
Abstract:

Objectives: The difficult intravenous access (DIVA) score, a proportionally weighted four-variable (vein palpability, vein visibility, patient age, and history of prematurity) clinical rule, has been developed to predict failure of intravenous (IV) placement in children. This study sought to externally validate and refine the DIVA score.

Methods: Patients undergoing peripheral IV placement by pediatric emergency department (ED) nurses were enrolled. The outcome of interest was defined as failure of cannulation on first attempt. Proposed refinement predictor variables include history of newborn intensive care unit (NICU) stay, operator experience characteristics (years since graduation, years of pediatric nursing experience, and IVs started per month), and skin shade. Adjusted multivariate models were constructed using logistic regression. Receiver operating characteristic (ROC) curves were constructed and areas under the curve (AUC) calculated for each model.

Results: A total of 366 subjects were enrolled (mean age = 5.4 years, SD ± 5.6 years) and of them, 118 (32.2%) subjects failed the first IV attempt. The original four-variable model tested in this data set resulted in an AUC of 0.72 (95% confidence interval = 0.67 to 0.78). Patients with a DIVA score of 4 or greater had more than 50% likelihood of failed first IV attempt. A three-variable rule (vein palpability, vein visibility, and patient age) was evaluated and found to possess similar discriminating ability (AUC = 0.72, 95% CI = 0.67 to 0.78).

Conclusions: This study validated the previously derived four-variable DIVA score. A simpler three-variable rule was as predictive of failed IV placement on first attempt as the four-variable rule. Validation in nonpediatric EDs is needed to thoroughly evaluate generalizability.