

# Hemorrhagic Stroke

***Only time will tell:  
Predicting outcomes***

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# Disclosures

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# Introduction

- Neurologist's predictions of outcome after spontaneous intracerebral hemorrhage (ICH) affects treatment decisions that make the difference between life and death.
- We assessed the accuracy of neurointensivists' prediction of 3-month functional outcome to patients' actual outcome in a prospective patient cohort.
- Neurointensivists' predictions were compared with outcome predictions using the ICH score

# Methods

- Consecutive ICH patients were prospectively enrolled shortly after hospital admission.
- Inclusion criteria:
  - Men and non-pregnant women = 18 years old
  - Spontaneous ICH or intraventricular hemorrhage (IVH) causing symptoms = 48 hours prior to hospital presentation
  - Ability to undergo MRI
- Exclusion criteria:
  - Known pre-existing source of ICH
  - Pt receiving investigational drug therapies or procedures prior to MRI scanning
  - Glasgow coma scale (GCS) score <6 in absence of sedating medications
  - Informed consent cannot be obtained from patient or legally authorized representative
  - Severe coexisting or terminal systemic disease that limits life expectancy or may interfere with the conduct of the study.

# Methods

- On study enrolment, the treating neurointensivist predicted the 3-month modified Rankin scale score (mRS), typically within 2 days of hospital admission.
- None of the neurointensivists used the ICH score routinely to help predict outcome.
- Outcome was determined by means of clinic visits or by standardized telephone interviews and dichotomized to good (mRS 0-3) and poor (mRS 4-6).
- Neurointensivists' prediction of functional outcome at 3 months was compared to the prediction by the ICH score.

# Results

- Of 116 prospectively enrolled patients 101 were included: 2 withdrew consent and 13 were lost to follow-up.
- Sixteen (16%) of patients had died by 3 months.
- When removing patients who were taken off life support (n=12), 4 patients died by 3 months. All 4 had ICH scores =2, but were predicted to have a mRS>3 at 3 months by the neurointensivists.

*Unpublished data*

# Baseline Variables

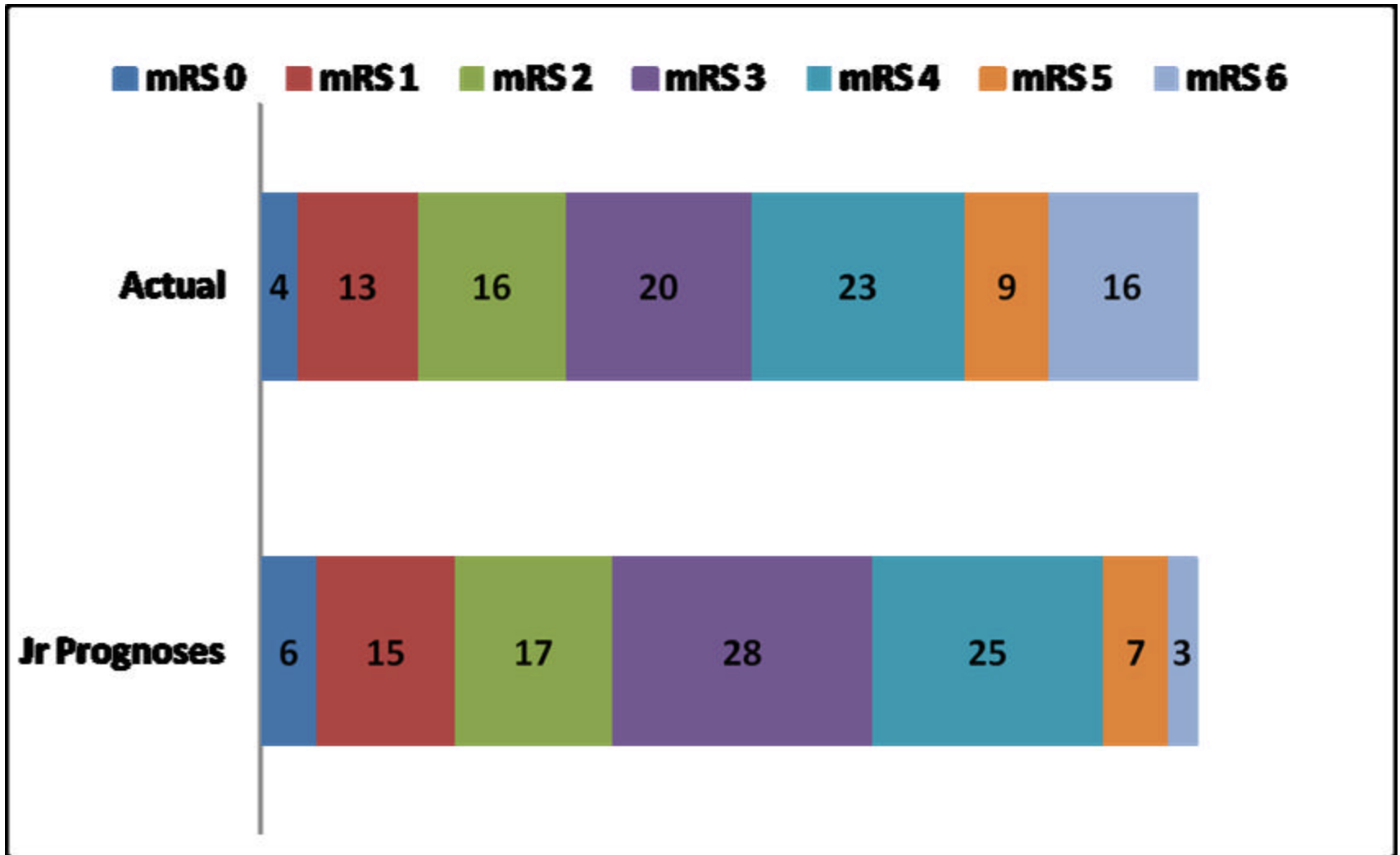
<b><i>Baseline patient characteristics, N = 101</i></b>	<b><i>Value</i></b>
<b>Age, mean <math>\pm</math> SD in years</b>	<b>62 <math>\pm</math> 18</b>
<b>Male gender, n (%)</b>	<b>54/101 (53%)</b>
<b>Hematoma volume, mean <math>\pm</math> SD, median (IQR) in mL</b>	<b>26 <math>\pm</math> 27, 16 (6-38)</b>
<b>Hemorrhage location, n (%)</b>	
Lobar	49 (49)
Deep	35 (35)
Both	4 (4)
Infratentorial	10 (10)
Isolated intraventricular hemorrhage	3 (3)
<b>Intraventricular involvement, n (%)</b>	<b>44 (44)</b>
<b>Admission GCS, mean <math>\pm</math> SD</b>	<b>12 <math>\pm</math> 3</b>
<b>Admission NIHSS, mean <math>\pm</math> SD</b>	<b>10 <math>\pm</math> 8</b>
<b>Mortality, n (%)</b>	<b>16 (16)</b>
<b>Patients taken off life support, n (%)</b>	<b>12 (12)</b>

# Physician variables

<b><i>Baseline Physician Characteristics</i></b>	<b><i>n = 11</i></b>
<b>No. years in practice*</b> , mean $\pm$ SD * Since completion of fellowship	<b>2<math>\pm</math>2.5</b>
<b>Gender, no. males, (%)</b>	<b>5 (45%)</b>
<b>Ethnicity, No. Caucasian(%)</b>	<b>8 (73%)</b>

*Unpublished data*

# Neurointensivists' Predictions Compared to Actual 3-month Outcomes



*Unpublished data*

# Accuracy of Predictions by Neurointensivists vs. the ICH score

Accuracy of Predictions	Neuro-intensivists (95% CI)	ICH Score > 2	P-Value
Overall Accuracy	79% (70-86%)	58% (49-68%)	P=.001
PV for Good Outcome (mRS 0-3)	74% (62-84%)	57% (45-67%)	P=0.03
PV for Poor Outcome (mRS 4-6)	89% (74-97%)	67% (41-86%)	P=0.07
PV for Poor Outcome after excluding pts withdrawn from life support	85% (64-95%)	57% (30-81%)	P=0.12
Sensitivity for poor outcome	67% (52-79%)	25% (14-40%)	P<.001
Specificity for poor outcome	92% (81-98%)	89% (76-95%)	non-significant

PV= Predictive Value

*Unpublished data*

# Discussion

- ICH score was not originally developed to predict functional outcome.
- Patients with GCS <6 were excluded.
- Small study at single tertiary care center.
- Different grouping of outcome predictions may have resulted in different accuracy of prognostic results.

# Conclusions

- Neurointensivists at our institution predict ICH outcome overall with 79% accuracy.
- Predictions for poor outcome are more accurate than predictions for good outcome.
- The neurointensivists outcome predictions for the individual patient are more accurate than the ICH score outcome predictions.



Thank you