

DEVELOPMENT AND INTERNAL VALIDATION OF AN ADMISSION-BASED PREDICTION MODEL FOR EXPANDED DENGUE SYNDROME AMONG HOSPITALIZED ADULTS WITH CONFIRMED DENGUE IN BANGLADESH

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Background: Expanded dengue syndrome (EDS) is associated with substantial morbidity and mortality, but early identification at hospital admission remains challenging. We aimed to describe the clinical profile of hospitalized adults with confirmed dengue and to develop an admission-based model to predict EDS. **Methods:** We analyzed 602 hospitalized adults with confirmed dengue from five tertiary hospitals in Dhaka, including 64 patients with EDS and 538 without EDS. Baseline characteristics, admission clinical features, laboratory findings, and outcomes were compared between groups. Univariable comparisons used appropriate parametric or non-parametric tests according to variable type and distribution. Multivariable prediction modeling was performed using Firth penalized logistic regression on complete cases to reduce small-sample bias. Candidate predictors included age, sex, shock, comorbidity status, platelet count, and neutrophil-to-lymphocyte ratio (NLR). Model discrimination was assessed by receiver operating characteristic analysis, with bootstrap internal validation. **Results:** Patients with EDS were older than those without EDS (median 53.0 vs 35.0 years, $p<0.001$) and more frequently had comorbidity (76.6% vs 27.9%, $p<0.001$). On admission, shock (35.9% vs 3.3%), respiratory distress (31.2% vs 0.2%), rapid breathing (37.5% vs 2.0%), higher white blood cell count, higher NLR, higher creatinine, and markedly elevated ALT were all associated with EDS (all $p<0.05$). EDS was also associated with worse outcomes, including more frequent ICU admission (37.5% vs 1.7%) and lower survival (78.1% vs 99.8%) (both $p<0.001$). In multivariable Firth logistic regression, independent predictors of EDS were older age per 10-year increase (OR 1.38, 95% CI 1.12–1.71), shock (OR 36.55, 95% CI 14.57–100.91), and any comorbidity (OR 7.52, 95% CI 3.59–17.29), while platelet count and log-transformed NLR were not statistically significant in the final model. The final multivariable model demonstrated excellent discrimination, with an apparent area under the curve (AUC) of 0.953 and optimism-corrected AUC of 0.945 after 2000 bootstrap resamples. **Conclusion:** EDS in hospitalized adults with dengue was strongly associated with older age, shock, and underlying comorbidity, and carried substantially higher risks of ICU admission and death. An admission-based multivariable model showed excellent apparent and internally validated discrimination, supporting its potential utility for early risk stratification in hospitalized dengue patients.

Keywords: Expanded dengue syndrome, Risk prediction model, Dengue severity

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