



Article

# The Predictive Role of Modified Early Warning Score in 174 Hematological Patients at the Point of Transfer to the Intensive Care Unit

Catalin Constantinescu <sup>1,2,3,4</sup> , Sergiu Pasca <sup>1,3,5</sup>, Sabina Iluta <sup>1,5</sup>, Grigore Gafencu <sup>6</sup> , Maria Santa <sup>1,3,5</sup>, Ciprian Jitaru <sup>1,3,5</sup>, Patric Teodorescu <sup>1,5,7</sup> , Delia Dima <sup>1,3,5</sup>, Mihnea Zdrenghea <sup>1,5</sup> and Ciprian Tomuleasa <sup>1,3,5,\*</sup>

- <sup>1</sup> Department of Hematology, Iuliu Hatieganu University of Medicine and Pharmacy, 400349 Cluj Napoca, Romania; constantinescu.catalin@gmail.com (C.C.); pasca.sergiu123@gmail.com (S.P.); iluta.sabina@yahoo.com (S.I.); maria.elena@yahoo.com (M.S.); Ciprianjitaru.jitaru@gmail.com (C.J.); patric\_te@yahoo.com (P.T.); delia\_dima@yahoo.com (D.D.); m.zdrenghea@yahoo.com (M.Z.)
  - <sup>2</sup> Department of Anesthesia and Intensive Care, Iuliu Hatieganu University of Medicine and Pharmacy, 400349 Cluj Napoca, Romania
  - <sup>3</sup> Medfuture Research Center for Advanced Medicine, Iuliu Hatieganu University of Medicine and Pharmacy, 400337 Cluj Napoca, Romania
  - <sup>4</sup> Intensive Care Unit, Emergency Hospital, 400006 Cluj Napoca, Romania
  - <sup>5</sup> Department of Hematology, Ion Chiricuta Cancer Center, 400015 Cluj Napoca, Romania
  - <sup>6</sup> MRC Molecular Haematology Unit—The MRC Weatherall Institute of Molecular Medicine, University of Oxford, Oxford OX3 9DS, UK; grigore.gafencu@rdm.ox.ac.uk
  - <sup>7</sup> Division of Hematologic Malignancy, Department of Oncology, Johns Hopkins University, Baltimore, MD 21211, USA
- \* Correspondence: ciprian.tomuleasa@gmail.com



Citation: Constantinescu, C.; Pasca, S.; Iluta, S.; Gafencu, G.; Santa, M.; Jitaru, C.; Teodorescu, P.; Dima, D.; Zdrenghea, M.; Tomuleasa, C. The Predictive Role of Modified Early Warning Score in 174 Hematological Patients at the Point of Transfer to the Intensive Care Unit. *J. Clin. Med.* **2021**, *10*, 4766. <https://doi.org/10.3390/jcm10204766>

Academic Editor: Tadeusz Robak

Received: 16 August 2021  
Accepted: 14 October 2021  
Published: 18 October 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

**Abstract:** Introduction: The examination of vital signs and their changes during illness can alert physicians to possible impending deterioration and organ dysfunction. The Modified Early Warning Score (MEWS) is used worldwide as a track and trigger system that can help to identify patients at risk of critical illness. Thus, the current study aimed to assess the ability of MEWS to predict the mortality of hematologic patients at the point of transfer from the ward to the intensive care unit (ICU). Materials and Methods: The present study was retrospective, longitudinal, and observational, conducted at an oncology hospital in the city of Cluj-Napoca, Romania. We included 174 patients with hematological disorders transferred from the ward to the ICU between the 1st of January 2018 and the 1st of May 2020. We assessed the MEWS at the moment of admission in these patients in the ICU. The accuracy of MEWS in predicting mortality was assessed via the area under the receiver operating characteristic curves (AUC), and sensitivity, specificity, and hazard ratio (HR) were calculated for different MEWS cutoffs. MEWS values considering the status at discharge and frequency of death by MEWS were also analyzed. Results: We calculated MEWS values considering the status at discharge ( $p < 0.0001$ ), and we assessed the frequency of death by MEWS. We also calculated the hazard ratio (HR) of death depending on the selected MEWS cutoff. The best cutoff point was found to be  $\geq 6$ , with an accuracy of 0.667, sensitivity of 0.675, specificity of 0.646, and AUC of 0.731. Patients with higher MEWS had a higher probability of mortality. Conclusion: The MEWS and cutoff points were determined on a sample of hematologic patients at the moment of admission to the ICU. The final aim is to encourage physicians to use these scores to improve awareness of organ failure to admit patients to the ICU sooner and limit overall morbidity and mortality. The presence of an ICU physician on ward rounds might help in reducing the timeframe of access to a high-dependency unit (HDU) or ICU. An extension of these scores outside hematologic patients or considering hematologic patients outside ICU must be further studied.

**Keywords:** modified early warning score; hematology; intensive care; prognosis