

00065 Predicting Hospital Admission at Emergency Department Triage: A Novel Prediction Model

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Aims: Emergency department (ED) overcrowding is a growing international patient safety issue. A major contributor to overcrowding is long wait times for inpatient hospital admission. One strategy is earlier notification of the admitting ward of likely admissions from the ED via an admission prediction model. The objective of this study is to create a model that can predict a patient's need for hospital admission at the time of triage using demographic, administrative, and clinical information readily available at triage.

Methodology: Retrospective observational study of electronic clinical records of all ED visits over ten years to SGH. The data was randomly divided into a derivation set (70%) and validation set (30%). We used the derivation set to develop a linear regression model that predicts probability of hospital admission for patients presenting to the ED. We tested the model on the validation set and evaluated retrospective performance by measuring the AUC of the ROC curve. The optimal cutoff was chosen to maximize sensitivity and specificity.

Result: A total of 1,232,016 visits were included for final analysis, of which 38.7% were admitted. The derivation set contained 864,246 visits and the validation set contained 370,392. Eight variables were included in the final model: age group, race, postal code, day of week, time of day, triage category, mode of arrival, and fever status. The model performed well with an AUC-ROC of 0.825 (95% CI 0.824-0.827).

Conclusion: We developed a model that accurately predicts admission for patients presenting to the ED using demographic, administrative, and clinical data routinely collected at triage. Implementation of the model into the electronic health record could calculate the probability of admission for patients at triage and alert the admitting ward of impending admissions. Advance notice could minimize ED crowding with admitted patients awaiting beds, thus reducing the burden of overcrowding.