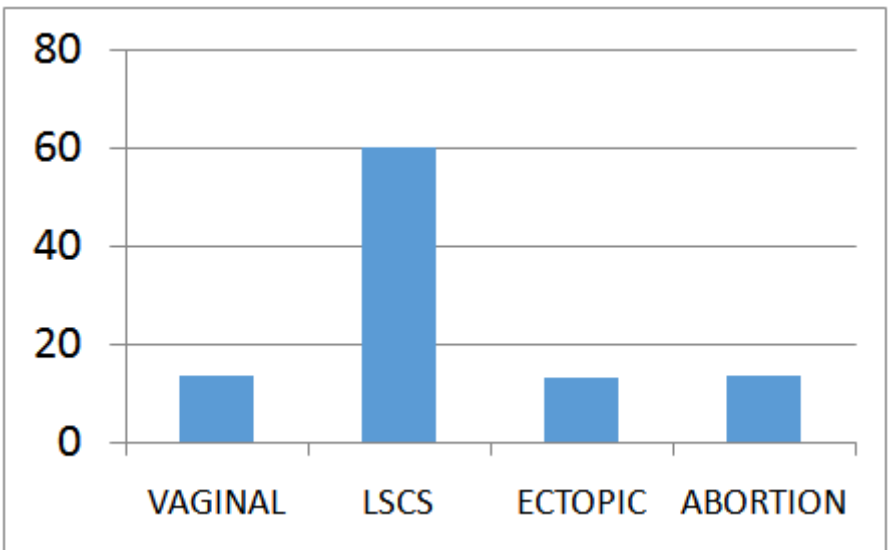
PRES	3	20
HELLP	2	13.3
MONITORING FOLLOWING ANTEPARTUM ECLAMPSIA	1	6.7
CCF	2	13.3
SEPSIS	2	13.3
TOTAL	15	100

Most common indication for ICU admission was hypovolemic shock – 26.6% , followed by PRES - 20%

OUTCOME OF PREGNANCY

OUTCOME OF PREGNANCY	**NO**	**PERCENTAGE**
VAGINAL	2	13.3
LSCS	**9**	**60.1**
ECTOPIC	2	13.3
ABORTION	2	13.3



Out of the 11 patients, 9 (81.8%) underwent LSCS, 2 patients had delivered vaginally.

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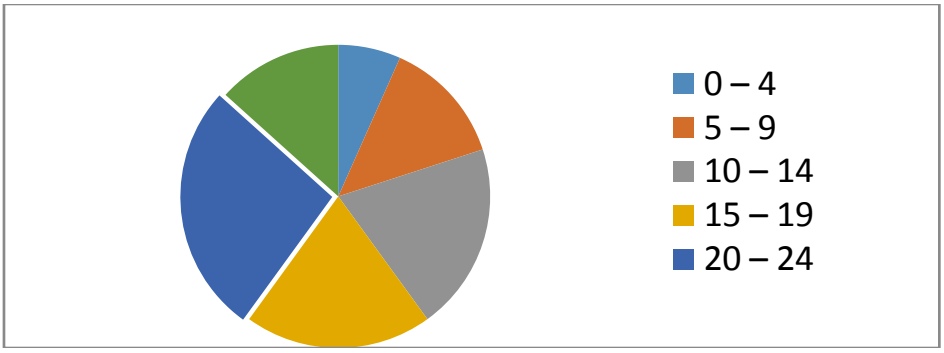
APACHE II SCORE

SCORE	NO	PERCENTAGE
0 – 4	1	6.7
5 – 9	2	13.3
10 – 14	3	20
15 – 19	3	20
20 – 24	**4**	**26.7**
25 – 29	2	13.3
30 – 34	0	0
35	0	0



The mean APACHE II score at admission to ICU was 20 – 24 which corresponds to 40% chances of mortality.

DURATION PERIOD IN ICU

INDICATION FOR ADMISSION	NO. OF DAYS

HYPOVOLEMIC SHOCK	2 -4
DIC	4
PRES	3
HELLP	2
MONITORING FOLLOWING ANTEPARTUM ECLAMPSIA	2
CCF	3 - 4
SEPSIS	**7 - 15**
TOTAL	15

Cases having sepsis had the longest duration of stay in ICU, ranging from 7 days upto 15 days.

CORRELATION BETWEEN APACHE II SCORE AND OUTCOME

	OUTCOME		
SCORE	**RECOVERED**	**DEATH**	**DAMA**
0 – 4	1	0	0
5 – 9	2	0	0
10 – 14	3	0	0
15 – 19	3	0	0
20 – 24	2	2	0
25 – 29	0	1	1

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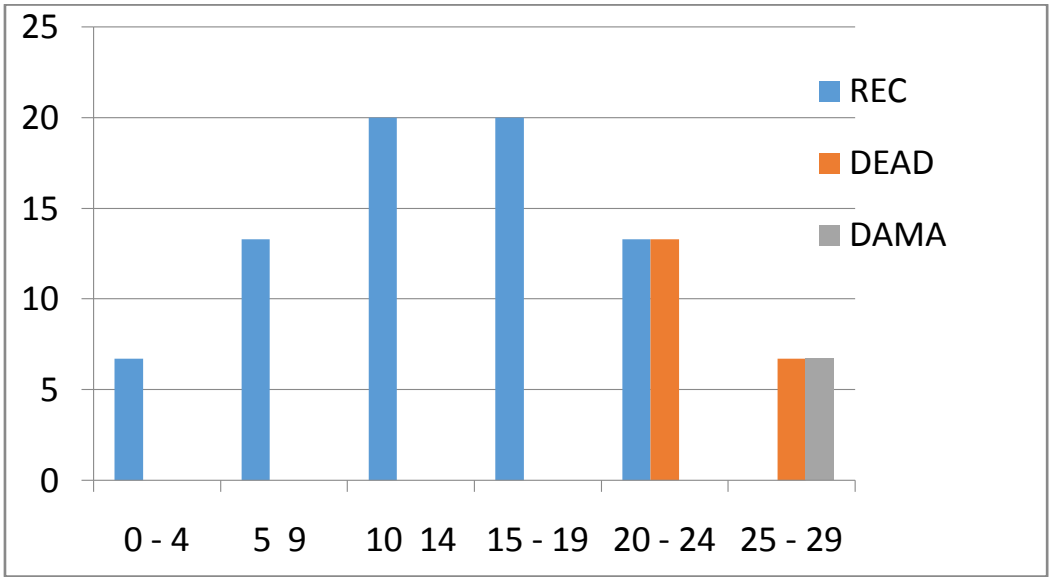
30 – 34	0	0	0
35	0	0	0



2 cases with APACHE II score 20 – 24 expired and 1 patient with a score of 29 expired. All patients with score <20 recovered.

CAUSE OF MATERNAL MORTALITY

CAUSE	**FREQUENCY**
Cardiac arrest	2
Pulmonary edema + DIC	1
Total	3

The cause of maternal mortality with APACHE II score 20 -24 was cardiac arrest due to dilated cardiomyopathy secondary to severe anemia, in both the cases and with score 29 was pulmonary edema with DIC (disseminated intravascular coagulation).

OUTCOME

OUTCOME	**NO**	**PERCENTAGE**

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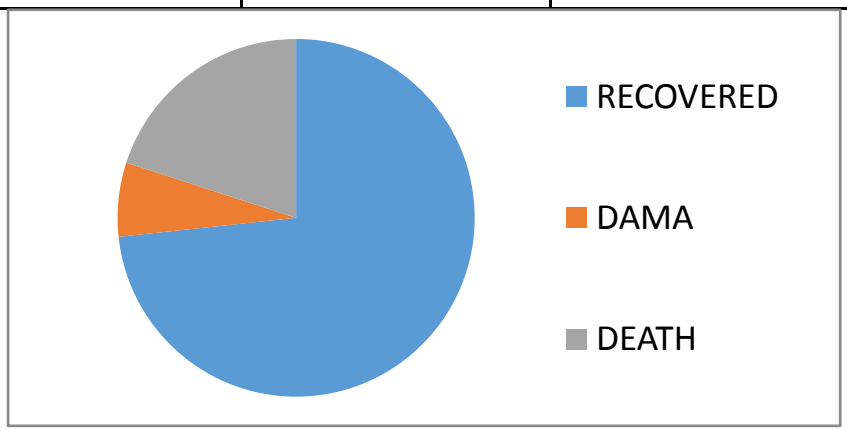
RECOVERED	11	73.3
DAMA	1	6.7
DEATH	3	20



1 1 patients recovered and got discharged in stable condition.
3 patients – 6.7 % expired .
Patient with Acute Kidney Injury with HELLP syndrome went DAMA.

III. DISCUSSION

The outcome of critically ill obstetric patients is an indirect indicator of health status in our country.

The Acute Physiology and Chronic Health Evaluation II (APACHE II) scoring system, which is a ICU prognostic scoring model, is an accurate mortality predictor and it correlates strongly with the outcome of critical patients.

In our study, conducted during COVID 19 period and our hospital being a COVID hospital, 15 (2%) obstetric patients were admitted to ICU, out of the 724 patients who got admitted between september 2019 and september 2020.

Age is an important prognostic factor and the mean age group of the patients admitted to ICU was 26 – 30years(40%). A patient of 37 years had ruptured ectopic pregnancy and 34 years had HELLP syndrome.

Bhadade et al. found that **increased** maternal **age** is associated with **hypertensive disorders of pregnancy, ectopic pregnancies and placenta** previa.

The most common period at admission to ICU was in third trimester – 40%, followed by postpartum period – 33.3%.

It was found that anemia was the most common risk factors among the cases getting admitted to ICU, accounting for 66.6%. 7 out of 15 i.e 46.7% cases were unbooked. **Regular antenatal check ups** will help detect and treat obstetric complications in the early stages.

6 (40%) cases were referred at end stages . There is increased risk of complications as precious time is lost in their transport. A case of postpartum hemorrhage was referred in a stage of severe hypovolemic shock. As the time interval between diagnosis of complications and **referral to higher centre increases**, the **APACHE II score increases, i.e the mortality rate increases**.

Most common indication for ICU admission in our study was hypovolemic shock – 26.6% , followed by PRES - 20%. 2 out of 4 cases who had hypovolemic shock, had anemia. This emphasizes the importance of **iron prophylaxis** for all pregnant women to prevent complications of anemia in pregnancy.

The other indications for ICU admission were,

Acute Kidney Injury – 2 cases, due to sepsis and severe pre eclampsia

congestive cardiac failure – 2 cases. The cause of CCF in both the cases was severe anemia

Peurperal sepsis

HELLP syndrome

Disseminated intravascular coagulation

The mean APACHE II score at admission to ICU was 20 – 24 which corresponds to 40% chances of mortality. All patients with score <20 recovered. This indicates that as the **APACHE II score increases** the chances of maternal **mortality increases.**

Out of the 11 patients, 9 (81.8%) underwent LSCS, 2 patients had delivered vaginally. **All** the **LSCS** were done under **emergency** and the indications for 7 cases was severe preeclampsia, eclampsia and HELLP syndrome. Out of the 2 vaginal deliveries, 1 case - spontaneous preterm delivery at home and the other case was induced in view of severe pre eclampsia.

This highlights the importance of the need of knowledge and skills to detect and treat any abnormal conditions that may require ICU admission, at the earliest.

The cause of maternal mortality with APACHE II score 20 -24 was cardiac arrest due to dilated cardiomyopathy secondary to severe anemia, in both the cases and with score 29 was pulmonary edema with disseminated intravascular coagulation.

Haemodynamic monitoring is of utmost importance in these group of patients with significant blood loss and altered physiology secondary to pregnancy. These cases recover well from their critical state if treated at the earliest.

A **skilled obstetrician** and a **good ICU** care with monitoring can save a young life.

IV. CONCLUSION

Pregnancy is considered as a **rebirth** of a woman. Obstetric morbidity and mortality is an important predictor of the healthcare system in a country. A continuous vigilance is required to assess the drawbacks and rectify them at the earliest, by formulating policies and goals directed towards the provision of better health care to pregnant women, that help to reduce maternal morbidity and mortality rate.

The Millennium Development Goals of India, goal no.5 focussed on reducing maternal mortality rate and delivery by Skilled Health Personnel. There was significant reduction in MMR, from 212 deaths per 100,000 live births in 2007 to 167 deaths in 2013,but the target could not be achieved by few states. Due to the nature of Indian geographical, socioeconomic, and political diversities, there was a lag in implementation of the health policies that were formulated. This delineates the need for improvement of health sector in all aspects.

The most common reasons for ICU admission in this study were obstetric hemorrhage, hypertension and its complications. A multidisciplinary team approach is required to mange such cases. **Health education**, **early recognition of risk factors, timely referral and training of health professionals** aids in the management of acute emergencies and also improves the outcome.

Awareness regarding the importance of adequate antenatal care, detection of danger signs of various obstetric complications and need for contacting medical facilities in case of emergency situations, should be created among people. All tertiary centres should have **Obstetric ICU** dedicated for the management of only obstetric patients.

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	Physiologic variable[a]	Point score								
		+4	+3	+2	+1	0	+1	+2	+3	+4
1	Temperature	≥41°	39–40.9°	–	38.5–38.9°	36–38.4°	34–35.9°	32–33.9°	30–31.9°	≤29.9°
2	Mean arterial pressure (mm Hg)	≥160	130–159	110–129	–	70–109	–	50–69	–	≤49
3	Heart rate	≥180	140–179	110–139	–	70–109	–	55–69	40–54	≤39
4	Respiratory rate(non-ventilated or ventilated)	≥50	35–49	–	25–34	12–24	10–11	6–9	–	≤5
5	Oxygenation:									
	a) FiO_2 ≥ 0.5: use A-aDO_2	≥500	350–499	200–349	–	<200	–	–	–	–
	b) FiO_2 < 0.5: use PaO_2 (mm Hg)	–	–	–	–	>70	61–70	–	55–60	<55
6	Arterial pH	≥7.7	7.6–7.69	–	7.5–7.59	7.33–7.49	–	7.25–7.32	7.15–7.24	<7.15
7	Serum Na (mMol/L)	≥180	160–179	155–159	150–154	130–149	–	120–129	111–119	≤110
8	Serum K (mMol/L)	≥7	6–6.9	–	5.5–5.9	3.5–5.4	3–3.4	2.5–2.9	–	<2.5
9	Serum creatinine (mg/dL): double point score for acute renal failure	≥++++3.5	2–3.4	1.5–1.9	–	0.6–1.4	–	<0.6	–	—
10	Hct (%)	≥60	–	50–59.9	46–49.9	30–45.9	–	20–29.9	–	<20
11	WBC (in 1000s)	≥40	–	20–39.9	15–19.9	3–14.9	–	1–2.9	–	<1
12	Glasgow coma score (GCS)	Score = 15 minus actual GCS								
Acute physiology score is the sum of the 12 individual variable points										
Add 0 points for the age <44.2 points, 45–54 years: three points, 55–64 years: five points, 65–74 years: six points ≥75 years										
APACHE II score = acute physiology score + age points + chronic health points. Minimum score = 0; maximum score = 71. Increasing score is associated with increasinf = g risk of hospital death										
Add chronic health status points: two points if elective postoperative patient with immunocompromise or history of severe organ insufficiency: five points for nonoperative patient or emergency postperative patient with immunocompromise or severe organ insufficiency[c]										
13[d]	Serum HCO_3 (venous-mMol/L) use only if no ABGs	≥52	41–51.9	–	32–40.9	22–31.9	–	18–21.9	15–17.9	<15

Adapted from Knaus WA, Draper EA, Wagner DP, Zimmermann JB: APACHE II: A severity of disease classification system. *Critial care medicine* 13: 818–829. 1985.
Interpretation of APACHE II scores (predicted mortality rate).
0–4 = ~4% death rate 10–14 = ~15% death rate 20–24 = ~40% death rate 30–34 = ~75% death rate.
5–9 = ~8% death rate 15–19 = ~25% death rate 25–29 = ~55% death rate Over 34 = ~85% death rate.

[a] APACHE II Score = acute physiology score + age points + chronic health points. Minimum score = 0; maximum score = 71. Increasing score is associated with increasing risk of hospital death.
[b] Choose worst value in the past 24 h.
[c] Chronic health status: Organ sufficiency (e.g. hepatic, cardiovascular, renal, pulmonary) or immuno-compromised state must have preceded current admission.
[d] Optional variable: use only if no ABGs.

PATIENT INFORMED CONSENT FORM

I/ WE the patient/the patient's attender of hereby give consent to be part of study of DR YASHASWINI P RAO

STUDY – PROSPECTIVE STUDY ON OBSTETRIC ADMISSIONS TO THE INTENSIVE CARE UNIT OF TERTIARY HOSPITAL

The nature and purpose of the above mentioned study and expected duration of the study and other relevant details of the study have been explained . I give permission to have access to the records. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without any medical care or legal right being affected.

There will be no direct benefit to me as a participant. However the information provided would help the health professional to better understand the conditions in pregnancy requiring ICU admission and its management and outcome.

By signing this form I acknowledge that I have read or had this form read and explained to me in the language I understand and fully understand its contents.

I agree to take part in the above study.

DATE_____

SIGNATURE OF PATIENT_____

SIGNATURE OF THE ATTENDER