

**Intensive Care Unit in a Tertiary Care Center – A Retrospective Study****S Anita, Preeti Banerjee, Swetha Mude, Priyadarshini**

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**Received: 10/09/2023. Revised: 13/09/2023 / Accepted: 18-09-2023****Corresponding author: Preeti Banerjee****Conflict of interest: Nil****Abstract**

**Introduction:** The characteristics of these patients admitted to intensive care unit (ICU) including the sociodemographic factors are useful in better management of these patients in future. Also, the admission of the obstetric patient to ICU and their outcome is an indirect indicator of health care status of a country.

**Aims:** To find out the booked and referral, indications, Maternal and fetal outcome among the cases in the maternal ICU.

**Materials and Methods:** It is a Retrospective observational study in all pregnant women who were admitted in obstetric critical care unit in a government Tertiary care centre. All women who were admitted in obstetric critical care either due to obstetric complications or any other systemic comorbidities during the pregnancy are included in study

**Results:** In our study, total of 1500 patients were admitted in the maternal ICU 61 of whom were cases of ectopic pregnancy 5 with severe thrombocytopenia, 6 were acute fatty liver of pregnancy. 22 patients died and 37 patients were maternal near miss. Out of 22 maternal deaths. It was found statistically significant that as the time to reach the hospital increased the maternal mortality and morbidity increased. 316 patients were less than 20 years of age, among whom 17 were near miss and 12 died, in between 20 to 35 years of age 870 were admitted out of whom 7 were near miss and 5 deaths. Statistical significance was not found in between parity and maternal mortality. 857 who were admitted in MICU, were singleton pregnancies, out of whom 31 were near miss and 19 deaths, 375 were twin pregnancies.

986 patients needed <2 weeks of hospital stay, 368 patients had hospital stay in between 2 to 4 weeks, 146 patients had to stay beyond 4 weeks. Out of 1235 antenatal cases that were admitted in MICU, 432 patients had vaginal delivery, 223 had hysterectomy and 580 had LSCS. It was statistically significant that as the weight of the babies increased, the number of deaths were reduced.

**Conclusions:** It was found that highest mortality was found with acute fatty liver, IC Bleed, placenta accreta and PPCM and near term babies, weight of more than 2 kgs babies had better chances of survival. At the same time, pre term deliveries were found common in patients admitted in MICU.

**Keywords:** Medical Intensive Care Unit (MICU), preterm deliveries, placenta accreta, Peripartum cardiomyopathy (PPCM).

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**Introduction**

Women may develop a life threatening condition anytime during her pregnancy with either little or no prior warning signs. These may include: Any complications arising in antepartum, intrapartum or postpartum period as a direct result of pregnancy itself such as preeclampsia, PPH etc. or any other maternal co morbid conditions involving multisystem such as diabetes, hypertension cardiac and renal diseases. [1]

The women with obstetrics complications need access to quality maternal health services that can detect and manage life threatening complications. These women would need 24×7 personalized care by skilled provider, essentially led by obstetricians

or emergency obstetric care, some may also need intensivist or super speciality management and also the babies of these mothers are most of the times preterm and may need neonatal intensive care. Current maternal mortality rate worldwide is 152/100,000 live births and that of India is 113/100,000 live births (2016-2018). [2]

Current perinatal mortality rate worldwide is 17/1000 live births<sup>4</sup> and in India it is 28/1000 live births. Hence it is utmost important that the maternal ICU should be well equipped with all emergency drugs and proper ventilator support with multimodal team of doctors lead by obstetric emergency team and also there should be

availability of good neonatal intensive care unit as most of the babies may have to bear the complications of being preterm.

When critical cases are reassessed, it can provide proper information on area of involvement and also can help to identify the limitations in the health system and also assess the quality of maternal health care, also the distance and timely referral to Tertiary care centre also effect the general maternal and fetal outcome. The following are recommended for maternal Intensive care unit and/or High Dependency Unit in a hospital at Medical College and District Hospitals. >1000 deliveries/month: 4 bed ICU + 8 bed HDU 501-1000 deliveries/month 8 bed Hybrid ICU (6 HDU+2 ICU), 250-500 deliveries/month : ) 8 bed HDU.

Institutional deliveries and referral from periphery greatly differ between medical college hospitals. Hence, same setup is neither ideal nor practical to implement. Hence, concept of hybrid model of Obstetric ICU is developed where 8 bed unit is proposed to be developed at medical college hospitals who do not have adequate load for separate ICU. 8 bed unit will have 6 bed HDU and 2 bed ICU in the same unit. This is the more appropriate way of using resources optimally. Detailed Human Resource requirement and equipment requirement is detailed in later parts of these guidelines. [3, 4]

This study intends to review critical cases that can provide significant information about areas of improvement and is useful in identifying health system failures and assessment of quality of maternal health-care. This study aims to find percentage of women out of total admission in the obstetric unit in Niloufer hospital who needed maternal intensive care and their outcome and needed to for any multimodal management along with their fetal outcome, if they were booked case or referral from other places and the time to reach Niloufer hospital and time of onset of the disease to onset of treatment and their outcome and also to the percentages of various indications which lead to admission in the maternal intensive care unit(MICU).

### Materials & Methods

It is a Retrospective observational study in all pregnant women who were admitted in obstetric critical care unit from January 2021 to December 2021 in NILOUFER HOSPITAL, a government Tertiary care centre. Inclusion Criteria: all women who were admitted in obstetric critical care either due to obstetric complications or any other systemic comorbidities during the pregnancy. Exclusion criteria: Cases with any medicolegal issue, Road traffic accidents and Cases brought to hospital in moribund condition

Sample Size: all cases that were admitted in the MICU in the year 2021 from January to December will be considered as sample.

Methodology: All the cases that were admitted in obstetric intensive care unit were classified into booked or referral cases, in case of referral, time of referral to start of treatment is determined, relevant history taken, indication for the MICU admission is found, the maternal outcome, needed multimodal management, shift to higher antibiotics, multiple blood transfusions, needed assisted ventilator support, non-invasive ventilator support,, permanent comorbidities of mother or mortality caused by direct or indirect obstetric cause is found along with their fetal outcome and the data is collected and prevalence calculated and analysed statistically. A Retrospective Cross sectional study to study various Maternal and fetal outcome among the patients admitted in obstetric intensive and prevalence of various indications that lead to the admission in MICU were calculated and statistically analysed.

### Statistical Analysis Plan:

All the categorical parameters like booking status, various indications and maternal / fatal outcomes, etc. will be represented with frequency and percentages. All the quantitative parameters like mother age, lag time to reach hospital, etc. will be represented with means and standard deviation. To find the association between booking status, indications, maternal outcome and fatal outcome with MICU admission we will use Chi-square test for measure of association. To find the significant difference of lag time between MICU and non MICU patients we will use unpaired t-test. All the data will be entered in MS. Excel and analysed by SPSS 19.0v. All the values will be presented with relevant charts/ figures.

### Results

In our study , total of 1500 patients were admitted in the maternal ICU 61 of whom were cases of ectopic pregnancy 5 with severe thrombocytopenia, 6 were acute fatty liver of pregnancy,1 with acute flaccid paralysis,2 with intracranial bleed, 273 with postpartum haemorrhage, 5 with hepatosplenomegaly and haemolytic anaemia, 1with congenital pulmonary airway malformation of left lung,12 with post abortal bleed, 8 with heart disease,15 with rupture uterus, 10 with diabetic ketoacidosis,87 with sepsis,246 with severe anaemia, 32 with covid related complications,192 with antepartum eclampsia, 220 with severe preeclampsia,38 with HELLP syndrome, 106 with abruption, 13 with PPCM, 3 with renal transplant,100 with placenta previa, 64 with placenta accrete.

**Table 1: Cause of Admission in present study**

Cause of Admission	No Residual Morbidity	Near Miss	Deaths	Total
Ectopic Pregnancy	59	2	0	61
Severe Thrombocytopenia	5	0	0	5
Acute Fatty Liver Of Pregnancy	4	1	1	6
Acute Flaccid Paralysis	0	1	0	1
Intracranial Bleed	0	1	1	2
PPH	268	4	1	273
Hepatosplenomegaly With Haemolytic Anaemia	4	1	0	5
Congenital Pulm Airway Malformation Of Left Lung	1	0	0	1
Post Abortal Bleed	8	4	0	12
Heart Disease	8	0	0	8
Rupture Uterus	13	0	2	15
Diabetic Ketoacidosis	6	4	0	10
Sepsis	84	2	1	87
Severe Anemia	242	2	2	246
Covid Related Complications	29	2	1	32
Antepartum Eclampsia	188	2	2	192
Severe Preeclampsia	217	3	0	220
Hellp	34	2	2	38
Abruption	100	2	4	106
Ppcm	8	2	3	13
Renal Transplant	3	0	0	3
Placenta Previa	100	0	0	100
Placenta Accreta	60	2	2	64

**Table 2: Maternal outcome in present study**

Maternal Outcome	No. of Subjects	Percentage
No Residual Morbidity	1441	96.1%
Near Miss	37	2.5%
Deaths	22	1.5%
Total	1500	

Out of 1500 cases, 22 patients died and 37 patients were maternal near miss

**Table 3: Number of deaths and cause of admission in present study**

Cause of Admission	No. of Deaths
Acute Fatty Liver Of Pregnancy	1
Intracranial Bleed	1
PPH	1
Rupture Uterus	2
Sepsis	1
Severe Anemia	2
Covid related complications	1
Antepartum Eclampsia	2
HELLP	2
Abruption	4
PPCM	3
Placenta Accreta	2
Total	22

Out of 22 maternal deaths, 1 had acute fatty liver of pregnancy, 1 had intracranial bleed, 1 with post-

partum haemorrhage, 2 patients with rupture uterus, 1 with sepsis, 2 with severe anaemia,, 1 with covid

related complications, 2 with antepartum eclampsia, 2 with HELLP, 4 with abruption, 3 with PPCM and 2 with placenta accrete.

**Table 4: Time to reach the hospital for the patient**

Time to reach the hospital	No Residual Morbidity	Near Miss	Deaths	Total
<3 hrs	497(34.49%)	3(8.11%)	0	500
3-8 hrs	540(37.47%)	7(18.92%)	7(31.82%)	554
>8 hrs	404(28.04%)	27(72.97%)	15(68.18%)	446
<b>Total</b>	1441	37	22	1500
P Value	<0.001			

Out of 6000 patients who were admitted in the labour room, 1500 patients who were admitted in MICU, 500 reached the hospital within 3 hours of onset of complication, 554 reached in between 3 to 8 hours and 446 reached after 8 hours. Among the patients who reached the hospital within 3 hours, none had died and 3 were near miss. Among the

patients who reached in between 3 to 8 hours, 7 had died and 7 were near miss, among patients who reached after 8 hours, 15 had died and 27 were near miss. It was found statistically significant that as the time to reach the hospital increased the maternal mortality and morbidity increased.

**Table-5: Referral status of patients in present study**

Referral Status	No Residual Morbidity	Near Miss	Deaths	Total
<b>Booked</b>	266(18.46%)	5(13.51%)	0	271
<b>Un-Booked</b>	354(24.57%)	11(29.73%)	2(9.09%)	367
<b>Referral</b>	821(56.97%)	21(56.76%)	20(90.91%)	862
<b>Total</b>	1441	37	22	1500
P Value	0.022			

In our study, 425 patients had BMI less than 18.5, out of whom 13 were near miss, and 7 deaths. 549 patients had BMI in between 18.5-25, out of whom 5 were near miss and 6 deaths, 467 patients had

BMI more than 25, among whom 19 were near miss and 9 deaths. It was found statistically significant that the deaths occurred more in BMI of more than 25 rather than lower BMI's.

**Table-6: Association with demographic details and death rate in present study**

Age (Years)	No Residual Morbidity	Near Miss	Deaths	Total
<20	287((19.92%))	17(45.95%)	12(54.55%)	316
20-35	870(60.37%)	7(18.92%)	5(22.73%)	882
>35	284(19.71%)	13(35.14%)	5(22.73%)	302
<b>Total</b>	1441	37	22	1500
P Value	<0.001			
<b>BMI</b>				
<18.5	425(29.49%)	13(35.14%)	7(31.82%)	445
18.5-25	549(38.10%)	5(13.51%)	6(27.27%)	560
>25	467(32.41%)	19(51.35%)	9(40.91%)	495
<b>Total</b>	1441	37	22	1500
P Value	0.024			
<b>Parity</b>				
Primi	523(36.29%)	16(43.24%)	11(50.00%)	550
G2	456(31.64%)	7(18.92%)	3(13.64%)	466
G3 & Above	462(32.06%)	14(37.84%)	8(36.36%)	484
<b>Total</b>	1441	37	22	1500
P Value	0.191			
<b>Multifetal Gestation</b>				
Singleton	807(67.82%)	31(88.57%)	19(86.36%)	857
Twins	369(31.01%)	3(8.57%)	3(13.64%)	375
Triplets	14(1.18%)	1(2.86%)	0	15
<b>Total</b>	1190	35	22	1247

In our study, 316 patients were less than 20 years of age, among whom 17 were near miss and 12 died, in between 20 to 35 years of age 870 were

admitted out of whom 7 were near miss and 5 deaths. Over 35 years 284 were admitted, among whom 13 were near miss and 5 deaths. In our

study, it was found statistically the age of less than 20 years have higher mortality rates. In our study, 550 patients that were admitted in MICU, were primigravida, out of whom 16 were near miss and 11 were deaths, 466 were 2<sup>nd</sup> gravida, out of whom 7 were near miss and 3 were deaths and 484 were 3<sup>rd</sup> gravida and more, out of whom 14 were near miss and 8 deaths. Statistical significance was not

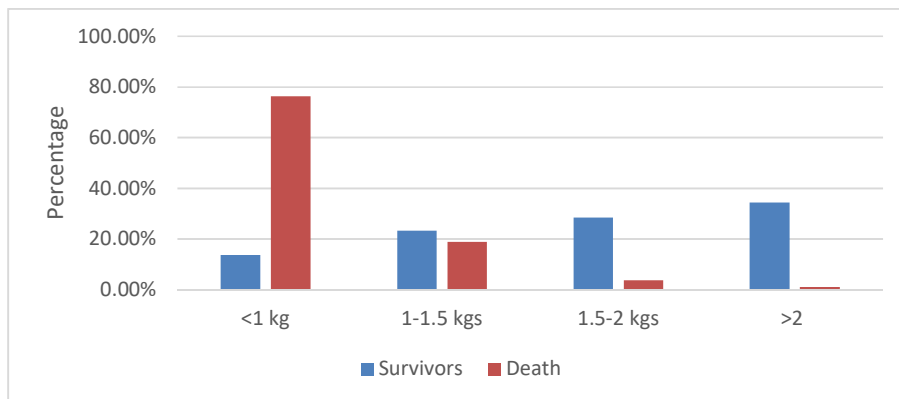
found in between parity and maternal mortality. In our study, 857 who were admitted in MICU, were singleton pregnancies, out of whom 31 were near miss and 19 deaths, 375 were twin pregnancies 3 were near miss and 3 were deaths, 15 were triplet pregnancies out of whom 1 was near miss and no death.

**Table-7: Hospital stay and treatment in present study**

Hospital Stay	No. of Subjects	Percentage
<2 weeks	986	65.73%
2-4 weeks	368	24.53%
>4 weeks	146	9.73%
<b>Total</b>	<b>1500</b>	
<b>Supportive treatment</b>		
ventilatory support	50	5.7%
multimodal approach	611	69.2%
multiple blood transfusion	180	20.4%
MODS	42	4.8%
<b>Total</b>	<b>883</b>	
<b>Mode of delivery</b>		
Vaginal	432	35.0%
hysterotomy	223	18.1%
Lscs	580	47.0%
<b>Total</b>	<b>1235</b>	

In our study, out of 1500 patients who were admitted in micu, 986 patients needed <2 weeks of hospital stay, 368 patients had hospital stay in between 2 to 4 weeks, 146 patients had to stay beyond 4 weeks Out of 1500 cases that were admitted in MICU, 50 patients needed ventilatory

support, 611 patients needed multimodal approach, 180 patients needed multiple blood transfusion, 42 patients landed into MODS. Out of 1235 antenatal cases that were admitted in micu, 432 patients had vaginal delivery, 223 had hysterotomy and 580 had lscs.



**Figure-1: weight of baby in association with survivors and death**

Out of 1640 babies that were delivered among micu patients, 391 were <1kg, out of whom 202 babies died, 371 babies were between 1-1.5 kgs, out of which 50 babies died, 402 babies were in between

1.5-2 kgs, out of which 10 babies died, 476 babies were >2kgs, out of which 3 died. It was statistically concluded that as the weight of the babies increased, the number of deaths were reduced 6 were acute fatty liver of pregnancy, 1 with acute flaccid paralysis, 2 with intracranial bleed, 273 with postpartum haemorrhage, 5 with hepatosplenomegaly and haemolytic anaemia, 1 with congenital pulmonary airway malformation

**Conclusion**

In our study, total of 1500 patients were admitted in the maternal ICU 61 of whom were cases of ectopic pregnancy 5 with severe thrombocytopenia,

of left lung, 12 with post abortal bleed, 8 with heart disease, 15 with rupture uterus, 10 with diabetic ketoacidosis, 87 with sepsis, 246 with severe anaemia, 32 with covid related complications, 192 with antepartum eclampsia, 220 with severe preeclampsia, 38 with HELLP syndrome, 106 with abruption, 13 with PPCM, 3 with renal transplant, 100 with placenta previa, 64 with placenta accrete. Out of 1500 cases, 22 patients died and 37 patients were maternal near miss. Out of 22 maternal deaths, 1 had acute fatty liver of pregnancy, 1 had intracranial bleed, 1 with post-partum haemorrhage, 2 patients with rupture uterus, 1 with sepsis, 2 with severe anaemia, 1 with covid related complications, 2 with antepartum eclampsia, 2 with HELLP, 4 with abruption, 3 with PPCM and 2 with placenta accrete. Out of 6000 patients who were admitted in the labour room, 1500 patients who were admitted in MICU. This comprised of 25% of the total patients, among whom 500 reached the hospital within 3 hours of onset of complication, 554 reached in between 3 to 8 hours and 446 reached after 8 hours. Among the patients who reached the hospital within 3 hours, none had died and 3 were near miss. Among the patients who reached in between 3 to 8 hours, 7 had died and 7 were near miss, among patients who reached after 8 hours, 15 had died and 27 were near miss. It was found statistically significant that as the time to reach the hospital increased the maternal mortality and morbidity increased.

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was near miss and no deaths. In our study, out of 1500 patients who were admitted in micu, 986 patients needed <2 weeks of hospital stay, 368 patients had hospital stay in between 2 to 4 weeks, 146 patients had to stay beyond 4 weeks.

Out of 1500 cases that were admitted in MICU, 50 patients needed ventilatory support, 611 patients needed multimodal approach, 180 patients needed multiple blood transfusion, 42 patients landed into MODS. Out of 1235 antenatal cases that were admitted in MICU, 432 patients had vaginal delivery, 223 had hysterotomy and 580 had LSCS. Studies have found prior history of Caesarean a risk factor for developing maternal near miss.[5]

Out of 1640 babies that were delivered among MICU patients, 391 were <1kg, out of whom 202 babies died, 371 babies were between 1-1.5 kgs, out of which 50 babies died, 402 babies were in between 1.5-2 kgs, out of which 10 babies died, 476 babies were >2kgs, out of which 3 died. It was statistically concluded that as the weight of the babies increased, the number of deaths were reduced.

According to Rakesh Bhadade et al, [6] a study conducted to find maternal outcomes in critically ill obstetric patients. They found that maternal age more than 30 years was associated with high mortality. Majority of patients were admitted in 3rd trimester and post-partum period and found highest mortality in postpartum period with increased parity to have been associated with higher mortality rates. Acute viral hepatitis E, Malaria and pregnancy induced hypertension were the most common indication for the patients to get transferred in MICU, with the most common cause of death being viral hepatitis E with hepatic failure.

A study conducted by Vinutha K Veerabhadrapa et al [7], who conducted a maternal outcome in obstetric ICU and HDU, a total of 7966 were admitted out of which total number of deliveries were 5085 and live births were 4490. 8 total were maternal deaths, making the maternal mortality ratio 1.7 per thousand deliveries. Total number of MICU admissions was 60 which is 0.7% of obstetric admissions. ICU utilization was 0.7%. No significant difference between survivors and non survivors was found. No significant difference was seen in terms of distance from the centre and literacy status of the women. Postpartum admissions were significantly more compared to anti partum admissions. Most common admission was due to hypertensive disorder. This emphasizes the point that there may not be much time for transfer to ICU in case of obstetric cases and things can turn for the worse pretty quickly. Lack of antenatal care, poor socio economic background, delays in referral from the peripheral health centres predicted poor outcomes. [8, 9, 10]

### Conclusion

As per our study, it was found that less time to reach to the hospital from the onset of the condition and booked status of the patient in antenatal visit was statistically found significant to reduce the maternal mortality. As per our study, highest mortality was found with acute fatty liver, IC Bleed, placenta accreata and PPCM. It was found that near term babies and weight of more than 2 kgs babies had better chances of survival. At the same time, pre term deliveries were found common in patients admitted in MICU.

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