Early Warning Scoring System for Early Recognition of and Timely Intervention in Deteriorating Patients in the Hospital

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Abstract
Delay in recognizing clinical deterioration in acutely unwell patients often leads to cardiac arrests and unexpected admissions to the Intensive Care Unit. Early Warning Scoring Systems based on vital physiological parameters help in early detection of clinical deterioration. When combined with a system of prompt and appropriate clinical response, they have been shown to improve outcome. A standardised National Early Warning Score has been implemented in the United Kingdom. There is a need to implement an early warning scoring system in hospitals in India in order to ensure effective and judicious utilization of our overburdened acute services and to minimize adverse outcomes.

Background
Majority of hospitalized patients who suffer a cardiorespiratory arrest show signs of deterioration in the preceding few hours. Early recognition and prompt action to prevent cardiac arrest is the first link in the chain of survival. It has been noted that there is often a delay in recognition and timely and appropriate management of deteriorating patients which leads to delayed referral to critical care, avoidable admissions to the Intensive Care Unit (ICU) and avoidable cardiac arrests and deaths. Inability of healthcare professionals to communicate effectively among themselves is another recognized hindrance to timely response to clinical deterioration. Hence, there is a need to develop a mechanism to detect any deterioration in the clinical status of hospitalized patients quickly, to convey this information clearly to an appropriate responder and ensure timely action from the latter.

National Early Warning Score (NEWS)

Early Warning Score
‘Early warning scores (EWS)’ or ‘tract-and-Trigger-systems’ have been used by hospitals in several countries to identify and respond to acutely unwell patients. The implementation of EWS along with rapid response teams has been shown to reduce cardiac arrests and unexpected ICU admissions. An EWS is a scoring system based on physiological parameters like heart rate, blood pressure and oxygen saturation etc. that are periodically measured and recorded as part of a patient’s routine monitoring while in hospital. A score is allocated to each parameter, the value of which reflects how much the measurement varies from the norm at the given time. The scores of all the individual parameters are aggregated to give the EWS which gives a numerical indication of the degree of sickness of an acutely unwell patient. The scoring should be accompanied by guidance on the steps to be taken depending on the EWS. These steps often vary slightly from one organization to another depending on factors like the level of training of different grades of staff, their working patterns and monitoring facilities available in different clinical areas.

NEWS

In the United Kingdom, several versions of the EWS differing slightly from each other mainly in the physiological parameters used and the relative weightage given to each of those parameters were being used throughout the National Health Services (NHS). It was felt necessary to have a standardized EWS to be used throughout the NHS in order to improve training and avoid lack of familiarity with the local system when staff moved between hospitals. The Royal College of Physicians (RCP) in consultation with the other stakeholders including various professional bodies suggested in 2012 a National Early Warning Score or NEWS to be used throughout the
NHS. Care was taken to keep the scoring system simple and easy to use, sensitive enough to pick up the severity of an acute illness or early signs of deterioration but not so sensitive as to cause unnecessary alerts and overburden the clinical response teams.

Six simple physiological parameters viz. respiratory rate, oxygen saturation, temperature, systolic blood pressure, pulse rate and level of consciousness form the basis of NEWS. An additional weighting score of two is added for any patient requiring supplemental oxygen. Scores for individual parameters have been shown in Table 1.

RCP recommends using standardized colour coded charts to record routine measurements of vital parameters. NEWS can be readily calculated from this chart and should be recorded with each set of measurements. The minimum frequency of monitoring, the urgency of clinical response and the competency requirements of the responder should be determined by this score. Most hospitals follow a routine of six to eight hourly monitoring of vital parameters. A minimum frequency of twelve hourly monitoring is recommended even if the NEWS is 0. For a low score of 1 to 4 this should be increased to four to six hourly unless a competent decision maker decides a different frequency. The patient should be reviewed by a registered nurse who should decide on the frequency of further monitoring and the need for escalation of care, e.g. informing the duty doctor. A medium score of 5 to 6 (or a score of 3 in any single physiological parameter) warrants hourly monitoring and urgent review by a clinician competent in assessing acutely ill patients including the ability to recognize when the care needs to be escalated to the critical care team. Continuous monitoring in a High Dependency Unit or ICU and urgent review by a clinical team with critical care competencies including advanced airway management is recommended for a high MEWS (a score of 7 or more).

NEWS is recommended for assessment of severity of an acute illness in the pre-hospital setting (e.g. in the ambulance), on presentation to the hospital and as a surveillance tool for all in-patients. All hospitals looking after acutely unwell patients should have locally agreed arrangements to ensure round the clock availability of teams with appropriate competencies to respond to the different NEWS trigger levels. All healthcare staff involved in recording data for NEWS or responding to it should be properly trained in its use and clearly understand the local response policy.

NEWS should not be used in individuals below the age of sixteen and in pregnant women as their physiological response to an acute illness may be different from an average adult. Some patients with chronic illnesses may have a higher than normal baseline MEWS. A typical example would be a patient of chronic obstructive pulmonary disease on long term oxygen treatment and a mild degree of tachypnoea who may have a medium score at baseline. Response policy in such patients may need to be individualized. Similarly, the use of NEWS may not be appropriate in a terminally ill patient where the ceiling of care has been decided. In all such cases, however, the monitoring and escalation plans should be clearly documented in the case notes. It is important to remember that NEWS is meant to complement clinical judgment and not replace it.

Further research has been recommended to evaluate the effectiveness of NEWS in improving outcomes in acutely ill patients. One study has found NEWS to be better in discriminating patients at risk of cardiac arrest, unexpected ICU admission or death in the next twenty four hours compared to thirty three other types of early warning scoring systems.

The Indian Context

There is a need to introduce a method of assessing the severity of acute illness and early detection of clinical deterioration and linking it with a system of timely and appropriate clinical response in hospitals looking after acutely unwell patients. Most acute hospitals in India, especially the government hospitals, are overburdened. One tertiary care hospital that introduced critical care outreach service found that there was inefficient utilization of the service. One of the main reasons identified was lack of effective activation criteria. Use of an early warning scoring system could help the on-call teams in prioritizing their work by identifying the patients in need of urgent review. Linking it with locally agreed protocols for review of sick patients will help in fixing accountability.

Table 1: National early warning score (NEWS)

<table>
<thead>
<tr>
<th>Physiological parameters</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>Respiratory rate (bpm)</td>
<td>≤8</td>
<td>9-11</td>
<td>12-20</td>
<td>21-24</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen saturation (%)</td>
<td>≤91</td>
<td>92-93</td>
<td>94-95</td>
<td>96-100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplemental oxygen</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>≤35</td>
<td>35.1-36</td>
<td>36.1-38</td>
<td>38.1-39</td>
<td>≥39.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic BP (mmHg)</td>
<td>≤90</td>
<td>91-100</td>
<td>101-110</td>
<td>111-129</td>
<td>≥220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse rate (bpm)</td>
<td>≤40</td>
<td>41-50</td>
<td>51-90</td>
<td>91-110</td>
<td>111-130</td>
<td>≥131</td>
<td></td>
</tr>
<tr>
<td>Level of consciousness*</td>
<td>A</td>
<td>V, P or U</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*(A= Alert, V=response to Voice, P= response to Pain and U= Unresponsive); Additional score of 2 to be added if the patient is on supplemental oxygen.
and improving the quality of acute care.

In one of the newly built ‘Institutes of National Importance’ an early warning scoring system called satarkataank adapted from NEWS and linked with a clinical response policy has been introduced to be used on the medical adult wards. Its clinical application is in early recognition of clinical deterioration in admitted patients so that they could be reviewed by a competent clinical responder and an appropriate monitoring and treatment plan instituted in a timely manner by optimum utilization of resources. The clinical response policy states that any patient with a satarkataank of 1 to 4 should be reviewed by a doctor (of any grade) and their observations (i.e. vital parameters) recorded at a maximum of four hourly intervals. For a satarkataank of 5 to 6, the minimum frequency of monitoring has been recommended as once every hour and the patient should be reviewed urgently by a Senior Resident (or above). A satarkataank of 7 or more warrants continuous monitoring (on a non-invasive cardiac monitor) and the Senior Resident should discuss the case with the critical care team immediately.

It is the duty of the nursing staff caring for the patient to inform the doctor of appropriate grade and monitor the patient at appropriate intervals. The doctor should review the patient again to assess the response to initial treatment and decide the further course of action accordingly. It is permissible to deviate from the clinical response policy described above but any such decision must be clearly documented along with reasons in the patient’s case notes by the clinician making the decision.

An audit will be undertaken in due course to assess adherence to the policy and its clinical utility in improving the quality of acute care.

References