

Developing trauma mortality prediction models to measure injury severity

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Introduction

Injury severity measurement is integral to meaningful benchmarking and injury prevention strategies. Numerous injury mortality prediction methods have been developed and advanced, however, no consensus on the best model has been reached.

Objectives and Approach

The International Collaborative Effort (ICE) on Injury Statistics propose to develop a set of trauma mortality models for use in diverse settings by deriving and validating models with data from member countries including Wales, Australia, New Zealand and USA. The ICE team will create a definitive list of injuries required to identify trauma patients using ICD-10 codes. Models will be developed using Welsh data then validated with data from other member nations. The outcomes of interest are in-hospital and 30-day mortality. Models will be used for country benchmarking by comparing the distribution of injury severity and outcomes between nations.

Results

Initial results from replicating the model published by Wada, et al., as closely as possible using 348,433 cases held in SAIL for the years 2000 to 2013 achieved an AUROC value of 0.908 (95% CI 0.905-0.911). This model included 38 injury indicator variables, age, sex and comorbidity score. From 2009 onwards, the estimated number of deaths exceeded the actual number of deaths indicating improving risk adjusted survival. We aim to further enhance these models with additional covariates by linking with critical care data to enable us to determine the level of support patients received during their hospital stay, linking with laboratory data to provide indications of multiple organ dysfunction, acute physiological response and infection, and with GP data to incorporate measures of frailty.

Conclusion/Implications

Using multi-sourced population based linked data allows us to develop a suite of enhanced mortality models for use in observational and interventional research. Applying these methods to data from different countries will allow comparisons to be made of trends in severity and outcomes and support collaborative research.

