
New ICU Mortality Prediction Model for Low-Income Countries



A model to predict ICU mortality has been designed for use in low-income countries. The development team say that its use of a few easily collected variables make it suitable for use in sites that care for critically ill patients in low-income countries. This is the first time since 1989 that a model has been developed or validated in a low-income country.

Elisabeth D. Riviello, Department of Medicine, University of Rwanda, College of Medicine and Health Sciences, Kigali, Rwanda and Department of Medicine, Division of Pulmonary, Critical Care and Sleep Medicine, Beth Israel Deaconess Medical Center and Harvard Medical School, Boston, USA, with colleagues from Canada and Rwanda report on validation of the Mortality Probability Admission Model, version III (MPM0-III) in two public ICUs in Rwanda and subsequent development of the Rwanda Mortality Probability Model (R-MPM) for use in low-income countries.

The MPM0-III model is the only ICU risk prediction that has been validated in a large cohort and is not dependent on laboratory values. In this study it was validated using data on all adult patients admitted to the two public ICUs in Rwanda between 19 August 2013 and 6 October 2014. In-hospital mortality in the 425 adults admitted consecutively was 48.7%.

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Patients were most commonly admitted for respiratory failure or for endotracheal intubation (72.8%). Sepsis diagnosis within 24 hours included 42.2% with sepsis, 33.0% severe sepsis, and 20.8% septic shock. ARDS criteria according to the Berlin definition were met in 12.9% of all patients.

The MPM0-III predicted mortality with area under the receiver operating characteristic curve of 0.72 and Hosmer-Lemeshow chi-square statistic $p = 0.024$.

The Rwanda Mortality Probability Model (R-MPM) was developed using five variables: age, suspected or confirmed infection within 24 hours of ICU admission, hypotension or shock as a reason for ICU admission, Glasgow Coma Scale score at ICU admission, and heart rate at ICU admission. The R-MPM predicted outcomes with area under the ROC curve of 0.81 with 95% confidence interval of (0.77, 0.86), and Hosmer-Lemeshow chi-square statistic $p = 0.154$. The article outlines incremental change in mortality expected for a change in each independent variable, based on the odds ratio.

Riviello and co-authors suggest that the R-MPM, if validated in other critically ill patients in a broad range of settings, could potentially improve the reliability of comparisons used for critical care research and quality improvement initiatives in low-income countries.

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