Sudden Unexpected Death in Epilepsy
A Personalized Prediction Tool

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Study Question
Can a model that incorporates routinely collected clinical data accurately predict the risk of sudden unexplained death in epilepsy (SUDEP)?

What Is Known and What This Paper Adds
Several factors contributing to average SUDEP risk have been identified but predicting an individual’s risk of SUDEP remains challenging. This study presents a model based on routine clinical data that outperforms widely used simpler estimates of individual-level SUDEP risk.

Methods
For prognostic model development, the investigators used data from 1,273 people with epilepsy, among whom 287 died of SUDEP and 986 did not. Twenty-two common clinical predictor variables were included. These data came from a cohort study conducted in the US and 3 case-control studies conducted in England and Wales, Sweden, and Scotland. Bayesian logistic regression was used to develop a novel predictive model. The investigators also tested a “baseline” model and a “baseline generalized tonic-clonic seizures (GTCS)” model. The baseline model represented current clinical guidance by incorporating population intercepts as predictors but did not use any other clinical information, and the baseline GTCS model included population intercepts and GTCS frequencies. The primary outcomes were the comparative utilities of these 3 models at differentiating SUDEP cases from non-SUDEP cases using cross-validated information-based criteria and receiver operating characteristic (ROC) analyses.

Results and Study Limitations
The cross-validated discriminatory performance of the novel Bayesian model (area under the ROC curve [AUC], 0.71; 95% bootstrap confidence interval [CI], 0.68–0.74) was superior to the baseline model (AUC, 0.38; 95% CI, 0.33–0.42) and the baseline GTCS model (AUC, 0.63; 95% CI, 0.59–0.67). Important predictors of SUDEP in the novel model included GTCS and focal-onset seizure frequency, excessive alcohol consumption, younger age at epilepsy onset, and a family history of epilepsy. Adherence to antiseizure medication predicted lower SUDEP risk. The present study’s limitations include missing data, an inability to draw causal links between the aforementioned risk factors and SUDEP, and the need to test the model in an external validation dataset.

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