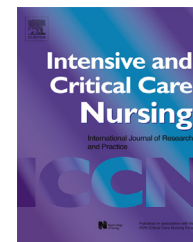




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ORIGINAL ARTICLE

The National Early Warning Score: Translation, testing and prediction in a Swedish setting

Martin Spångfors^{a,c,*}, Lisa Arvidsson^{b,c}, Victoria Karlsson^{b,c}, Karin Samuelson^{a,b}

^a Lund University, Faculty of Medicine, Department of Clinical Sciences Lund, Anaesthesiology and Intensive Care, Lund, Sweden

^b Lund University, Faculty of Medicine, Department of Health Sciences, Lund, Sweden

^c Kristianstad Hospital, Department of Anaesthesia and Intensive Care, Kristianstad, Sweden

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KEYWORDS

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Summary The National Early Warning Score – NEWS is a “track and trigger” scale designed to assess in-hospital patients’ vital signs and detect clinical deterioration. In this study the NEWS was translated into Swedish and its association with the need of intensive care was investigated. A total of 868 patient charts, recorded by the medical emergency team at a university hospital, containing the parameters needed to calculate the NEWS were audited. The NEWS was translated into Swedish and tested for inter-rater reliability with a perfect agreement (weighted $\kappa = 1.0$) among the raters. The median score for patients admitted to the ICU were higher than for those who were not (10 vs. 8, $p < 0.0001$). AUROC for discriminating admittance to the ICU was 0.68 (95% CI: 0.622–0.739, $p < 0.0001$). A regression analysis showed that lower oxygen saturation and a lower level of consciousness were significantly associated with ICU admission (OR 1.27 [1.06–1.52], $p = 0.01$ and OR 1.77 [1.12–2.82], $p = 0.02$) and may predict admission to the ICU better than the other parameters. The Swedish translated NEWS seems to have excellent inter-rater reliability and can be used without risk of linguistic misinterpretation. High scores for the parameters oxygen saturation and level of consciousness in the NEWS may predict admission to the ICU.

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* Corresponding author at: Lund University, Faculty of Medicine, Department of Clinical Sciences Lund, Anaesthesiology and Intensive Care, Lund, Sweden. Tel.: +46 708840484; fax: +46 443091167.

E-mail address: martin.spangfors@skane.se (M. Spångfors).

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Implications for Clinical Practice

- The Swedish translated version of the NEWS seems to have excellent overall inter-rater reliability and can be used without great risk of linguistic misinterpretation.
- As suggested in this study the NEWS can discriminate high-risk patients in need of intensive care in Swedish settings.
- High points on the NEWS parameters oxygen saturation and level of consciousness might predict the need for intensive care better than the others.

Introduction

Clinical deterioration often occurs before serious adverse events (SAE) such as cardiac arrest or mortality. Early identification of potentially deteriorating patients is therefore crucial ([National Confidential Enquiry into Patient Outcome and Death, 2012](#)). According to the National Registry of Cardiopulmonary Resuscitation there is an incidence of about 209,000 in-hospital cardiac arrests (IHCA) in the United States yearly ([Kolte et al., 2015](#)). The Swedish Resuscitation Council, which covers 95% of the Swedish hospitals, reported an incidence of about 2300 in-hospital cardiac arrests in Sweden on a yearly basis. The highest survival rates (65%) were seen on the cardiac angiography catheterisation laboratory, with a cardiac arrest occurrence of only 7%. The lowest survival rate (17%) was seen in the hospital wards where the majority of the cardiac arrests occurred ([Herlitz, 2014](#)).

In-hospital cardiac arrests (IHCA) differ in one significant way from the out of hospital cardiac arrests (OHCA). The IHCA is often the aggregate outcome of a clinical deterioration, unlike the OHCA, and can be identified by abnormal vital signs in 68% of cases up to 6 hours pre cardiac arrest ([National Confidential Enquiry into Patient Outcome and Death, 2012](#)). If hospital staff can detect these abnormal vital signs they might prevent the potential deterioration of the patient on the ward or transfer the patient to the ICU for closer observation before the cardiac arrest occurs ([Gao et al., 2007](#)). A structured way to detect abnormal vital signs is to use a "track and trigger" scale where the abnormality in the patient's vital signs are measured and graded ([Royal College of Physicians, 2012](#)). In a study by Bunkenborg a statistically significant reduction (from 61 to 17/100 adjusted patient years) of in-hospital cardiac arrests was seen after the introduction of the "track and trigger" scale Modified Early Warning Score, MEWS ([Bunkenborg et al., 2014](#)).

In order to detect the abnormal vital signs, competent and trained professionals are needed to assess the patient in accordance with the deviating vital signs and take appropriate action ([Bunkenborg et al., 2013](#)). In the last decade there has been an introduction of medical emergency teams MET for this purpose. A recent Australian study showed a decrease of in-hospital cardiac arrests and its associated mortality during the last decade after the introduction of both MET's and "track and trigger" scales ([Chen et al., 2014](#)). To this date there are several "track and trigger" scales being used and there is a lot of debate concerning which scale performs the best. However, most of them lack overall validity ([Smith et al., 2013](#)).

In Great Britain a nationwide review of hospital care for the acutely ill took place in 2007 ([National Institute](#)

[for Health and Clinical Excellence, 2007](#)). The report stipulated the need for a national validated early warning scale and concluded that this would be the single most important action that could improve care for the acutely ill in hospitals. As a result, the National Early Warning Score – NEWS, was introduced in 2012 by the Royal College of Physicians, (RCP). This "track and trigger" scale was designed to assess in-hospital patients' vital signs and detect clinical deterioration, with the purpose of increasing in-hospital patient safety by discriminating patients at risk of dying within 24 hours or in need of intensive care ([Smith et al., 2013](#)). In comparison with 32 other widely used "track and trigger" scales, the NEWS showed the best ability to discriminate patients at risk of cardiac arrest, unanticipated ICU admission or death within 24 hours ([Smith et al., 2013](#)). Furthermore, in a recent Finish study by Tirkkonen, the NEWS was retrospectively calculated on a cohort of patients and compared with the hospital's MET-calling criteria. A MET-calling criterion exists when any of a number of vital signs' cut-off values is reached and triggers a response. The authors concluded that the NEWS, unlike the MET-calling criteria, has got the ability to discriminate high-risk patients ([Tirkkonen et al., 2014](#)). Moreover, it has been shown that unplanned ICU-admission can be reduced by the use of aggregated early warning systems like the NEWS ([McNeill and Bryden, 2013](#)). This relationship between deviating vital signs and ICU-admission within 24 hours was first established in 1999 by [Goldhill et al., 1999](#). In a recent study by Smith et al. the NEWS, amongst a total of 33 EWS's, performed the best in discriminating ICU admitted patients ([Smith et al., 2013](#)).

The NEWS consists of a scale in which measures of respiratory frequency, oxygen saturations, body temperature, systolic blood pressure, heart rate and level of consciousness are given points, from 0 to 3, that correlate with their divergence from the expected normal values ([Royal College of Physicians, 2012](#)). If the patient receives oxygen, two points aggregate the total score. The total sum of points can be related to the patient's risk of critical illness using the clinical risk scale that comes with the NEWS. An outline clinical response scale, containing predefined assessment intervals, is also included with the concept. In this study we refer to these three parts together, as the NEWS concept ([Royal College of Physicians, 2012](#)).

From a patient safety perspective a "track and trigger" scale like the NEWS offers an appealingly easy and standardised way in assessing and communicating patients' vital signs. To this date no large clinical evaluation reports of the NEWS concept exists. Moreover, there is a lack of Swedish studies using or evaluating the concept. If the NEWS is to be properly implemented into a Swedish setting it needs to be translated into Swedish and tested between raters

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