



## Rapid Response Systems

Factors affecting response to National Early Warning Score (NEWS)<sup>☆</sup>Ivana Kolic<sup>a,\*</sup>, Smiley Crane<sup>a</sup>, Suzanne McCartney<sup>a</sup>, Zane Perkins<sup>b</sup>, Alex Taylor<sup>a</sup><sup>a</sup> Acute Medical Unit, The Queen Elizabeth Hospital, Lewisham & Greenwich NHS Trust, London, United Kingdom<sup>b</sup> William Harvey Hospital, East Kent Hospitals University NHS Trust, Ashford, United Kingdom

## ARTICLE INFO

## Article history:

Received 9 August 2014

Received in revised form 28 January 2015

Accepted 8 February 2015

## Keywords:

National Early Warning Score

Critical illness

Patient safety

Clinical response

Consistency

## ABSTRACT

**Introduction:** The NEWS is a physiological score, which prescribes an appropriate response for the deteriorating patient in need of urgent medical care. However, it has been suggested that compliance with early warning scoring systems for identifying patient deterioration may vary out of hours. We aimed to (1) assess the scoring accuracy and the adequacy of the prescribed clinical responses to NEWS and (2) assess whether responses were affected by time of day, day of week and score severity.

**Methods:** We performed a prospective observational study of 370 adult patients admitted to an acute medical ward in a London District General Hospital. Patient characteristics, NEWS score, time of day, day of week and clinical response data were collected for the first 24 h of admission. Patients with less than a 12 h hospital stay were excluded. We analysed data with univariate and multivariate logistic regression.

**Results:** In 70 patients (18.9%) the NEWS score was calculated incorrectly. There was a worsening of the clinical response with increasing NEWS score. An appropriate clinical response to the NEWS was observed in 274 patients (74.1%). Patients admitted on the weekend were more likely to receive an inadequate response, compared to patients admitted during the week ( $p < 0.0001$ ). After adjusting for confounders, increasing NEWS score remained significantly associated with an inadequate clinical response. Furthermore, our results demonstrate a small increase in inadequate NEWS responses at night, however this was not clinically or statistically significant.

**Conclusion:** The high rate of incorrectly calculated NEWS scores has implications for the prescribed actions. Clinical response to NEWS score triggers is significantly worse at weekends, highlighting an important patient safety concern.

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## 1. Introduction

Hospitalised patients who develop acute illness often exhibit preceding abnormalities in vital signs.<sup>1,2</sup> Early Warning Scores (EWS) aim to identify these changes and allow an opportunity for early intervention and timely treatment.<sup>3,4</sup> As a result, NICE Guidelines recommend that EWS should be used to monitor all adult patients in acute hospital settings.<sup>5</sup> A variety of EWS have been used across the United Kingdom (UK), with the NEWS having been shown to be better than 33 other EWS.<sup>6</sup> The NEWS is a scoring system for the prevention and early identification of patients who develop or present with acute illness.<sup>7–9</sup> However, the effectiveness of EWS is dependent on appropriate implementation,<sup>10</sup> compliance

and an effective clinical response.<sup>5,11,12</sup> It has been suggested that compliance with track-and-trigger systems for identifying patient deterioration may vary out of hours.<sup>13</sup>

A principle of the NHS is ‘equality of treatment or clinical outcome regardless of the day of the week’ as outlined in The Foster Report.<sup>14</sup> However, it is recognised that mortality is higher in patients admitted to hospital out of hours.<sup>15–17</sup>

The overall aim of this study was to assess the association between the appropriate use of NEWS and out-of hours activity. Our first aim was to assess the scoring accuracy and the adequacy of the prescribed clinical responses to NEWS. Secondly, our aim was to assess whether responses were affected by time of day, day of week and score severity as a possible explanation for the increased mortality at these times.

## 2. Methodology

We conducted an observational study in patients ( $n = 370$ ) presenting to the Acute Medical Unit (AMU) from 1 October 2013 to 15 October 2013 and from 9th December 2013 to 22nd December

<sup>☆</sup> A Spanish translated version of the abstract of this article appears as Appendix in the final online version at <http://dx.doi.org/10.1016/j.resuscitation.2015.02.009>.

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National Early Warning Score (NEWS)\*

PHYSIOLOGICAL PARAMETERS	3	2	1	0	1	2	3
Respiration Rate	≤8		9 - 11	12 - 20		21 - 24	≥25
Oxygen Saturations	≤91	92 - 93	94 - 95	≥96			
Any Supplemental Oxygen		Yes		No			
Temperature	≤35.0		35.1 - 36.0	36.1 - 38.0	38.1 - 39.0	≥39.1	
Systolic BP	≤90	91 - 100	101 - 110	111 - 219			≥220
Heart Rate	≤40		41 - 50	51 - 90	91 - 110	111 - 130	≥131
Level of Consciousness				A			V, P, or U

Fig. 1. The NEWS Scoring System.

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2013. The protocol was reviewed by the Local Clinical Effectiveness Department and met National Institute of Health Research criteria for service evaluation. The study was conducted in Queen Elizabeth Hospital (QEH), a National Health Service (NHS) Trust District General hospital in London. Eligibility included adult patients on two acute medical wards in QEH. Exclusion criteria involved patients with a less than 12 h inpatient stay.

Data was collected prospectively. Information was collected on patient baseline characteristics, documented scores allocated to each physiological parameter, documented total scores, re-calculated scores (manually calculated from the documented vital signs on the observation charts), time to subsequent observations and the adequacy of clinical responses. Points were allocated according to basic clinical observations including pulse rate, respiratory rate, blood pressure, oxygen saturation, and level of

consciousness (see Fig. 1). Time of day and day of week was noted. For NEWS categories 3 (score 5–6) and Category 4 (score ≥ 7), we looked into the reasons for an inadequate clinical response.

### 2.1. Outcomes

Two outcomes were scoring error and adequacy of the clinical response. For a clinical response to be adequate we required the prescribed actions to be carried out according to level of score as set out by the Royal College of Physicians report 'Standardising the assessment of acute-illness severity in the NHS 2012'.<sup>9</sup> This involves the correct frequency of observations and the correct action (Fig. 2). The correct action requires both the appropriate urgency and competency of the clinical responder and the appropriate clinical environment. Furthermore, we collected data on

News score	Frequency of monitoring	Clinical response
0	Minimum every 12 hours	Continue routine monitoring of national early warning scores (NEWS) with every set of observations
Total (1-4)	Minimum every 4-6 hours	Inform registered nurse, who must assess the patient Registered nurse to decide if increased frequency of monitoring and/or escalation of clinical care is required
Total (≥5, or 3 in one variable)	Increased frequency to a minimum of once an hour	Registered nurse to urgently inform the medical team caring for the patient Urgent assessment by a clinician with core competencies to assess acutely ill patients Clinical care in an environment with monitoring facilities
Total (≥7)	Continuous monitoring of vital signs	Registered nurse to immediately inform the medical team caring for the patient - this should be at least at specialty trainee level Emergency assessment by a clinician team with critical care competencies, which also includes practitioner(s) with advanced airway skills Consider transfer of clinical care to a level 2 or 3 care facility - that is, a higher dependency or intensive care unit

Fig. 2. Clinical response to NEWS triggers.

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