ICU
MANAGEMENT & PRACTICE

Machine Learning for Predicting Unscheduled Returns to ED

Hospitals utilise unscheduled return visit (URV) rates in emergency departments (EDs) to determine care quality. Higher rates lead to increased costs and longer wait times for patients who need immediate care. Frequent ED visits also contribute to overcrowding, causing treatment delays and higher mortality rates.

Developing predictive models is essential for early intervention to reduce ED revisits. URVs can be categorised into illness-, doctor-, and patient-related returns. However, differentiating between these can be challenging. Unlike conventional statistical methods, machine learning (ML) models can handle complex predictors and improve predictive performance, reducing errors and costs. Previous studies have investigated ML models for predicting ED URVs, but variations in methodology have hindered accuracy assessment.

A recent review compared the predictive power of multiple ML models, evaluated the proportion of methods, and examined the effects of various research factors on the performance of these models in predicting ED URVs.

Study researchers searched eight databases for articles published between 2010 and 2023 that utilised ML to predict return visits to EDs. The primary focus was evaluating the predictive performance of ML models, with analysis based on intervals of return visits, patient demographics, and scale of research.

From the initial pool of 582 articles, 14 were chosen for in-depth analysis. Variations in visit intervals, target demographics, and research scale did not significantly impact the predictive power of the models.

This study provides the first comprehensive overview of using ML to predict URVs in ED patients. While creating practical ML prediction models for ED URVs is feasible, achieving accuracy beyond 0.75 remains challenging. Incorporating diverse data sources and dimensions is crucial for enhancing ML model accuracy, yet it may pose time constraints. Implementing ML models for ED URV prediction could enhance patient safety and reduce medical costs by minimising URV occurrences. Further research is needed to assess the real-world effectiveness of ML models in this context.

Source: BMC Emergency Medicine
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