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**Original article**

# Maternal Early Warning Scores (MEWS): Development of a Nigerian National Maternal Early Warning Scores (MEWS) Version

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## Abstract

Maternal Early Warning Scores (MEWS) is an acute maternity illness severity scoring and escalation trigger system. ***Background:*** The use of the MEWS in Nigerian obstetric practice is rare but with the strong desire for its use reported and the increasing number of international partnerships with clinicians in Nigeria for the introduction of this tool, the use of multiple versions of MEWS into the Nigerian clinical practice has been recognised as a potential patient safety risk best managed through the development of a Nigerian national MEWS version. ***Aims:*** We set out to explore the development of a Nigerian National MEWS version that would make an acceptable fit for the Nigerian acute obstetric care environment to be used by all clinicians involved in acute obstetric care in Nigeria. ***Methods:*** The United Kingdom MOEWS was used as the baseline (template); following planned training on MEWS using the above template, surveys of experts at these meetings on the suitability (for Nigeria) and necessity for modifications of the template was done using survey monkey and paper-based questionnaires. ***Results:*** One hundred and forty one experts responded out of two hundred requests (70.5%), one hundred and twenty five (88.6%) opted for modifications of the template. Of these, one hundred and three (82.4%) favoured the addition of a parameter directly related to pre-eclampsia. ***Conclusion:*** A modification of the UK MOEWS by the addition of another parameter related to pre-eclampsia was favoured by the majority of experts in this study for the development of a Nigerian national MEWS.

***Keyword:*** ***Emergency Obstetric Care in Nigeria. Patient Safety in Nigeria***

## Introduction

Maternal Early Warning Scores (MEWS) is an acute maternity illness severity scoring and escalation trigger system, the absence of this track and trigger tool or the failure of staff to use this tool for the early recognition and escalation of acutely deteriorating obstetric conditions have been recognized as contributory factors in several cases of sub-standard care, morbidities and mortalities [1,2,3,4].

Improving the recognition of acute deterioration and preventing mortality require a step-wise solution involving staff education, patient monitoring, recognition of patient deterioration, a system to call for help, and an effective clinical response[5]. This five-ringed "chain of prevention" can provide a structure for hospitals to design care processes to prevent and detect patient deterioration and death. The Maternal Early Warning Scores (MEWS) provides solutions to many of these and can set the foundation for team approach to emergency obstetric care (EMOC).

The development of the Maternal Early Warning Scores (MEWS) arose from the report of the United Kingdom confidential enquires into maternal and child health (CEMACH) of 2003–2005, in that triennial report, evidence of substandard care and mortalities reviewed were linked to the failure of clinical staff to recognize acutely deteriorating obstetric conditions and trigger escalation of care sooner, this prompted a recommendation in the report, "There is an urgent need for the routine use of a national early warning chart, which can be used in all obstetric women which will help in the more timely recognition, treatment and referral of women who have, or are developing, a critical illness[6].

The track and trigger system that emerged from this recommendation was called Modified Obstetric Early Warning Scores (MOEWS)[7] in the United Kingdom - named Modified Obstetrics EWS (MOEWS) to distinguish it from the non-obstetric Early Warning Scores (EWS) because of the physiological changes of pregnancy, outside the United Kingdom, it is simply referred to as Maternal Early Warning Scores (MEWS).

Following endorsement of MOEWS and EWS by the United Kingdom National Institute for Health and Clinical Excellence (NICE), UK[8] it rapidly gained popularity, unfortunately different Hospitals began to develop local versions to the point that over 72 recorded versions of the early warning scoring systems were in use

at different hospitals in the United Kingdom prior to the call of the Royal College of Physicians, London, for a national early warning scores[9,10,11].

Internationally, other versions of the MEWS are also in use in the United States of America[12], Belgium, Republic of Ireland, etc. and with the adoption of this tool in the United Nations post 2015 Sustainable Development Goals (SDGs) within Goal 3, target 13 (SDG3:13): "Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks" the risk of many more different versions of this tool (MEWS) in simultaneous use in hospitals within countries and around the world becomes ever greater.

Although Isemede and Unuigbe[13], reported a rarity of MEWS in the Nigerian Obstetric practice in 2019, that study also showed a couple of other pertinent points - first, that a quarter of the respondents reported a locally designed MEWS-like system (physician specific calling systems) - a hunger for standard MEWS and secondly, that 96% of respondents indicated desire for the introduction and implementation of the MEWS in their hospitals.

Against this background of unmet need for the use of the MEWS in the Nigerian acute obstetric care practice, International partnerships with clinicians in Nigeria from several organisations such as the Royal College of Obstetricians and Gynaecologists, (RCOG) London, Royal College of Anaesthetists (RCoA), London, Patient Safety Africa, Irish teams, USA based teams, etc. have stepped in to support the introduction and implementation of their versions of MEWS (Africa Day, RCOG, London), September 27, 2019)[14]. The potential for unintended patient safety harm from multiple versions of the MEWS in simultaneous use in the Nigerian acute clinical care environment as a result of seemingly uncoordinated interventions by several international partners needs to be considered and addressed at this early stage of MEWS development in Nigeria and managed through the development of a Nigerian National MEWS version.

## Aims

We set out to explore the development of a Nigerian National MEWS version that would make an acceptable fit for the Nigerian emergency obstetric care environment to be used by all clinicians involved in acute obstetric care in Nigeria.

## Methods

Following planned training on MEWS (the second phase of the Patient Safety Africa three phase project for the introduction of MEWS for routine use in acute obstetric practice in Nigeria), using the UK MOEWS at seven regional medical centres and at two national conferences in Nigeria in 2018 and 2019, surveys of experts (senior registrars and consultants in obstetrics, midwifery staff of sister level and above and senior registrars and consultants in obstetric anaesthesia care in Nigeria) at these meetings, were surveyed on the suitability of the UK MEOWS template, the need for modifications, choice of necessary modifications to render it suitable for the Nigerian acute obstetric care environment was carried out using survey monkey and paper based questionnaires.

A switch to paper based questionnaire was made following poor response rates from online surveys after visits to the first three centres, as online reminders were sent to the first three centre experts, paper based questionnaires were used in the last four centres and at the national conferences.

The national spread of the centres, the inclusion of all professional groups (Obstetricians, Midwives and Obstetric anaesthetists) in maternity care and the fact that the national conferences had participants drawn from all over the country made this sample a good representation of the national picture.

Response rate turned out better than feared after initial reviews because responses to online reminders were good and better responses were seen with paper based system used in the last four centres and at the national conferences.

## Results 1

A total of two hundred requests were sent to the experts, one hundred and forty one responses were received (70.5%) this was made up of 68 responses out of 100 requests to obstetricians, 21 responses out of 30 requests sent to Midwives and 52 responses out of 70 requests sent to Obstetric anaesthetists.

**Table 1: Survey Population**

| | Requests | Received |
|---|---|---|
| Obstetricians | 100 | 68 (68.0%) |
| Midwives | 30 | 21 (70.0%) |
| Obstetric-Anaesthetists | 70 | 52 (74.2% |
| **Total** | **200** | **141 (70.5%)** |

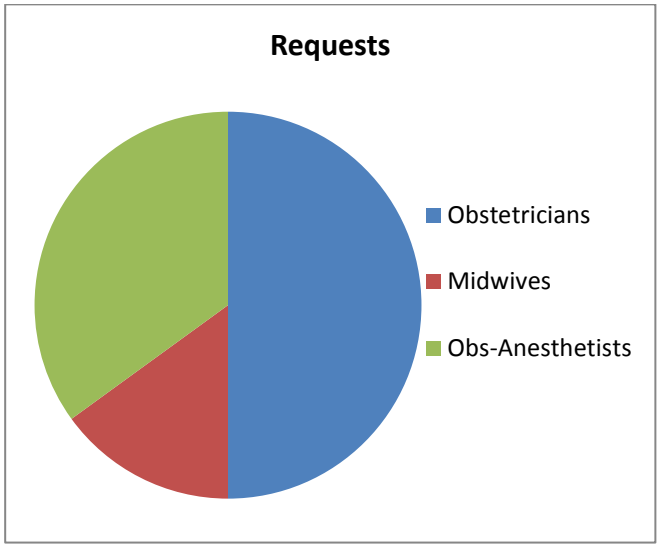



**Figure1.1: Survey Population: Requests**

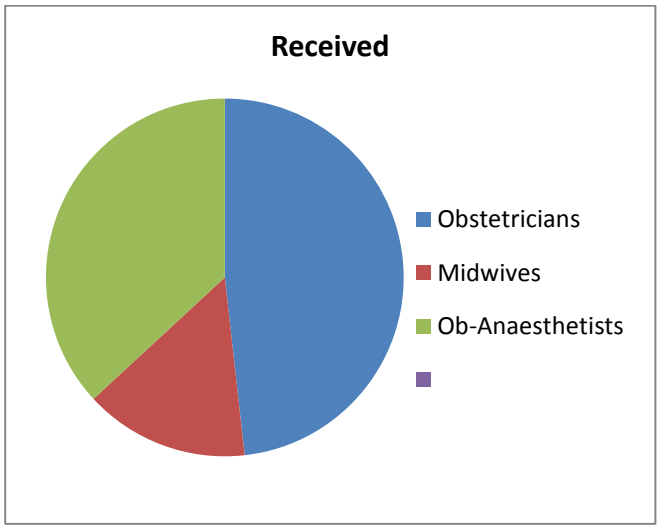



**Figure1.2: Survey Population: Respondents**

## Results 2

One hundred and twenty five (88.6%) of experts opted for modifications of the template while sixteen (11.4%) favoured retaining the baseline (MOEWS/UK) template without modifications.

**Table 2: Responses to the need for template (MOEWS/UK) modifications**

| | Number of Respondents | % |
|---|---|---|
| YES | 125 | 88.6 |
| NO | 16 | 11.4 |

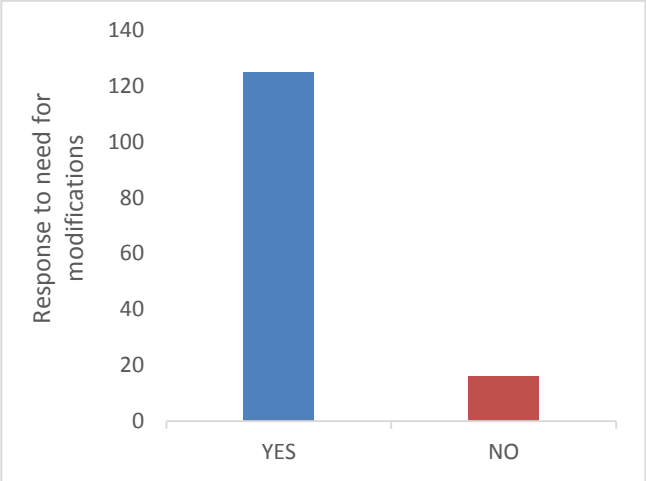



**Figure 2.1: Responses and numbers to the need for template modifications**

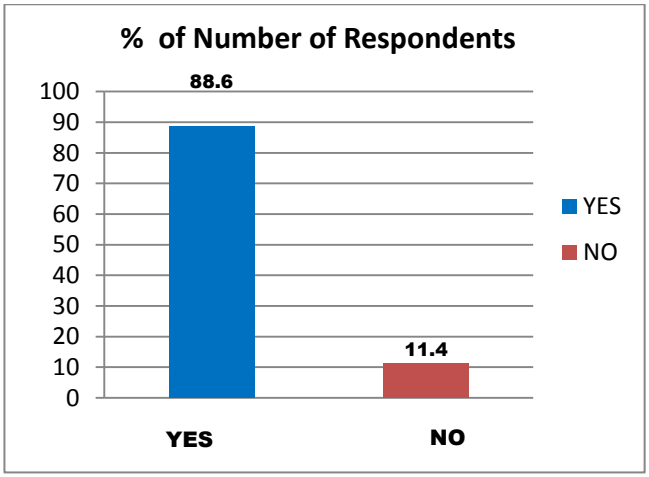



**Figure 2.2: % of Respondents to the need for template modifications**

## Results 3

Out of the hundred and twenty five in favour of modification of the UK MEWS template, one hundred and three (82.4%) opted for the addition of pre-eclampsia related parameter.

**Table 3: Modification options and number of experts in favour of options**

| Additional Parameters | Number of Experts /respondents in favour | % |
|---|---|---|
| Hourly Urine Output | 3 | 2.4% |
| Mean Arterial BP (MAP) | 6 | 4.8% |
| Bedside Glucose levels | 13 | 10.4% |
| Hypertension associated with unremitting headache | 103 | 82.4% |
| Total | **125** | |

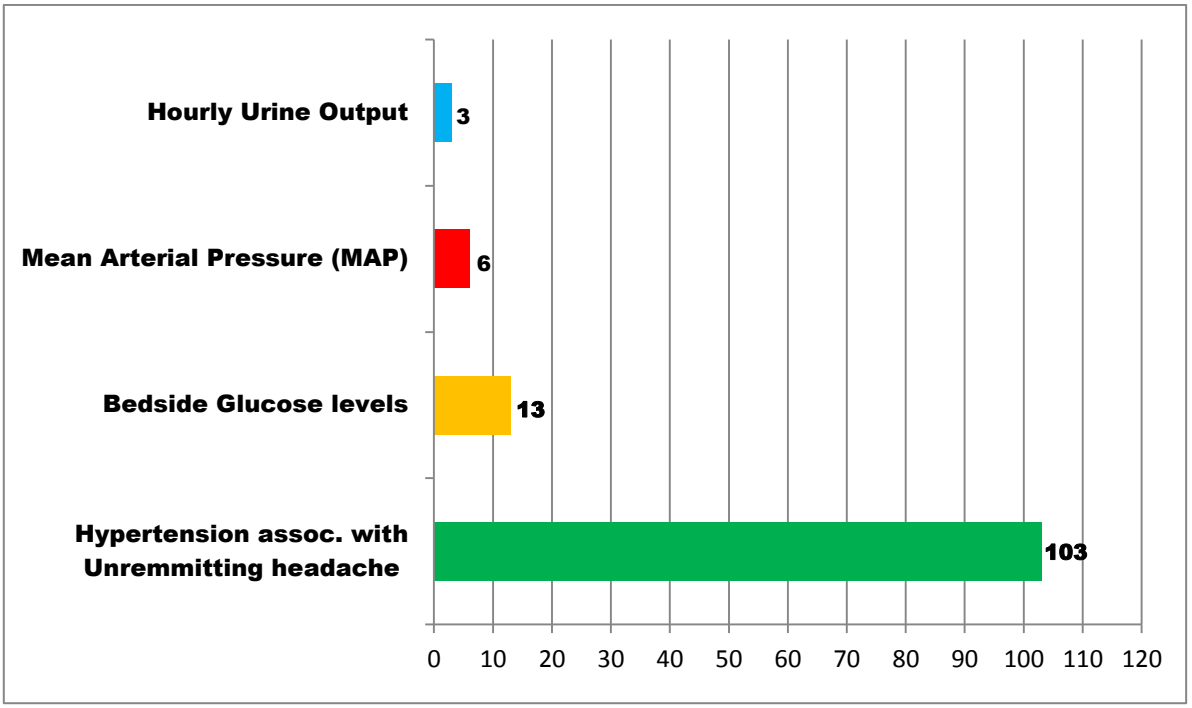



**Figure 3: Modification options and number of experts in favour of options**

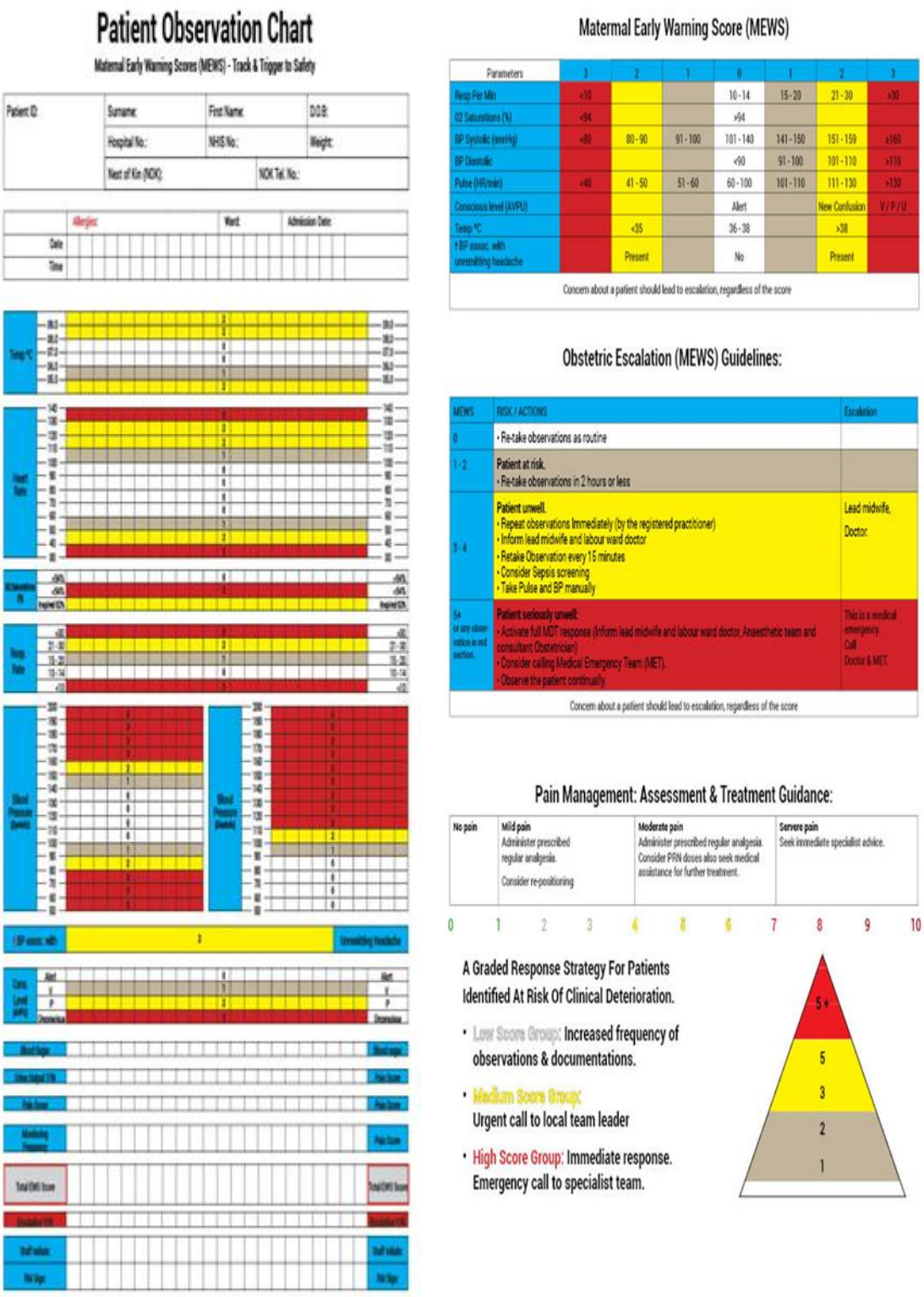


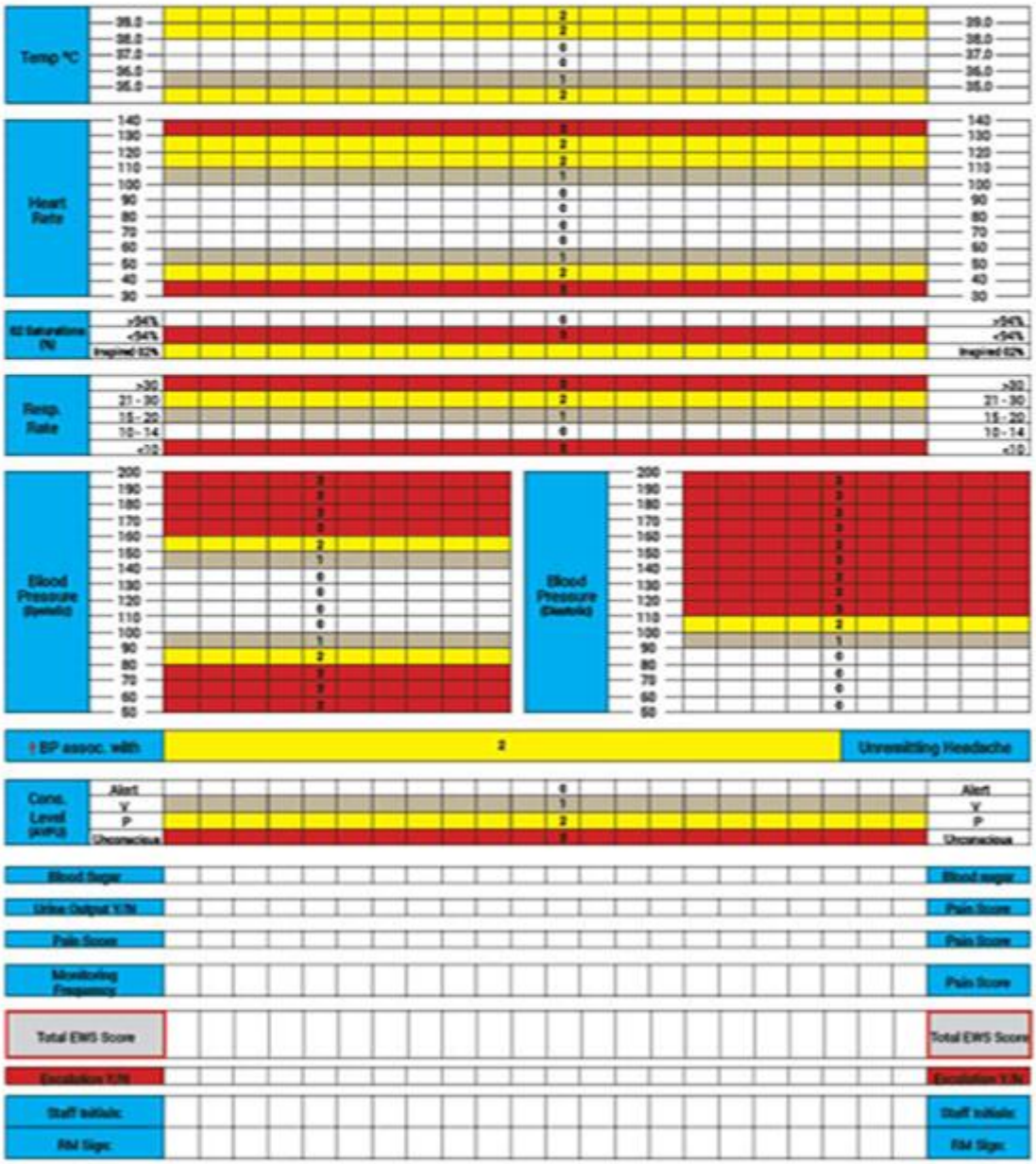

**Figure 4: Proposed Nigerian national MEWS: A single sheet of A4 paper - vital signs records (tracking) in front and triggering (escalation) guidelines on the back page.**

# Patient Observation Chart

**Maternal Early Warning Scores (MEWS) - Track & Trigger to Safety**

| Patient ID: | Surname: | First Name: | D.O.B: |
|---|---|---|---|
| | Hospital No.: | NHIS No.: | Weight: |
| | Next of Kin (NOK): | NOK Tel. No.: | |

| | Allergies: | Ward: | Admission Date: |
|---|---|---|---|
| Date | | | |
| Time | | | |



**Matermal Early Warning Score (MEWS)**

| Parameters | 3 | 2 | 1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| Resp Per Min | <10 | | | 10 - 14 | 15 - 20 | 21 - 30 | >30 |
| 02 Saturations (%) | <94 | | | >94 | | | |
| BP Systolic (mmHg) | <80 | 80 - 90 | 91 - 100 | 101 - 140 | 141 - 150 | 151 - 159 | ≥160 |
| BP Diastolic | | | | <90 | 91 - 100 | 101 - 110 | >110 |
| Pulse (HR/min) | <40 | 41 - 50 | 51 - 60 | 60 - 100 | 101 - 110 | 111 - 130 | >130 |
| Conscious level (AVPU) | | | | Alert | | New Confusion | V / P / U |
| Temp °C | | <35 | | 36 - 38 | | >38 | |
| ↑ BP assoc. with unremitting headache | | Present | | No | | Present | |
| Concern about a patient should lead to escalation, regardless of the score | | | | | | | |

**Obstetric Escalation (MEWS) Guidelines:**

| MEWS | RISK / ACTIONS | Escalation |
|---|---|---|
| 0 | • Re-take observations as routine | |
| 1 - 2 | **Patient at risk.**<br>• Re-take observations in 2 hours or less | |
| 3 - 4 | **Patient unwell.**<br>• Repeat observations Immediately (by the registered practitioner)<br>• Inform lead midwife and labour ward doctor<br>• Retake Observation every 15 minutes<br>• Consider Sepsis screening<br>• Take Pulse and BP manually | Lead midwife,<br>Doctor. |
| 5+<br>or any observations in red section. | **Patient seriously unwell:**<br>• Activate full MDT response (Inform lead midwife and labour ward doctor, Anaesthetic team and consultant Obstetrician)<br>• Consider calling Medical Emergency Team (MET).<br>• Observe the patient continually | This is a medical emergency<br>Call<br>Doctor & MET. |
| Concern about a patient should lead to escalation, regardless of the score | | |

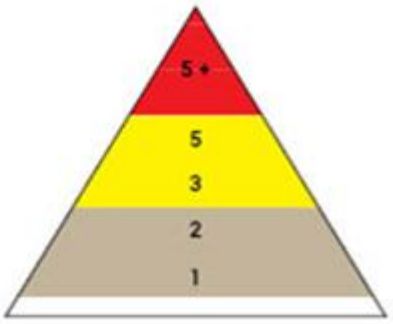
**Pain Management: Assessment & Treatment Guidance:**

| No pain | Mild pain | Moderate pain | Servere pain |
|---|---|---|---|
| | Administer prescribed regular analgesia.<br>Consider re-positioning | Administer prescribed regular analgesia. Consider PRN doses also seek medical assistance for further treatment. | Seek immediate specialist advice. |

0 1 2 3 4 5 6 7 8 9 10

**A Graded Response Strategy For Patients Identified At Risk Of Clinical Deterioration.**

- Low Score Group: **Increased frequency of observations & documentations.**
- Medium Score Group: **Urgent call to local team leader**
- **High Score Group: Immediate response. Emergency call to specialist team.**




## Discussions

Acute illnesses in the obstetric patient need to be recognized early and adequate monitoring instituted to prevent physiologic deterioration and a cascade of events to organ failure, multi-organ failure, and cardiorespiratory arrest.

Routine patient observations which are only periodic - done at fixed intervals or sometimes not done – are inadequate for acutely deteriorating obstetric emergencies where maternal collapse and deaths can occur precipitously.

Most pregnancies and labour tend to be normal physiological events, but potential risks of complications and deterioration exist with each and every case, and because not all deteriorations can be predicted, it is necessary to monitor these women very closely, this involves recording and acting on vital signs to ensure early detection of actual or potential deterioration of patient's physiological state in order to reduce morbidities and mortalities, the maternal early warning scoring system encapsulates these actions and benefits[15,16].

MEWS utilises the vital signs in common use in the ABCDE approach to emergency care, these vital signs (monitored in the MEWS) are as follows: respiratory rate, heart rate, blood pressure - systolic and diastolic, temperature, oxygen saturations, and level of consciousness (using the AVPU = (A)lert, response to (V)oice, response to (P)ain and (U)nresponsive). Every recoded vital sign generates a score of (0–3), depending on size of deviations from

normal: 0 for parameters within normal physiological limits and a score of 3 for the most severe deviation; a total track and trigger score is generated by adding all the scores generated from the vital signs.

A graded response (escalation) strategy for patients identified to be at risk of clinical deterioration is used – low score group: increased frequency of observations, document/report; medium score group: urgent call to local team leader; high score group: immediate response and emergency call to specialist team.

The MEWS is useful in providing visual aids of trends, revealing "hidden" trends, facilitating shared understanding, and providing legitimacy for escalation that entails timely recognition of deterioration, good communication between teams, expedited treatment, and/or referral[17,18].

Sixteen experts out of one hundred and forty one respondents (11.4%) were happy for the introduction of the UK MOEWS template without modifications, one hundred and twenty five experts (88.6%), opted for template modification to make it more suitable for the Nigerian acute obstetric care environment. This majority in favour of modification, may be related to the high drive in this study population to achieve reductions in the country's very high maternal mortality rates through preventing deterioration, reducing delays and getting acutely ill obstetric patients in the country to points of definitive care in a more expeditious manner which a more robust MEWS version may offer[19,20].

Hypertension associated with unremitting headache was the favoured additional parameter by 103 out of the 125 experts (82.4%), others are: hourly urine output measurements, 3 (2.4%), Mean Arterial Blood Pressure recordings, 6 (4.8%) and bedside glucose measurement 13 (10.4%). The choice of hypertension associated with unremitting headache may be due to the fact that hypertensive diseases in pregnancy has become the highest cause of maternal mortalities in Nigeria and several parts of Sub-Saharan Africa[21], also, the choice of bedside glucose measurements as an additional parameter may be a pointer to common clinical experiences of fitting obstetric patients in this study population.

Mean Arterial blood Pressure (MAP) and hourly urine output recordings were less favoured as additional parameters by the experts, this may be due to experts desiring a version of MEWS that would be suitable for both the secondary care as well as the rural primary care centres, a version that would improve communications and expedite transfer rather than hinder them if the required processes are complex or cumbersome[22,23].

In implementing the MEWS in Nigeria, caution must be exercised to ensure that scores and numbers do not replace comprehensive patients' assessments as such overdependence on scores by recorders without due regard to clinical judgement has also been shown to be a risk in this process[24], likewise, the early warning system is not a replacement for adequate staffing; in Sub-Saharan Africa where the challenge of skilled birth attendants is acute, this temptation must be resisted. The MEWS is also not for chronic patients or patients on end of life pathway.

The similarities in acute obstetric care in most of Sub-Saharan Africa[21] may make this proposed Nigerian national MEWS version suitable for use in several of these countries until specific country level studies are available to underpin individual national MEWS.

MEWS Implementation research - protocol development, training, systematic pilots in both secondary and primary healthcare settings and audits in a collaborative approach for the introduction and implementation of a national Maternal Early Warning Scores (MEWS) in Nigeria is keenly advocated.

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Nil

## Conflicts of interest

There are no conflicts of interest.

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