Spontaneous intracerebral hemorrhage (ICH), the second most common cause of stroke, has a high rate of morbidity and mortality. One of the independent predictors of poor outcome in ICH patients is hematoma expansion, which occurs in 16-38% of patients.

Hematoma expansion is defined as a 30% or a 6-mL increase in blood volume as evidenced in imaging. Wang et al developed a simple algorithm, BRAIN, which is a 24-point score based on Baseline ICH volume, Recurrent ICH, Anticoagulation with warfarin at symptom onset, Intraventricular extension, and Number of hours to baseline computed tomography from symptom onset, which predicts in percentage the probability of hematoma expansion in ICH patients within the next 24 hours (Table 1).

This study aims to externally validate BRAIN scoring in prediction of hematoma expansion in ICH patients.

This was a prospective, external validation study consisting of 100 intracerebral hemorrhage patients in Jose R. Reyes Memorial Medical Center from August 2016 to March 2017.

Subjects underwent initial cranial CT scan and BRAIN score was determined. Repeat neuroimaging was done after 24 hours. The volume of hemorrhage on the initial and repeat CT scan were computed using the Modified Kothari method (Figure 1). The validity of BRAIN score was measured by area under the curve of the receiver operating characteristic.

Results showed that the BRAIN score was discriminative in predicting hematoma expansion in ICH patients (area under the curve, 0.8722) (Figure 2), and calibration (Hosmer–Lemeshow P=0.80) with a sensitivity of 88.64% and specificity of 60.71%. Positive predictive value was 63.93% and negative predictive value was 87.18.

The strongest factors for ICH growth were large baseline ICH volume (>20 mL, 7 points) and short time from onset to first CT (<3 hours = 3 to 5 points), which alone had an expected hematoma growth of ≥8% but when combined, however, this outcome occurred in over 40% of patients. Wang et al also identified these 2 factors, along with prior anticoagulation use, as the significant variables in the risk of hematoma expansion in ICH patients.

The BRAIN score is simple and reliable in predicting hematoma expansion in ICH patients. This scoring could be helpful in risk stratification and prognosis of intracerebral hemorrhage patients and for future researches.