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Evaluation of Utility of Modified Early Obstetric Warning Score (Meows) Chart on Reducing Incidence of Peurpural Sepsis in Tertiary Care Setting

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ABSTRACT

Background: Puerperal sepsis is a leading cause of maternal morbidity and mortality, particularly in low- and middle-income countries. The Modified Early Obstetric Warning Score (MEOWS) chart is a clinical tool designed to facilitate early detection of deterioration in obstetric patients through structured monitoring of physiological parameters. **Objective:** To evaluate the utility of the MEOWS chart in reducing the incidence of puerperal sepsis among postpartum women in a tertiary care hospital. **Methods:** This prospective interventional study was conducted at Shaikh Zaid Women Hospital, Larkana, from January 2025 to April 2025. A total of 185 postpartum patients were enrolled in the study using a non-probability consecutive sampling technique. Patient data were collected using a structured clinical proforma. The study was divided into two equal phases. In the first (pre-intervention) phase, standard postpartum monitoring protocols were followed without the use of the MEOWS chart. In the second (post-intervention) phase, the MEOWS chart was implemented for routine monitoring. **Results:** The incidence of puerperal sepsis significantly decreased from 20.0% in the pre-intervention group to 6.3% in the post-intervention group ($p = 0.006$). The mean time to diagnosis was reduced from 14.6 ± 5.2 hours to 6.3 ± 2.8 hours ($p < 0.001$), and time to antibiotic initiation decreased from 16.2 ± 6.0 hours to 7.4 ± 3.1 hours ($p < 0.001$). ICU admissions dropped from 5.6% to 1.1% ($p = 0.098$), and the average hospital stay was shorter in the MEOWS group (4.9 ± 1.3 days vs. 5.6 ± 1.5 days; $p = 0.014$). **Conclusion:** The MEOWS chart is a practical and effective tool for early detection of puerperal sepsis. Its implementation significantly reduced sepsis rates and improved response times in postpartum patients. Routine use of MEOWS in obstetric wards can enhance maternal safety, particularly in resource-limited settings.

INTRODUCTION

Puerperal sepsis, an infection of the genital tract occurring during or after delivery, remains a persistent threat to maternal health globally. According to the World Health Organization, it accounts for approximately 10% of maternal deaths, many of which are preventable through timely recognition and management. The condition may present subtly in its early stages, often with non-specific symptoms such as mild fever or malaise, which contributes to diagnostic delays and rapid progression to severe sepsis or septic shock if unnoticed. In many clinical settings, especially in resource-limited environments, the absence of robust monitoring systems significantly contributes to missed opportunities for early intervention [1]. Thus, the implementation of structured surveillance tools, like the Modified Early Obstetric Warning Score (MEOWS), becomes not just useful, but essential. The MEOWS chart is a clinical bedside monitoring tool that tracks a set of physiological parameters, including temperature, respiratory rate, heart rate, blood pressure, oxygen saturation, and level of consciousness, with thresholds adjusted to reflect normal variations in pregnancy and postpartum physiology [2]. This tool is color-coded and designed to flag deviations from normal ranges in a way that is both easy to interpret and prompts timely escalation [3]. The underlying goal of MEOWS is to reduce response latency by empowering all levels of healthcare workers including midwives and junior doctors to identify deteriorating maternal health early and activate appropriate interventions. Originally developed in the United Kingdom, the MEOWS chart has demonstrated success in multiple hospital audits in high-resource settings, where its routine use has correlated with reductions in critical care admissions and severe maternal morbidity. However, in lower-income regions such as South Asia and Sub-Saharan Africa, the adoption of such tools has been variable and under-evaluated [4]. Yet, these regions bear the heaviest burden of maternal infections due to overcrowded hospitals, limited aseptic practices during delivery, inadequate follow-up, and cultural barriers that delay postpartum care-seeking. In such contexts, the integration of a low-cost, easy-to-use system

like MEOWS into postpartum wards holds transformative potential [5]. What distinguishes MEOWS from routine postnatal monitoring is not just the parameters it captures, but the structured action plans it mandates based on specific score thresholds. A moderate score may trigger more frequent observations or physician notification, whereas a high score demands immediate senior review and resuscitative measures [6]. This standardized escalation framework minimizes reliance on subjective clinical judgment and reduces inter-provider variability in care. Despite its potential, the effectiveness of MEOWS in reducing the incidence of specific postpartum infections such as puerperal sepsis has not been systematically evaluated in many developing countries. Questions remain regarding its real-world utility in overburdened public hospitals, staff compliance with chart documentation, and whether its implementation tangibly alters infection-related outcomes [7]. Additionally, there is a need to examine not only reduction in morbidity and mortality but also the impact on length of hospital stay, antibiotic usage, ICU transfers, and readmission rates [8] [9].

Objective

This study is therefore designed to evaluate the impact of routinely implementing the MEOWS chart on the incidence of puerperal sepsis in a tertiary care hospital setting.

METHODOLOGY

This prospective observational study was conducted at Shaikh Zaid Women Hospital, Larkana from January 2025 to April 2025 A total of 185 postpartum patients were enrolled in the study using a non-probability consecutive sampling technique. The sample was divided into two groups based on the study phase: 90 patients in the pre-intervention group and 95 in the post-intervention group.

Inclusion Criteria

Participants included in the study were postpartum women aged between 18 and 45 years, admitted to the hospital within 24 hours of delivery—either vaginal or cesarean. Only those who provided informed consent were included in the final analysis.

Exclusion Criteria

Patients were excluded if they had signs of sepsis at the time of admission, had known immunocompromised conditions such as HIV infection or were on immunosuppressive therapy, or had chronic or active infections like tuberculosis. These exclusions were applied to ensure that only new-onset puerperal sepsis was captured during the study.

Data Collection

Patient data were collected using a structured clinical proforma. The study was divided into two equal phases. In the first (pre-intervention) phase, standard postpartum monitoring protocols were followed without the use of the MEOWS chart. In the second (post-intervention) phase, the MEOWS chart was implemented for routine monitoring. Before this phase, staff including nurses and junior doctors were trained in the use of the MEOWS chart to ensure correct and consistent application.

Intervention

The MEOWS chart was introduced as a clinical tool during the post-intervention phase. Vital signs were recorded at six-hour intervals, including temperature, respiratory rate, heart rate, blood pressure, oxygen saturation, and level of consciousness. The MEOWS chart is color-coded to trigger an alert when readings fall outside predefined thresholds. Abnormal scores initiated an escalation protocol that involved notifying senior medical staff, initiating diagnostic workup, and beginning early treatment if required. The primary outcome measure of this study was the incidence of puerperal sepsis, defined as a fever of ≥38°C accompanied by pelvic pain, foul-smelling lochia, or abnormal vaginal discharge in the postpartum period. Secondary outcome measures included time to clinical diagnosis, time to initiation of antibiotics, rate of ICU admissions, duration of hospital stay, and overall maternal morbidity and mortality.

Data Analysis

Data were analyzed using SPSS version 26 for analysis. Categorical variables were compared using the Chi-square test. The difference in incidence of puerperal sepsis between the two phases of the study was analyzed, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 185 postpartum patients were enrolled in the study, with 90 patients monitored during the pre-intervention phase and 95 patients during the post-intervention phase following the implementation of the MEOWS chart. The mean age of participants in the pre-intervention group was 28.6 ± 4.7 years, compared to 28.2 ± 4.9 years in the post-intervention group (p-value = 0.59). Vaginal delivery was slightly more common in both groups, with 67.8% in the pre-intervention group and 66.3% in the post-intervention group (p-value = 0.83). The proportions of primiparous (41.1% vs. 40.0%) and multiparous (58.9% vs. 60.0%) women were also similar across both groups (p-value = 0.88).

Table 1

Baseline Characteristics of Study Participants (n = 185)

Variable	Pre-Intervention Group (n = 90)	Post-Intervention Group (n = 95)	p-value
Mean Age (years)	28.6 ± 4.7	28.2 ± 4.9	0.59
Vaginal Delivery	61 (67.8%)	63 (66.3%)	0.83
Cesarean Delivery	29 (32.2%)	32 (33.7%)	
Primiparous	37 (41.1%)	38 (40.0%)	0.88
Multiparous	53 (58.9%)	57 (60.0%)	

There was a significant reduction in puerperal sepsis cases in the post-intervention group, with only 6.3% of patients diagnosed with sepsis compared to 20.0% in the pre-intervention group (p-value = 0.006). The time to diagnosis and the time to initiation of antibiotics were both significantly shorter in the post-intervention group, with the mean time to diagnosis reduced from 14.6 ± 5.2 hours to 6.3 ± 2.8 hours (p-value < 0.001) and the mean time to antibiotic start reduced from 16.2 ± 6.0 hours to 7.4 ± 3.1 hours (p-value < 0.001). Although there was a reduction in ICU admissions in the post-intervention group (1.1% vs. 5.6%, p-value = 0.098), the difference was not statistically

significant. The average hospital stay was also shorter in the post-intervention group (4.9 ± 1.3 days) compared to the pre-intervention group (5.6 ± 1.5 days), with a statistically significant p-value of 0.014.

Table 2

Incidence and Outcomes of Puerperal Sepsis

Outcome Variable	Pre-Intervention (n = 90)	Post-Intervention (n = 95)	p-value
Puerperal Sepsis Cases	18 (20.0%)	6 (6.3%)	0.006
Time to Diagnosis (hours)	14.6 ± 5.2	6.3 ± 2.8	<0.001
Time to Antibiotic Start (hrs)	16.2 ± 6.0	7.4 ± 3.1	<0.001
ICU Admissions (n)	5 (5.6%)	1 (1.1%)	0.098
Avg. Hospital Stay (days)	5.6 ± 1.5	4.9 ± 1.3	0.014

The clinical symptoms of patients diagnosed with puerperal sepsis showed that fever (≥38°C) was present in all cases (100%) in both groups. However, other symptoms showed varying distributions between the pre- and post-intervention groups. Pelvic pain was observed in 72.2% of the pre-intervention group, compared to 50.0% of the post-intervention group (p-value = 0.39). Similarly, foul-smelling lochia was more common in the pre-intervention group (83.3%) compared to the post-intervention group (66.7%), but the difference was not statistically significant (p-value = 0.41). Abnormal vaginal discharge and hypotension were less common in the post-intervention group, but these differences were also not statistically significant, with p-values of 0.25 and 0.73, respectively.

Table 3

Distribution of Clinical Symptoms Among Patients Diagnosed with Puerperal Sepsis

Symptom	Pre-Intervention Group (n = 18)	Post-Intervention Group (n = 6)	p-value
Fever ≥ 38°C	18 (100%)	6 (100%)	–
Pelvic Pain	13 (72.2%)	3 (50.0%)	0.39
Foul-Smelling Lochia	15 (83.3%)	4 (66.7%)	0.41
Abnormal Vaginal Discharge	11 (61.1%)	2 (33.3%)	0.25
Hypotension (<90 mmHg systolic)	4 (22.2%)	1 (16.7%)	0.73

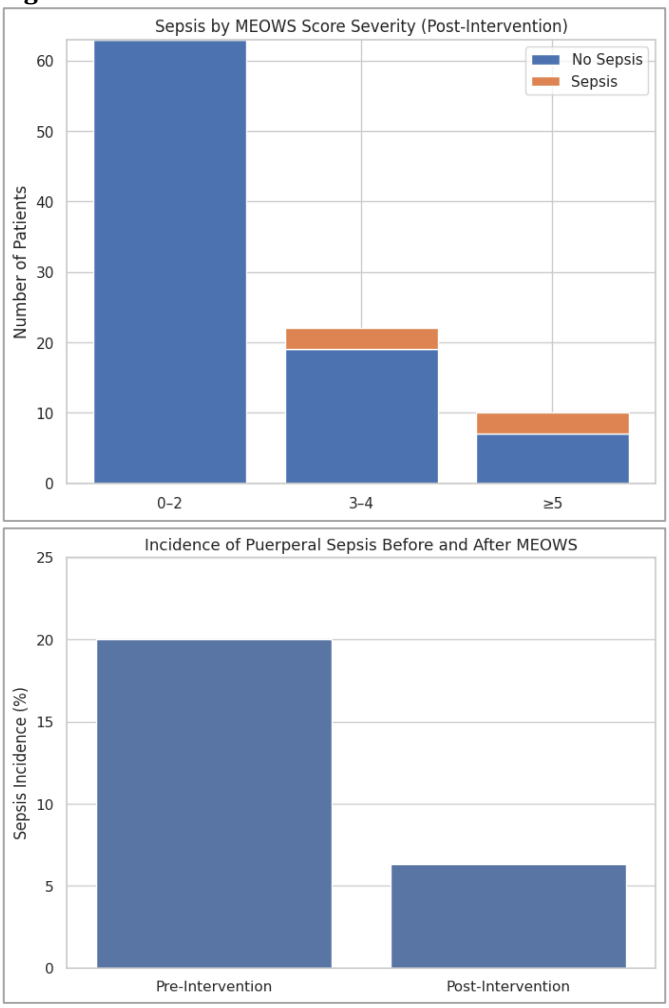
Most patients in the post-intervention group had a MEOWS score of 0–2 (63 patients, indicating normal status), with none of these patients being diagnosed with sepsis or requiring ICU admission. A total of 22 patients (23.2%) had a MEOWS score in the 3–4 range (yellow zone), of whom 3 were diagnosed with sepsis but did not require ICU admission. Ten patients (10.5%) had a MEOWS score of ≥5 (red zone), indicating severe deterioration, and 3 of these patients were diagnosed with sepsis, with 1 requiring ICU admission.

Table 4

MEOWS Scores at First Detection of Clinical Deterioration (Post-Intervention Group Only, n = 95)

MEOWS Total Score Range	Number of Patients	Sepsis Diagnosed (n)	ICU Required (n)
0–2 (Normal)	63	0	0
3–4 (Yellow Zone)	22	3	0
≥5 (Red Zone)	10	3	1

Figure 1 & 2



A higher percentage of patients in the post-intervention group (100%) were started on broad-spectrum antibiotics compared to 50% in the pre-intervention group (p-value = 0.015). Although fewer patients in the post-intervention group required escalation of antibiotics (33.3%) compared to the pre-intervention group (72.2%), this difference was not statistically significant (p-value = 0.09). The average duration of antibiotic therapy was significantly shorter in the post-intervention group (5.4 ± 1.8 days) compared to the pre-intervention group (8.2 ± 2.5 days), with a p-value of 0.004, indicating more efficient management of sepsis.

Table 5

Antibiotic Usage and Escalation in Sepsis Patients

Antibiotic Outcome	Pre-Intervention (n = 18)	Post-Intervention (n = 6)	p-value
Started on Broad-Spectrum ABX	9 (50.0%)	6 (100%)	0.015
Required Escalation of ABX	13 (72.2%)	2 (33.3%)	0.09
Average Duration of ABX (days)	8.2 ± 2.5	5.4 ± 1.8	0.004

DISCUSSION

The findings of this study highlight the clinical utility of the Modified Early Obstetric Warning Score (MEOWS) chart in reducing the incidence of puerperal sepsis among postpartum patients. Our results demonstrate a statistically significant decline in sepsis cases following the

implementation of MEOWS from 20.0% in the pre-intervention group to just 6.3% post-intervention (p = 0.006). This underscores the effectiveness of structured, standardized early warning systems in identifying at-risk patients and prompting timely medical intervention [10-12]. The reduction in time to diagnosis and antibiotic initiation observed in the post-intervention group further validates the practical impact of MEOWS. On average, patients in the post-intervention group were diagnosed 8 hours earlier and started on antibiotics nearly 9 hours sooner than those in the pre-intervention phase [13]. These timeframes are critical in the context of sepsis, where delays in recognition and management significantly increase the risk of systemic deterioration and maternal mortality. Our data suggest that the MEOWS chart effectively bridges this time gap by facilitating early detection of subtle physiological changes that might otherwise go unnoticed [14].

Another noteworthy observation was the reduced need for ICU admissions and the shorter duration of hospital stay in the MEOWS-monitored group. Although the difference in ICU transfers was not statistically significant (p = 0.098), the trend toward lower escalation of care suggests that earlier interventions may prevent clinical deterioration to the point of requiring intensive monitoring [15]. The average hospital stay was also reduced by nearly one day (p = 0.014), reflecting not only better outcomes but also the potential for cost savings and improved bed turnover in resource-limited hospitals. The post-intervention data also showed a significant improvement in the use of broad-spectrum antibiotics from the outset and a decline in the need for antibiotic escalation, indicating more appropriate and timely empirical treatment decisions [16]. Infections were managed more aggressively and earlier in the clinical course, reducing the risk of complications and prolonged illness [17].

The MEOWS chart's effectiveness stems from its simplicity, visual clarity, and integration into routine clinical workflows. It empowers both junior staff and nurses to participate in early recognition of maternal deterioration without relying solely on physician-led assessment [18]. This democratization of vigilance is particularly crucial in overcrowded wards or during night shifts when senior staff may not be immediately available [19-21]. However, this study does have certain limitations. First, the non-randomized design may introduce selection bias despite efforts to match baseline characteristics. Second, the study was conducted in a single center, which may limit the generalizability of findings. Third, the outcomes were limited to short-term postpartum observations; long-term follow-up was not within the scope of this project. Additionally, compliance with MEOWS documentation was not quantitatively measured, though informal audit suggested good uptake following staff training. Despite these limitations, the results strongly support the use of MEOWS as an effective early warning system in obstetric settings. The findings are particularly relevant to healthcare facilities in low- and middle-income countries where the burden of maternal infections remains high and diagnostic delays are common.

CONCLUSION

It is concluded that the implementation of the Modified Early Obstetric Warning Score (MEOWS) chart significantly reduces the incidence of puerperal sepsis by enabling earlier recognition of clinical deterioration and timely intervention in postpartum patients. The structured, color-coded system facilitated prompt escalation of care, which translated into shorter times to diagnosis, earlier initiation of antibiotics, reduced ICU admissions, and shorter hospital stays. These improvements were observed without requiring complex technology or extensive resources, demonstrating MEOWS' feasibility and relevance, especially in low-resource healthcare settings.

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