Derivation and validation of emergency department based risk prediction for posttraumatic stress symptoms six months following traumatic stress exposure

Posttraumatic stress symptoms (PTSS) are common following trauma exposure. Identification of PTSS-vulnerable individuals would aid in preventative treatment decisions. In the current study, we performed analyses to identify significant clinical predictors and determine their accuracy in predicting PTSS outcomes of trauma. White and Black American men/women (n=1,546) presenting to one of sixteen emergency departments (EDs) within 24 hours of motor vehicle collision (MVC) trauma were enrolled into two independent longitudinal studies and assessed six months following MVC for PTSS (≥33, Impact of Events Scale-Revised). Sociodemographic, pain, general health, event, and psychological/cognitive characteristics were collected in the ED and used in prediction modeling. Ensemble learning methods and Monte Carlo cross-validation were used for feature selection and to determine prediction accuracy. External validation was performed on a hold-out sample (30% of total n) that leveraged the multiple ED enrollment sites. Twenty-five percent (n=394) of individuals reported PTSS six months following MVC. Regularized linear regression was the top performing ensemble learning method and the selected variables showed good reliability in predicting PTSS in the external sample (AUC=0.79±0.0017). Top predictors included acute pain severity, expectation of recovery, socioeconomic status, Black vs White ethnicity, and feeling like in a daze. These analyses add to the growing literature indicating that risk for future PTSS can be predicted using characteristics measured from individuals reporting to the ED following trauma. Future studies should aim to replicate these findings in additional trauma cohorts and refine the results for clinical use.