

Poster

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Poster 30

[P-30-04] Preliminary Machine Learning-Based Prediction of Short-Term Psychiatric Crisis in Depressive Outpatients Using Structured and NLP-Derived EHR Features

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Background: Short-term psychiatric crises, including suicide attempts and emergency visits, are critical in depressive patients. Predicting these events using electronic health records (EHR) may support timely clinical intervention. This study presents a preliminary analysis of a machine learning model for predicting such crises within 30 days after outpatient visits.

Methods: EHR data from 6,607 patients diagnosed with depressive disorders (ICD-10 F32, F33) who had ≥ 2 outpatient visits between January 1, 2019, and December 31, 2023, were analyzed. The dataset included 60,558 outpatient visit records. The prediction target was the occurrence of a psychiatric crisis (suicide attempt, psychiatric ER visit, or hospitalization) within 30 days post-visit. A total of 1,270 such events were identified. Features included structured clinical history during the 1, 2, and 3 months prior to each visit—such as prior ER visits, suicide attempts, outpatient frequency, guardian involvement, and medication changes—along with demographic data. In addition, symptom-related expressions (e.g., suicidal ideation, anxiety, insomnia) were extracted from free-text clinical notes using ChatGPT-assisted natural language processing. A gradient boosting model (XGBoost) was trained on 80% of patients and evaluated on a 20% held-out test set with patient-level separation.

Results: The model achieved an AUROC of 0.81 and PR-AUC of 0.30. Recent suicide attempts, emergency visits, and NLP-derived symptom features were among the strongest predictors.

Conclusions: Short-term psychiatric crises in depressive outpatients may be predicted with reasonable accuracy using structured EHR data and NLP-derived symptom information. These findings support the potential utility of combining structured and unstructured clinical data for early risk identification.