Modified Early Warning Score (MEWS)

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MEWS

- Simple physiological scoring system.
- Validated in the surgical and medical units as a tool for identifying patients at risk of deterioration.
- Based on 5 bedside parameters: SBP, HR, RR, temperature, and level of consciousness (assessed by the AVPU or RASS score).
## MEWS

<table>
<thead>
<tr>
<th></th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic BP (mmHg)</td>
<td>&lt;70</td>
<td>71-80</td>
<td>81-100</td>
<td>101-199</td>
<td>&gt;200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart rate (bpm)</td>
<td>&lt;40</td>
<td>41-50</td>
<td>51-100</td>
<td>101-110</td>
<td>111-129</td>
<td>&gt;130</td>
<td></td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>&lt;9</td>
<td>9-14</td>
<td>15-20</td>
<td>21-29</td>
<td>&gt;30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>&lt;35</td>
<td>35-38.4</td>
<td>&gt;38.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AVPU score/RASS score</td>
<td>Alert +3 to 0</td>
<td>Reacting to Voice -1 to -3</td>
<td>Reacting to Pain -4</td>
<td>Unresponsive -5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Evidence Based

- MEWS has been shown to predict:
  - Hospital mortality
  - ICU admission within 72 hours
  - Cardiac arrest
  - RRT call within 72 hours
Why is MEWS being Implemented?

• Most adverse events are usually preceded by early warning signs of clinical instability.

• Early signs are more often subtle changes in multiple parameters rather than a dramatic change in an isolated value.

• More informative “vital signs” could prevent failure to recognize early deterioration.

Clinical Trials

Original papers

Validation of a modified Early Warning Score in medical admissions

C.P. SUBBE, M. KRUGER, P. RUTHERFORD and L. GEMMEL

From the Departments of Medicine, and Critical Care, Wexham Manor Hospital, and Department of Nephrology, University of Wales College of Medicine, Wrexham, UK.

Received 17 May 2001 and in revised form 9 July 2001

Summary

The Early Warning Score (MEWS) is a simple physiological scoring system suitable for bedside application. The ability of a modified Early Warning Score (MEWS) to identify medical patients at risk of catastrophic deterioration in a busy clinical area was investigated. A prospective audit was conducted on medical patients admitted within 24 h of arrival at a District General Hospital (DGH). Data on 779 medical emergency admissions were collected during March 2000. Main outcome measures were the occurrence of adverse events and high dependency unit (HDU) admission, cardiac arrest, re-admission and hospital discharge, or 30-day survival rates of those who were associated with increased risk of death (OR 2.8, 95% CI 2.0–4.0). HDU admissions (OR 10.9, 95% CI 7.3–16.2) and MEWS > 3.0. MEWS scores > 3.0 was a strong indicator of imminent clinical deterioration who require increased levels of care in the HDU or ICU. A clinical pathway could be created, using more practitioners and critical care physicians, to respond to high scores and prevent adverse events and appropriate changes in clinical management.

Q J Med 2001; 94:521 - 526
Study Design

- Prospective cohort study.
- MEWS score collected for patients admitted to the general medical unit.
- Data on 673 admissions collected.
- ICU, CCU and PCU excluded.

Study design

- Physicians were blinded to MEWS value.
- Primary end point: death, ICU admission, PCU admission, CPA, survival and hospital discharge at 60 days.
Study Results

• Median score on admission was 1.
• MEWS ≥ 5 was associated with an increased risk of death (OR 5.4), ICU admission (OR 10.9) and PCU admission (OR 3.3).

Relative Risk Ratios

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic blood pressure</td>
<td>&lt;70</td>
<td>81-100</td>
<td>101-199</td>
<td>&gt;200</td>
<td></td>
</tr>
<tr>
<td>RR (95%CI)</td>
<td>8.6 (0.5-139)</td>
<td>5.7 (0.9-35)</td>
<td>2.1 (0.8-5.5)</td>
<td>0.5 (0.7-4.1)</td>
<td>130</td>
</tr>
<tr>
<td>Heart rate</td>
<td>&lt;40</td>
<td>41-50</td>
<td>51-100</td>
<td>101-199</td>
<td>&gt;200</td>
</tr>
<tr>
<td>RR (95%CI)</td>
<td>NA</td>
<td>NA</td>
<td>1.6 (0.7-3.2)</td>
<td>1.5 (0.7-3.4)</td>
<td>3.0 (0.9-9.5)</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>&lt;9</td>
<td>9-14</td>
<td>15-20</td>
<td>21-29</td>
<td>&gt;30</td>
</tr>
<tr>
<td>RR (95%CI)</td>
<td>NA</td>
<td>NA</td>
<td>1.6 (0.4-7.1)</td>
<td>4.4 (1.0-19)</td>
<td>7.9 (1.5-42)</td>
</tr>
<tr>
<td>Temperature</td>
<td>&lt;35</td>
<td>35-38.4</td>
<td>38.5</td>
<td>&gt;38.5</td>
<td></td>
</tr>
<tr>
<td>RR (95%CI)</td>
<td>5.9 (1.8-19)</td>
<td>Alert</td>
<td>Reacting to Voice</td>
<td>Reacting to Pain</td>
<td>Unresponsive</td>
</tr>
<tr>
<td>AVPU score</td>
<td></td>
<td>Alert</td>
<td>Reacting to Voice</td>
<td>Reacting to Pain</td>
<td>Unresponsive</td>
</tr>
<tr>
<td>RR (95%CI)</td>
<td></td>
<td>2.0 (0.9-4.8)</td>
<td>5.2 (1.5-16.1)</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

Q J Med 2001; 94:524
Comparison of the behavior of MEWS score and Individual Vital Signs

Q J Med 2001; 94:521 - 526

Clinical Trials

Identification of deteriorating patients on general wards: measurement of vital parameters and potential effectiveness of the Modified Early Warning Score

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Abstract

Background and Purpose: Clear and unmistakable signs of deterioration have been shown to be present in most patients, raising the question of whether intervention could make a difference. We developed a model that allows for the prediction of deterioration, using vital signs and other variables. We investigated the potential effectiveness of the Modified Early Warning Score (MEWS).

Methods: A prospective observational study of medical and surgical patients from 2007 with a severe infection was conducted. The MEWS was calculated and compared with the development of a score of deterioration within 48 hours. The Modified Early Warning Score was calculated at 48 hours. The MEWS was calculated at 48 hours.

Results: Two hundred and fifty patients were included. At 48 hours, a total of 86 patients had an MEWS value of 4 or higher. The MEWS was calculated to be associated with a higher risk of deterioration (P = 0.003).

1. Introduction

Most critically ill patients who are admitted to the intensive care unit (ICU) or have a cardiopulmonary arrest.
Study Design

- Retrospective observational study of 204 medical and surgical patients who had an adverse clinical event.
- Adverse event: cardiopulmonary arrest, unplanned ICU admission, emergency surgery, or unexpected death.

MEWS score in the hours preceding a clinical event

Journal of Critical Care (2012) 27, 424.e11
Clinical Trials

Clinical paper

Is the Modified Early Warning Score (MEWS) superior to clinician judgement in detecting critical illness in the pre-hospital environment? 10
J.N. Fullerton et al. / Resuscitation 83 (2012) 557–562

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ABSTRACT

New physiological and trigger scores have an established role in enhancing the detection of critical illness in hospitalised patients. Their potential to identify individuals at risk of clinical deterioration in the pre-hospital environment is unknown. This study compared the predictive accuracy of the Modified Early Warning Score (MEWS) and clinician judgement in detecting critical illness in the pre-hospital environment. A prospective observational cohort study of non-trauma adult patients transported by emergency services to a district general hospital between March 2005 and June 2009 was used. The study included 3504 patients who suffered an adverse event within 24 h of admission. MEWS was calculated on arrival at the hospital and prior to transfer. A cut-off score of 4 or more resulted in a sensitivity of 61.8% (95% CI 51.1–72.8%) and a specificity of 84.8% (95% CI 83.5–86.1%).

1. Introduction

(J.N. Fullerton et al. / Resuscitation 83 (2012) 557–562)

Study Design and Results

- Retrospective observational study.
- 3504 patients who suffered an adverse event within 24 hours of admission.
- Clinical judgment demonstrated a sensitivity of 61.8% (95% CI 51.1-72.8%).
- Combination-MEWS with a cut-point of 4 or more resulted in a sensitivity of 72.4% (95% CI 62.5-82.7%) and specificity of 84.8% (95% CI 83.5-86.1%).
MEWS Implementation

• Nurses are being educated to review the “MEWS Summary Report” in IHIS at 9am and 9pm.
  • This score is automatically updated after vital signs are entered.
MEWS report on IHIS

MEWS Implementation

- The score is not meant to replace Nursing judgment, but if there is clinical concern we recommend:
  - MEWS = 4, call covering clinician, consider increase clinical monitoring (VS)
  - MEWS >4, call covering clinician, consider increase clinical monitoring (VS), consider ERT as needed.
## Proposed guided MEWS response for Nursing

<table>
<thead>
<tr>
<th>MEWS Score</th>
<th>Usual Care</th>
<th>Charge RN</th>
<th>Primary responder</th>
<th>ERT team</th>
<th>Associated care</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>Consider increased clinical monitoring</td>
</tr>
<tr>
<td>4</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>Consider increased clinical monitoring</td>
</tr>
<tr>
<td>5</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>Recommend</td>
</tr>
<tr>
<td>6</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>Recommend</td>
</tr>
<tr>
<td>≥7</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>Recommend</td>
</tr>
</tbody>
</table>

### Implications for Physicians

- Minimal change in workflow
- If you desire, you can review the “MEWS summary Report” as you wish.
  - Data only updates as often as vitals are entered.
- Be aware that nurses may call to alert you for changes in MEWS as a clinical concern.
- Give us feedback so that the alert thresholds and recommendations can be specific to your patients and their conditions.