# Prognostic Factors for Acute Ischemic Stroke Patients with and without Neurosurgical Endovascular Intervention

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## Introduction

Baseline NIHSS score and time window (duration since ictus) are meaningful prognostic factors for acute ischemic stroke (AIS) patients treated with IV-tPA, but their value for patients treated with neurosurgical endovascular interventions is less well defined.

## Methods

IRB-approved retrospective review of prospectively-collected data for all patients that presented to a single comprehensive Stroke Center (SC) from January 1 to December 31, 2011, with AIS. Intervention was defined as successful/attempted endovascular neuro-thrombolysis/thrombectomy with intraarterial pharmacological and/or mechanical agents performed at SC. Patient parameters included NIHSS at presentation to SC (PreNIHSS), and duration from symptom onset until CT/CTA/CTP scanning (TimetoCT) and intervention (TimetoTX). Clinical outcome parameters included NIHSS at hospital discharge (DcNIHSS), duration of in-hospital stay from presentation to SC until discharge (LOS), modified Rankin Scale score at >=90 days (mRS), and PreNIHSS minus DcNIHSS (DeltaNIHSS).

## Methods (Continued)

We used multivariate regression and Spearman's correlation to analyze factors affecting clinical outcome, and recursive partitioning to identify an algorithm predictive of large DeltaNIHSS for patients with intervention.

## Results

There were 344 patients with AIS and 64 (19%) had intervention. PreNIHSS was associated with clinical outcome for patients with and without intervention (Table 1, Figure 1). TimetoCT was not associated with clinical outcome for patients with and without intervention (Table 1), and TimetoTX was not associated with clinical outcome for patients with intervention (Table 2). For patients that had intervention, PreNIHSS > 12.5 and TimetoCT < 4.5 hours or between 5.5 and 7.5 hours predicted approximately 10 point DeltaNIHSS (Figure 2). Recursive partitioning-predicted DeltaNIHSS correlated with actual DeltaNIHSS (Spearman's rho=0.62, p<0.001).

### Table 1

| Parameter | p-Values | | | |
|---|---|---|---|---|
| | DC-NIHSS | LOS | 90-day mRS | ΔNIHSS |
| Pre-NIHSS | 0.0000045 (SS) | 0.037 (SS) | 0.00012 (SS) | 0.075 |
| Time-to-CT | 0.7 | 0.64 | 0.42 | 0.7 |

SS=Statistical Significance
Note: Multivariate regression analysis. Statistical significance achieved at p=0.05.

### Table 2

| Parameter | Spearman's rho (p-Values) | | | |
|---|---|---|---|---|
| | DC-NIHSS | LOS | 90-day mRS | ΔNIHSS |
| Time-to-TX | 0.16 (0.36) | 0.09 (0.58) | 0.04 (0.83) | -0.12 (0.5) |

Note: Spearman's correlation analysis. Statistical significance achieved at p=0.05.

### Figure 2
### ΔNIHSS Recursive Partitioning Analysis Tree

Patient with Intervention

Pre-NIHSS   < 12.5 points <   Pre-NIHSS

-0.4 points

Time-to-CT   =< 4.5 hours <   Time-to-CT

9.9 points

Time-to-CT   < 5.5 hours <   Time-to-CT

-2.8 points

Time-to-CT   < 7.5 hours =<   Time-to-CT

10.7 points          2.1 points

### Figure 1

PreNIHSS vs DcNIHSS
y = 0.4809x + 0.8754
R² = 0.40251

PreNIHSS vs LOS (days)
y = 0.3944x + 4.886
R² = 0.08912

PreNIHSS vs 90-day mRS (0-6)
y = 0.1064x + 2.0206
R² = 0.13545

Note: Positive slopes show directionality of association between PreNIHSS and clinical outcome indicators. No DcNIHSS values for patients with in-hospital mortality (n=13).
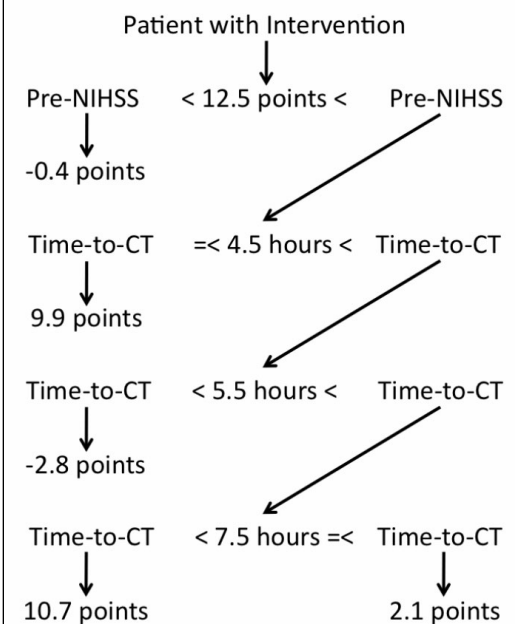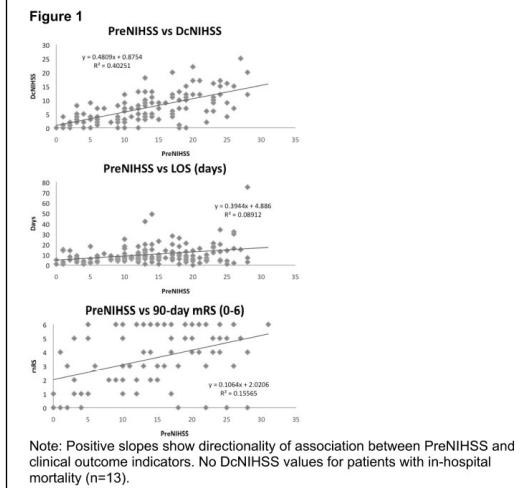
## Conclusions

Lower baseline NIHSS scores predict better clinical outcomes in AIS patients with and without neuroendovascular intervention. Time window is not an independent predictor of clinical outcome. In patients with high baseline NIHSS scores, the therapeutic time window for neuroendovascular intervention may be quite broad.