VOLUME - 12, ISSUE - 09, SEPTEMBER - 2023 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper | Obstetrics & Gynaecology

UTILITY OF OBSTETRIC NATIONAL EARLY WARNING SYSTEM IN EARLY IDENTIFICATION AND MANAGEMENT OF MATERNAL COMPLICATION IN ANTENATAL WOMEN ADMITTED IN B.R.D. MEDICAL COLLEGE GORAKHPUR

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ABSTRACT

Background: Maternal mortality is still a major challenge for health systems, while severe maternal complications are the primary causes of maternal death. Our study aimed to determine utility of obstetric national early warning system (ONEWS) in early identification and management of maternal complication in antenatal women. **Methods:** This case-control study conducted on 400 women admitted to department of Obs and gynae more than or equal to 34weeks pregnant after taking informed written consent. In group-A risk scoring of each patient was done as per ONEWS scoring system whereas in group-B frequency of observation, monitoring and necessary action was taken according to existing hospital protocol. **Results:** Patient managed by ONEWS system have longer hospital-stay than controls (p=.0015). 6.50% patients from study group and 14.50% of controls needed critical-care (p=0.091), patients followed with ONEWS had early detection of trigger parameter which leads to early detection and management which decreases critical-care need. Mean ICU stay was less for cases than controls. Commonest cause of mortality was hypertensive disorder of pregnancy and associated complication (1 in case, 3 in control) followed by post-partum hemorrhage with DIC.(41.0%) of cases and (55.0%) of control s developed CAMO (p<0.001), indicate that ONEWS leads to early detection of trigger parameter which decreases CAMO. **Conclusion:** Use of ONEWS leads to homogeneous distribution of monitoring which decreases implementation variation. ONEWS is simple bedside tool without need of high cost and maintenance equipment and can be implemented by nurse or junior resident, thus reduces wastage of manpower.

KEYWORDS : Maternal Mortality, obstetric national early warning system, pregnant women, hypertension disorder, CAMO

INTRODUCTION:

Maternal mortality is still a major challenge worldwide Maternal mortality ratio of India is 97 per 100000 live births and that of Uttar Pradesh is 167 per 100000 live birth(SRS 18-20) (32). Vital sign or physiological parameter based early warning score (EWS) are used to detect early signs of deterioration.' s Early detection of serious illness during pregnancy and childbirth helps in prevention of maternal as well as neonatal morbidity and mortality. The monitoring of physiological parameters is a critical component of maternal care. Usually, patients exhibit abnormalities in simple vitals parameters prior to development of critical illness. This helps in early identification of sick mothers and improved patient outcome.

Physiological parameters based early warning score (EWS) are utilised for this purpose. An EWS has 3 components (1) Early waring score- tool for identification and management of sick mother (2) Tracking- periodic monitoring of vital signs on observation chart & (3) Trigger - predetermined cut-off score will trigger the call for help, involving multidisciplinary team as required.

Critical illness in pregnancy might be due to pregnancy particular conditions, conditions exacerbates by pregnancy or due to coincidental condition. This is described in the classification of maternal deaths into direct, indirect and coincidental deaths.

In an effort to improve patient care, several early warning scoring systems have been designed for non-obstetric adult population but none of these are validated for the pregnant women. Normal physiology changes during pregnancy may cause alternation in the significance of physiological parameters thereby necessitating the modification in application of these scores.

Obstetric National Early Warning System (ONEWS)used in Wales UK is based on 10 physiological parameters for bedside evaluation of pregnant women was found suitable in Indian context. Moreover, there is a paucity of indian literature for validation of ONEWS, therefore this study has been planned.

AIMS AND OBJECTIVE-

To evaluate the obstetric national early warning system (ONEWS) as a screening tool for early identification of sick pregnant women and its impact in improving maternal outcome.

Sample Size: Sample size was calculated on assuming that among 50% of patients, this predictive score system ONEWS correctly predicted the maternal outcome (Assumption is based on the fact that by it maximum sample size arrives)

$$N = \frac{4xPxQ}{L^2}$$

P = 59%

Q=100-59=41%

L= 50% allowance error

$$= \frac{4 \times 59 \times 49}{5x5}$$

$$= 387.4$$

Methods

This case-control study was conducted in department of OBS & GYNAE at tertiary care institute of eastern uttar pradesh, India on 400 antenatal women who were more than or equal to 34 weeks pregnant during the period of August 2021 to July 2022. They were purposively allocated into two groups, Group A (ONEWS), and Group B (existing hospital protocol), written informed consent was obtained from each participant and Ethical clearance was taken from the institute's ethics committee.

Inclusion And Exclusion Criteria:

All antenatal women with more than or equal to 34 week pregnancies have been admitted in our labour room were included and women brought in shock or who died immediately after admission, who were admitted directly to ICU, denied consent and in active labor were excluded. All recruited women were allocated into two groups- Group A (study group) and Group B (control group). Detailed history regarding socio-demographic characteristics, obstetrical, medical and surgical history was noted. Complete general, systemic, and abdominal and pelvic examinations were done. Once admitted, all routine and specific investigation as required for the clinical case management was done for all patients after a complete clinical examination.

GROUP A -

Risk scoring was done for women received in this group based on ONEWS scoring system,(Table1) The parameters were noted on the ONEWS chart at time of admission by principal investigator and a score was assigned and further monitoring and management according to ONEWS chart was done by team posted on rotation duties in the labour room at a frequency depending upon ONEWS score(figure 1).

For **GROUP B** (control group) women recruited in this group-frequency of observation, monitoring and necessary action was taken according to existing hospital protocol (every hourly monitoring was done till the patient was kept in labour room as per patient condition, once the patient was shifted to ward 12hourly monitoring was done)

All participants cases as well as control were followed till discharge and further in postnatal period for 6 week, and also their outcome were noted.

Statistical Analysis:

Data were entered in Microsoft Excel and analyzed using statistical software SPSS version 23 (SPSS Inc., Chicago, IL, USA). The continuous variables were evaluated by mean (standard deviation) or range value when required. The dichotomous variables were presented in number/frequency and were analyzed using Chi-square. Analysis by Student t-test was used to compare the means between the two groups. ROC analysis were done to obtained specific cut-off value with sensitivity and specificity. A p-value of < 0.05 or 0.001 was regarded as significant.

RESULTS AND OBSERVATION

The mean age was 33.15+_5.84 years in study group and 32.84+_5.11 years in control group (Table 2). Most of women in study group (75%) as well as control group, belonged to lower middle socioeconomic status. Majority of antenatal women were booked in study group (60%) and control gropu (55.5%).

Most common trigger parameter in study group was presence of urinary protein (24%), followed by systolic blood pressure > 140mmHg (22%) and diastolic blood pressure >90mm Hg (21%). (Table3) Patients who met the trigger parameters had a significantly high relative risk of experiencing severe maternal morbidity than those who did not meet the trigger parameters. The highest relative risk was seen in patients with urinary protein, with a relative risk of 19.33(95%CI : 12.4-33.54), followed by urine output less than 1ml/kg/h with a relative risk of 10.91(95% CI : 1.22-101.2), and SpO2 less than 95% with a relative risk of 15.55(95%CI: 2.2-136.9).

There was no significant difference between cases and controls in the incidence of hypertensive disorder, APH, pulmonary edema, HELLP, MODS, respiratory failure, shock, PPH, acute kidney injury, puerperal sepsis, obstetric cholestasis, severe anemia, thrombocytopenia.(Figure2). On comparison of ONEWS score at admission, it was observed that 70.5% women had a score of 0-2, 5% had score of 6-8, while 8% had score of 8 or more (Figure3). However, at the time of discharge, 98.5% women had a score of 0-2, only 1.5% who were expired had persistently raised ONEWS score during their hospital stay.

CAMO (composite adverse maternal outcome) was observed in 41% patients of study group and 55% patients of control group (Figure 4).

The sensitivity and specificity, positive predictive value, negative predictive value of ONEWS at a cut-off acore of 5 for predicting CAMO was 97.56% and 83.05%, 80.0% and 98.0% respectively,(Table4). thus sensitivity and specificity of ONEWS in predicting CAMO are both high, indicating that it is a good diagnostic test. The PPV is high, indicating that a positive test result is reliable in predicting CAMO.(Table 4).

6.5% of study group and 14.5% of control had intensive care unit admissions. Among study group 98.5% of patients were discharged well and mortality was reported in 1.5% patients, whereas in control group 96.5% were discharged satisfactorily and 2.5% were expired. Most common cause of mortality in our study was hypertensive disorder of pregnancy (Table 5).

The area under receiver operating characteristic curve for ONEWS was 0.816, 0.95% CI 0.727-0.904(Figure5).

DISCUSSION

A scoring system with universal application to detect and weigh the severity of sickness in pregnant women has not been developed in India. A comprehensive scoring system can segregate the pregnant women into low, moderate and high risk, recognise the sick mothers, assess the severity of sickness and help in triage and timely referral to a higher centre. This can contribute to the reduction of maternal morbidity and mortality at the community level.

Several domains including direct obstetric causes, access and availability of care, utilization of healthcare services, illiteracy and lack of protocols applicable to all levels of care contribute to the majority of maternal mortality in India. A uniform comprehensive scoring system may help the healthcare providers in early identification of the sick mothers. The majority of the studied cases were in the age group 20 to 29 years in both the cases and the controls group with mean age 26.18 ±4.51 and 26.58±5.04 years respectively ($p>0.05$). The mean BMI was higher in cases (25.64±2.96) than controls (23.25±2.62). mean gestational age, mean gravid and ANC services received were also comparable between the groups ($p>0.05$). Our findings were in accordance with the findings of **Chakravarthy K et al** who reported that the majority of women (n=113, 94.16%) were aged 20–34 years with a mean age of 23.5 years. The interpregnancy interval less than 18 months was in 15.0% cases and parity more than 2 was in 29.0% cases. **Umar A et al** in their study reported that there was no difference in age between the intervention and control groups at baseline ($p=0.348$) and postimplementation ($p=0.169$). **Premkumari and Sowmiya S** in their study on validation study of the confidential enquiry into maternal and child health recommended modified early obstetric warning system as a predictor of obstetric morbidity found that the mean age of participating women was 25.76 ± 6.598 years ranging from 17

to 40 years, with maximum (47.1%) patients belonging to 21 - 25 years. Maximum of the subject was multiparous (58.7%).

In the present study the mean hospital stays were longer in cases (8.87±5.81) compared to controls (7.21±4.46). Statistically, a significant difference was observed among groups (p=0.0015). The mean postnatal stays were longer in cases (7.23±4.32) compared to controls (6.24±3.43). Statistically, a significant difference was observed among groups (p=0.0115). The majority of the women in the case (93.50%) and control group (85.50%) had not required ICU admission. Statistically, a significant difference was observed among groups (p=0.0091). Most of the women in the case (53.85%) and control group (55.17%) had 2-4 days of ICU stays, followed by >4 days. Statistically, a non-significant difference was observed in ICU stays among groups (p=0.514). The mean ICU stays were recorded (0.23±1.06) in cases and (0.48±1.59) in controls. **Umar A et al**[10] reported that Length of hospital stay was also comparable between intervention and control group (p=368). Our findings are consistent with other studies that reported improvement in the postoperative monitoring of women after caesarean section following the introduction of modified obstetric EWS. **Singh A et al** and **Singh S et al** also supported our findings regarding the above-mentioned parameters between the cases and the controls. According to **Rathore AM et al** the ICU admissions in the triggered group (n=200) was 10 per cent (n=20) and in the non-triggered group (n=300) was 4.3 per cent (n=13), with the difference being significant (P<0.01). Of the total 33 (6.6%) women who were transferred to ICU, 17 (51.5%) died. The mean length of hospital stay was 8.7±6.5 days.

Maternal Outcome

On the basis of mother outcome, the majority of the women in case (98.5%) and control group (96.50%) were discharged. At the same time, in the control group, 2 women absconded. The mortality occurs in 3(1.5%) in the case group and 5 (2.5%) in control group. Statistically, a non-significant difference was observed in maternal outcomes (p=0.281). The Scottish Confidential Audit of severe maternal morbidity revealed major obstetric haemorrhage as the most common severe maternal morbidity (5.0/1000 live birth), which was similar to (2.9/1000 live birth) our study. The most common cause of maternal death in our study was obstetric haemorrhage as compared to study conducted **Saravanakumar K et al**, with the most common cause of maternal death being cardiac disease.

The average institutional maternal mortality ratio (MMR) across the 3 study sites was 1052 per 100,000 live births. This is significantly higher than the population-based national average of 917 per 100,000 live births but comparable to the estimated institutional MMR from Nigerian tertiary health facilities. Maternal mortality reviews indicate that a significant proportion of women who die due to pregnancy and childbirth demonstrate abnormal vital signs long before death, suggesting that a multi-parameter EWS system should identify them with high specificity. Effectively, this should facilitate timely diagnosis and treatment, limit the severity of morbidity, and possibly reduce mortality. Obstetric EWS have been previously shown to prevent progressive obstetric morbidity.

Trigger Parameters

The majority of the patients' trigger parameter were Urinary protein [48 (24.0%)] followed by Systolic BP [44 (22.0%)], Diastolic BP [42 (21.0%)]and Pulse rate [39 (19.50%)]. The majority of the maternal morbidity was observed with trigger factor SBP [79.55%] followed DBP [73.81%] and Urine Output [72.73%]. However, a significant difference was observed in Trigger parameters of the enrolled patients. Our findings were in accordance with the findings of **Premkumari and Sowmiya S**[11] who reported that the most frequent trigger was pulse rate (75.0%), followed by diastolic BP (36%) and systolic BP (36.0%). Temperature (16.0%), oxygen saturation (5.5%), respiratory rate (3.2%), and the least frequent trigger was pain score. **Ryan HM et al** reported that following stepwise logistic regression, of eight significant variables identified using univariable analyses (P<0.05; maximum temperature, maximum heart rate, minimum heart rate, maximum systolic blood pressure, minimum SBP, maximum diastolic blood pressure, minimum diastolic blood pressure, and respiratory rate), four variables were significantly associated with ICU admission >24 hours: maximum temperature (b co-efficient 1.14; P=0.005); heart rate (b 0.06; P<0.001); sBP (b 0.05; P<0.001); and respiratory rate (b 0.22; p=0.001).

Obstetric Morbidity

In the case group, most of the women were anaemic [53 (26.50%)], followed by preterm labour [29 (14.5%)], oligohydramnios [17 (8.5%)] and so on. Similarly, women in the control group were also anaemic [38(19.0%)], followed by preterm labour [20 (10.0%)] and so on. Statistically, a non-significant difference was observed in obstetric morbidity among groups [p=0.345]. Our findings were consistent with the findings of **Radha R et al**[6] who reported that of the 1000 cases examined, 96 cases were preeclamptic, 45 cases had PPH, 19 cases had PPH with preeclampsia, 15 cases were found to have eclampsia, and 2 of these cases with eclampsia developed cortical venous thrombosis (CVT). Wound infection was found in nine cases, three cases had pulmonary edema, and pulmonary thromboembolism was found in one case. **Chakravarthy K et al**[9] reported that anaemia was the most common pregnancy-associated risk factor (n=34, 28.3%), followed by hypertensive disorders of pregnancy (n=27, 22.5%). According to **Premkumari and Sowmiya S**[11] the most common cause of near miss maternal morbidity was obstetric hemorrhage 75.0% followed by hypertensive disease of pregnancy 16.6% and sepsis 8.3%.

CAMO In Case And Control Groups

The majority of the patients in cases group had no CAMO [118(59.00%)] followed by 82(41.00%) patients who showed CAMO. However, in control group majority of the patients showed CAMO [110(55.00%)] followed by 90(45.00%) patients who didn't showed CAMO. Overall, a significant difference was observed **(p<0.001)** in CAMO in case and Control. **Rathore AM et al**[16] reported that the primary outcome measure was composite adverse maternal outcome (CAMO) in the form of one or more among mortality, severe maternal morbidity and intensive care unit admissions. Of the 500 women who participated, 200 (40.0%) had a score ≥3 (triggered an intervention). The CAMO among the triggered group [59.5% (n=119)] was significantly higher compared to that in the non-triggered group [13.3% (n=40) (P=0.001)].

ON EWS at cut off score of 5 in detection of various obstetric morbidity

While analyzing the predictive value between ONEWS score with cut-off score 5 and Critical care need, the sensitivity, specificity, PPV and NPV were 84.62%,84.49%,27.50 and 98.75% respectively was observed with statistically significant difference (p<0.05). The other parameters such as Maternal morbidity, hypertensive disorders, hemorrhage, sepsis, severe anemia, HELLP syndrome, DIC also shows significant difference between ONEWS score with cut-off score 5 (p<0.05). **Rathore AM et al**[16] reported that the sensitivity of the ONEWS in predicting adverse maternal outcome was 74.8%, specificity 76.2%, positive predictive value 59.5% and negative predictive value 86.7% using a cut-off score of 3. The sensitivity of the ONEWS in predicting CAMO was 74.8%, specificity 76.2%, positive predictive value 59.5% and negative predictive value 86.7% at a cut-off score of 3. The AUROC for ONEWS in their study (0.80, 0.95% CI 0.752-0.847) was lower as compared to the results of other studies by **Carle C et al** and **Swanton RDJ et al**, which ranged from 0.937 to

0.995. Out of 159 women in which CAMO was observed, major obstetric haemorrhage was observed in 29 (18.0%), preeclampsia/eclampsia in 96 (62.7%), renal dysfunction in 13 (8.49%), liver dysfunction in 14 (9.1%), cardiac arrest in seven (4.5%), pulmonary oedema in six (3.9%), acute respiratory dysfunction in five (3.2%), cerebrovascular event in one (0.65%), septicaemic shock in two (1.3%) and massive pulmonary embolism in three (1.9%) women. **Premkumari and Sowmiya S**[11] reported the sensitivity of MEOWS in predicting near miss maternal morbidity was 70.0%,specificity 84.3%, positive predictive value 21.6% and negative predictive value 97.8%. **Edwards S et al** for example, found wide variation when comparing the predictive ability of four MEWS charts for severe sepsis. Sensitivity ranged from 40% to 100% and specificity from 3.9% to 96.9%, leading the authors to conclude that the MEWS lacked predictive power for severe sepsis in a maternity population.

While analysing the ROC analysis of ONEWs vs CAMO parameter of the enrolled women, it was observed that, the Sensitivity, Specificity, PPV and NPV were 97.56%, 83.05%, 80.00% and 98.00%, respectively. Statistically, a significant difference was observed in ONEWs with CAMO ($p<0.05$). **Rathore AM et al**[16] in their study reported that the sensitivity of the ONEWS in predicting CAMO was 74.8%, specificity 76.2%, positive predictive value 59.5% and negative predictive value 86.7% at a cut-off score of 3. According to **Theron G et al** ONEWS may be used for predicting CAMO in high-risk pregnant women. Further research may be directed to increase sensitivity and specificity by lowering the threshold at which morbidity is defined.

Prakash A et al in their study reported that the MEOWS demonstrated a much higher sensitivity than non-obstetric early warning system that are currently used in adult population. The evidence from **Smith V et al** review suggests that MEWS probably does not reduce maternal death but may result in lower rates of obstetric haemorrhage in women and probably reduces a woman's length of stay in hospital. Existing validation studies on MEWS for maternity populations also provide mixed results on predictive ability of MEWS for detecting maternal compromise.

Thus, ONEWS may be used for predicting CAMO in high-risk pregnant women, and to enhance maternal outcome, As, area under the curve in our study is comparable with other studies. And sensitivity, specificity, PPV and NPV of ONEWS for CAMO is higher in our study as compared with MEOWS and MEWT as found in other studies. Further research may be directed to increase sensitivity and specificity by lowering the threshold at which morbidity is defined.

CONCLUSION

Delay in identification of complications during pregnancy is associated with higher odd of maternal mortality, so implantation of ONEWS help in reducing maternal morbidity by early detection of maternal complications. ONEWS Scoring system help in early detection of obstetric morbidity as compared with hospital protocol because ONEWS use wide range of parameters for monitoring. ONEWS has multidisciplinary approach incorporated in their protocol which leads to timely intervention and prompt management by multidisciplinary co-ordination which reduces severe adverse maternal outcome and thereby reduce maternal mortality. Use of ONEWS leads to homogeneous distribution of monitoring which decreases implementation variation. ONEWS is a simple bedside tool without need of high cost and maintenance equipment and can be implemented by nurse or junior resident, thus reduces wastage of manpower.

Strength Of The Study-

*As ONEWS has wide range of parameters used for monitoring, so maternal morbidity was early detected as compared with existing hospital protocol.*ONEWS is easy bedside tool to apply and has better outcome, so can be implemented by nurse too.*As ONEWS has wide range of parameters used for monitoring, so maternal morbidity was early detected as compared with existing hospital protocol.*ONEWS is easy bedside tool to apply and has better outcome, so can be implemented by nurse too.

Limitations Of This Study-

1. Study has been conducted over a small study period. Longer period will give better assessment.
2. The study could have been done in larger population.
3. The study has been conducted among mothers attending academic institution and may suffer from population bias. Hence the result may not be applicable to general population
4. In a resource-limited country like India, it is difficult to monitor every high-risk patient in the ICU.

Recommendations of study-

1. Study to be conducted in different centers in a larger population.
2. Cut off values of ONEWS to be reconsidered to improve the sensitivity.

Table no 1-

Obstetric National Early Warning System (Version 1) Jan 12
The Scoring System!

Physiological Parameters / SCORE	DRAFT (1) Obstetric National Early Warning System						
	3	2	1	0	1	2	3
LOOKS / FEELS UNWELL?				NO		YES	
Respiratory Rate	≤8	8-10		11-20		21-24	≥25
Oxygen Sats (Air)	≤93	93-94	94-95	≥96			
Pulse	≤40		41-50	51-100	101-110	111-130	≥131
Systollic BP	≤80	81-90	91-100	101-139	140-149	150-160	≥160
Diastollic BP				<90	90-99	100-109	≥110
AVPU				Alert			VPU
Temperature (°C)	≤35.0		35.1-36	36.1-37.5	37.6-38	38.1-39	≥39.1
Other: Urine output	<0.5ml/kg/hr	<1ml/kg/hr		>1ml/kg/hr			
Urinary protein				NO		YES	

Concern about a woman should lead to escalation, regardless of the score.

ACTION PLAN ACCORDING TO ONEWS

Score	Monitoring interval	Action taken according to score
0-2	12 hourly	➢ No action required
3-5	1-4 hourly	➢ Consult senior resident to review the case with in 30 min. ➢ inform anesthetic resident to review the case ➢ Rule out the possibility of sepsis. ➢ More frequent monitoring done for high score and less frequent monitoring done for lesser score
6-8 6 = Sick	1-2 hourly	➢ Inform senior resident to review the case within 30 min. ➢ Simultaneous call to personnel with core competences for acute illness i.e. anesthesia resident , medicine emergency team and surgery team ➢ Consult senior resident to review the case with in 30 min. ➢ inform anesthetic resident to review the case Rule out the possibility of sepsis. ➢ More frequent monitoring done for high score and less frequent monitoring done for lesser score
≥ 9	30 min.	➢ Inform senior resident and inform consultant obstetrics to review the case ➢ Emergency call to the team with critical care competences- the team should include a medical practitioner skill in assessment of critically ill patients who possesses advanced airway management and resuscitation skills i.e. anesthesia resident and medicine resident

• Concern about a patient should lead to escalation regardless of the score

Figure 1- Action Plan According To ONEWS

Table 2-Demographic And Maternal Characteristics

Variables	Cases (n=200)	Controls (n=200)	p-value
Mean Age (years)	33.15±5.84	32.84±5.11	0.572
Mean Gravida	2.08±1.41	2.07±1.17	0.938
Mean Parity	0.81±1.08	0.81±0.88	0.959
Mean BMI (Kg/m^2)	30.25±3.62	28.64±4.96	0.001
Mean Gestational Age (weeks)	40.13±2.95	38.34±1.94	0.331

Booked	60.0%	55.5%	0.362
ANC services received	47.0%	48.0%	0.841
Caesarean Delivery	60.0%	65.5%	0.293

Table 3: Distribution Of Patients According To Trigger Parameter And The Relative Risk Of Severe Maternal Morbidity

Trigger Parameters	Number of patients [n=200]		Severe maternal morbidity		p-value	Relative risk of severe adverse morbidity (95%CI)
	N	%	N	%		
Systolic BP >140mmHg	44	22.0%	35	79.6%	<0.05*	3.11 (2.2-5.9)
Diastolic BP>90mmHg	42	21.0%	31	73.8%	<0.05*	3.55 (2.1-5.4)
Pulse >100/min	39	19.5%	21	53.9%	<0.05*	1.54 (1.2-2.9)
Respiratory rate >20/min	11	5.5%	5	45.5%	<0.05*	3.21 (1.1-8.5)
Temperature >37.5°	9	4.5%	5	55.6%	<0.05*	5.36 (1.5-17.6)
SpO_2	3	1.5%	2	66.7%	<0.05*	15.55 (2.2-136.9)
Looks/feels unwell	18	9.0%	11	61.1%	<0.05*	6.57 (2.1-15.8)
Neurological status AVPU	3	1.5%	1	33.3%	<0.05*	3.39 (2.7-3.9)
Urine output <1ml/kg/h	33	16.5%	24	72.7%	<0.05*	10.91 (1.22-101.2)
Urinary protein-yes	48	24.0%	31	64.6%	<0.05*	19.33 (12.4-33.54)

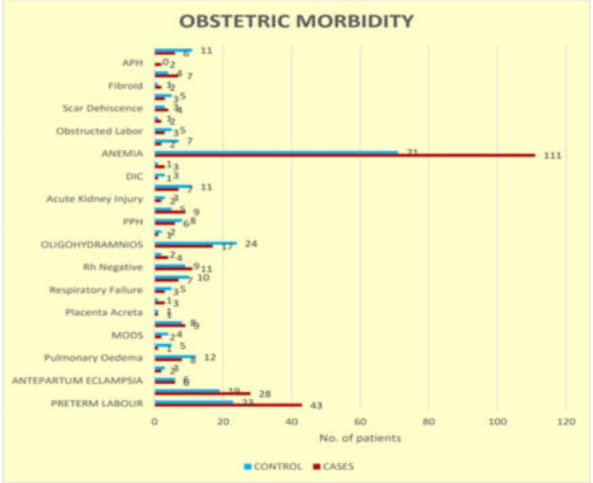

Fig-2 Graphical Representation Of Obstetric Morbidity In Women Enrolled In Case And Control Groups

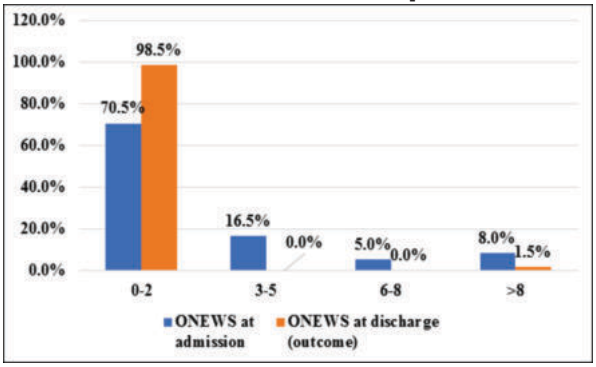

Figure 3: Graphical Representation Of Comparison Of ONEWS At Admission And Discharge (p<0.001).

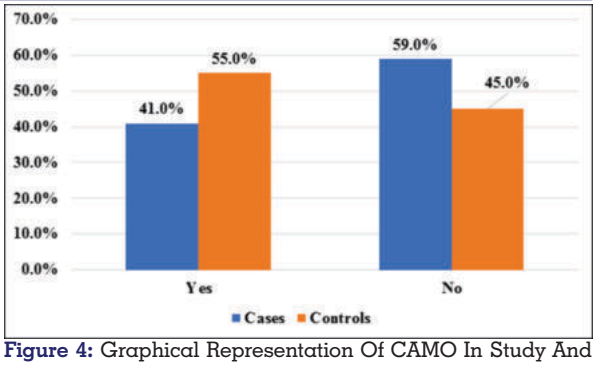

Figure 4: Graphical Representation Of CAMO In Study And Control Groups (p<0.001)

Table 4: ONEWS At Cut Off Score Of 5 In Detection Of Various Obstetric Morbidity

Variables	Sensitivity	Specificity	PPV	NPV	p-value
ICU Need	84.62%	84.49%	27.50%	98.75%	P<0.001
Maternal mortality	100.00%	81.22%	7.50%	100.00%	P=0.005
Hypertensive disorder	86.11%	94.51%	77.50%	96.88%	P<0.001
Sepsis	57.14%	81.35%	10.00%	98.12%	P=0.012
Severe anaemia	38.10%	82.12%	20.00%	91.88%	P=0.028
DIC	100.00%	80.40%	17.88%	100.00%	P=0.045
HELLP	100.00%	80.40%	17.88%	100.00%	P=0.045
Haemorrhage	42.86%	81.72%	15.00%	95.00%	P=0.026
CAMO	97.56%	83.05%	80.0%	98.0%	P<0.001

Table 5: The Outcome Of The Patients From Admission To Discharge

Variables	Cases (n=200)	Controls (n=200)	p-value
Mean Hospital Stay (days)	8.87±5.81	7.21±4.46	0.002
Mean Post-Natal Stay (days)	7.23±4.32	6.24±3.43	0.012
Mean ICU Stay	2.3±1.1	4.8±1.6	0.325
Mean Blood loss (ml)	640.7±256.7	616.3±248.9	0.333
ICU Admission	6.5%	14.5%	0.009
Discharged	98.5%	96.5%	
Mortality	1.5%	2.52%	

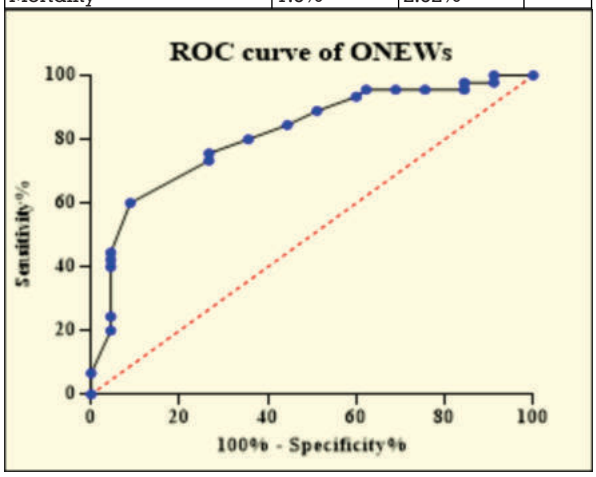

Figure 5: ROC Curve Of The ONEWS Parameters Of The Enrolled Women In Study Group

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