SUPPLEMENTAL MATERIAL

Natural language processing enhances prediction of functional outcome after acute ischemic stroke

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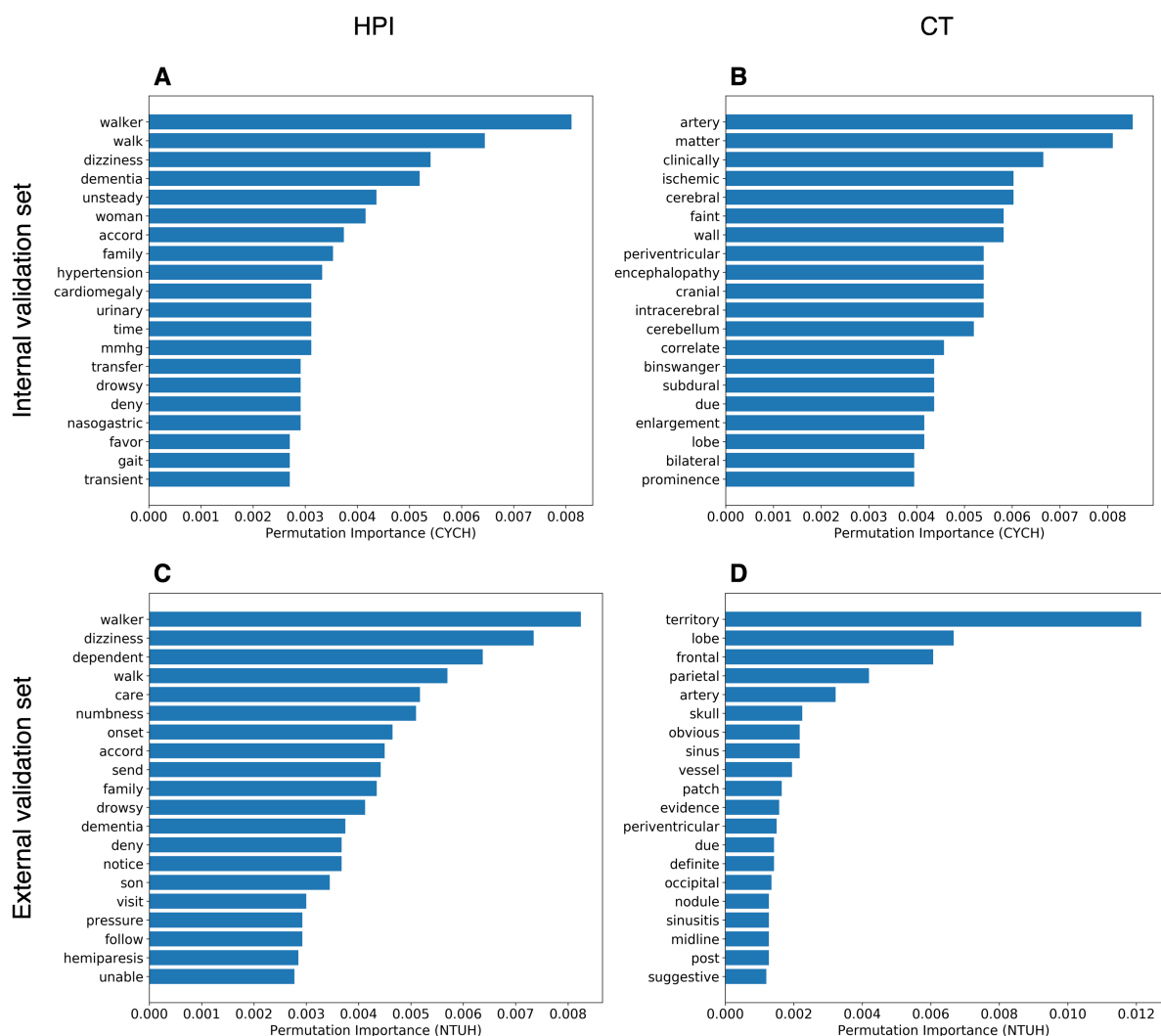# Supplemental Figures and Figure Legends

Figure S1. Top 20 most influential words for model HPI (A) and model CT (B) in the internal validation set and those for model HPI (C) and model CT (D) in the external validation set using the permutation-based feature importance. CT, computed tomography; CYCH, Chia-Yi Christian Hospital; HPI, history of present illness; NTUH, National Taiwan University Hospital.

A Internal validation set

B External validation set

Internal validation set legend:
- NIHSS, AUC: 0.815
- Age and NIHSS, AUC:0.842
- PLAN score, AUC: 0.837
- ASTRAL score, AUC: 0.847
- Model HPI+CT, AUC: 0.818
- Model HPI, AUC: 0.818
- Model CT, AUC: 0.674

External validation set legend:
- NIHSS, AUC: 0.811
- Age and NIHSS, AUC:0.840
- PLAN score, AUC: 0.835
- ASTRAL score, AUC: 0.840
- Model HPI+CT, AUC: 0.778
- Model HPI, AUC: 0.772
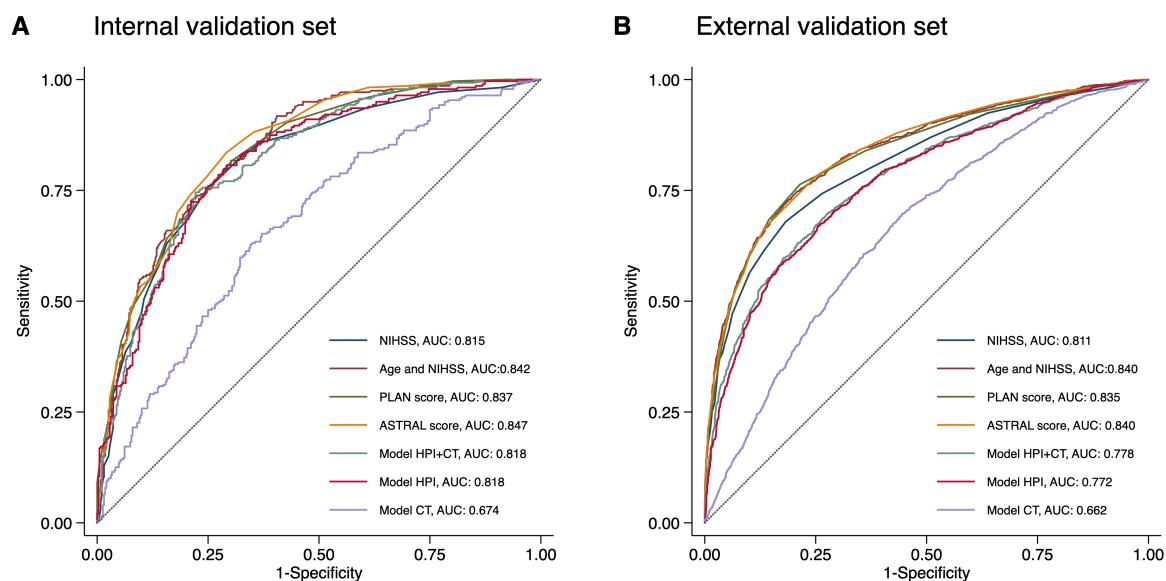- Model CT, AUC: 0.662

Figure S2. Receiver operating characteristic curves for predicting a poor functional outcome in the internal (A) and external (B) validation sets. NTUH cohort was used for derivation and internal validation whereas CYCH cohort was used for external validation. ASTRAL indicates Acute Stroke Registry and Analysis of Lausanne; AUC, area under the receiver operating characteristic curve; CT, computed tomography; CYCH, Chia-Yi Christian Hospital; HPI, history of present illness; NIHSS, National Institutes of Health Stroke Scale; NTUH, National Taiwan University Hospital; PLAN, preadmission comorbidities, level of consciousness, age, and neurological deficit.
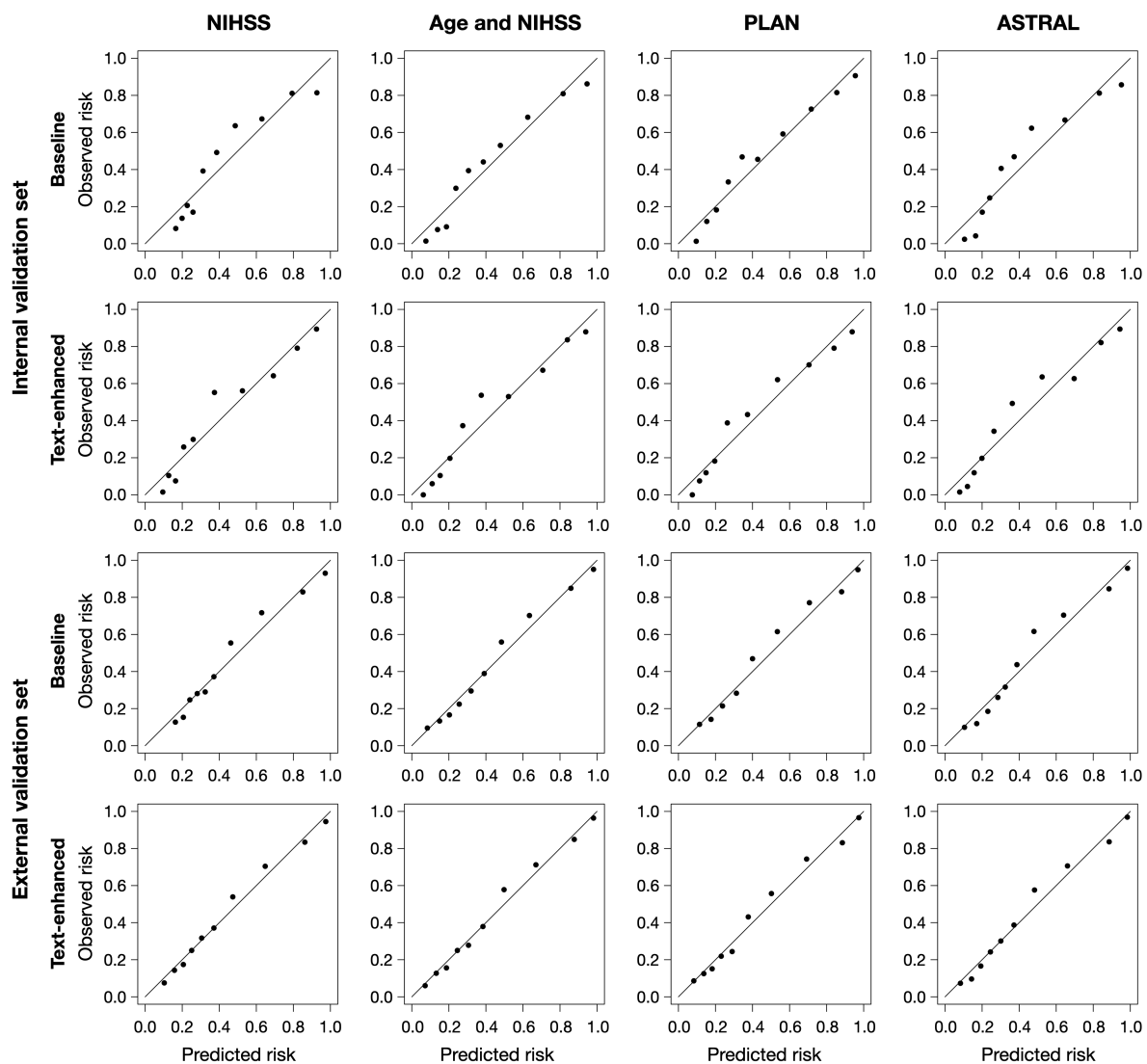
Figure S3. Calibration plots of the baseline and text-enhanced models. NTUH cohort was used for derivation and internal validation whereas CYCH cohort was used for external validation. ASTRAL indicates Acute Stroke Registry and Analysis of Lausanne; CYCH, Chia-Yi Christian Hospital; NIHSS, National Institutes of Health Stroke Scale; NTUH, National Taiwan University Hospital; PLAN, preadmission comorbidities, level of consciousness, age, and neurological deficit.

Supplemental Table

Table S1. Comparison of the predictive ability of baseline models with or without adding information from clinical text. NTUH cohort was used for derivation and internal validation whereas CYCH cohort was used for external validation

	Baseline AUC (95% CI)	Text-enhanced AUC (95% CI)	*P*	NRI (95% CI)	*P*	IDI (95% CI)	*P*
Internal validation							
NIHSS	0.815 (0.782–0.848)	0.847 (0.817–0.876)	0.004	0.594 (0.447–0.741)	<0.001	0.072 (0.052–0.093)	<0.001
Age and NIHSS	0.842 (0.813–0.871)	0.860 (0.832–0.887)	0.016	0.660 (0.517–0.804)	<0.001	0.045 (0.028–0.061)	<0.001
PLAN score	0.837 (0.807–0.866)	0.858 (0.831–0.886)	0.002	0.585 (0.439–0.730)	<0.001	0.046 (0.030–0.063)	<0.001
ASTRAL score	0.847 (0.818–0.875)	0.861 (0.833–0.888)	0.049	0.548 (0.401–0.694)	<0.001	0.043 (0.027–0.060)	<0.001
External validation							
NIHSS	0.811 (0.797–0.825)	0.834 (0.821–0.847)	<0.001	0.414 (0.352–0.477)	<0.001	0.045 (0.039–0.052)	<0.001
Age and NIHSS	0.840 (0.837–0.852)	0.850 (0.837–0.862)	<0.001	0.296 (0.233–0.359)	<0.001	0.024 (0.019–0.029)	<0.001
PLAN score	0.835 (0.822–0.848)	0.851 (0.838–0.863)	<0.001	0.394 (0.331–0.456)	<0.001	0.029 (0.023–0.034)	<0.001
ASTRAL score	0.840 (0.827–0.853)	0.850 (0.838–0.863)	<0.001	0.295 (0.232–0.358)	<0.001	0.027 (0.021–0.032)	<0.001

ASTRAL indicates Acute Stroke Registry and Analysis of Lausanne; AUC, area under the receiver operating characteristic curve; CI, confidence interval; CYCH, Chia-Yi Christian Hospital; IDI, integrated discrimination improvement; NIHSS, National Institutes of Health Stroke Scale; NRI, net reclassification improvement; NTUH, National Taiwan University Hospital; PLAN, preadmission comorbidities, level of consciousness, age, and neurological deficit.