

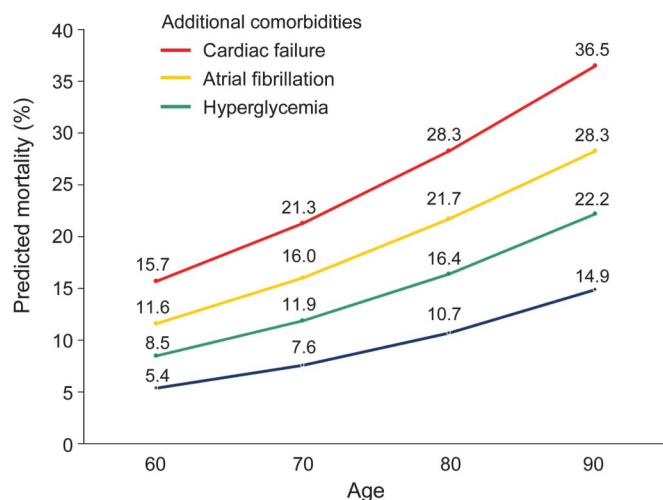
**Editors' Note:** In reference to "An integer-based score to predict functional outcome in acute ischemic stroke: The ASTRAL score," Dr. Saposnik describes an alternative risk score, the iScore, designed to predict functional outcome after an ischemic stroke using clinical parameters and comorbidities. Authors Ntaios and Michel respond and discuss the development of a subacute ASTRAL score to be measured at 24 hours. Regarding "Inpatient statin use predicts improved ischemic stroke discharge disposition," Drs. Kano et al. ask about differences in lesion location and in patient age.

Megan Alcauskas, MD, and Robert C. Griggs, MD

### AN INTEGER-BASED SCORE TO PREDICT FUNCTIONAL OUTCOME IN ACUTE ISCHEMIC STROKE: THE ASTRAL SCORE

**Gustavo Saposnik, Toronto, on behalf of the iScore Research Team:** Ntaios et al.<sup>1</sup> reported on the ASTRAL score to predict functional outcomes after ischemic stroke. They claim the score includes variables easily collected soon after hospitalization. Issues arise when analyzing the sensitivity and positive and negative predictive values in the derivation cohort.<sup>1</sup> There are currently several scores available to predict functional outcomes after an ischemic stroke.<sup>2,3</sup>

**Figure** Differential increment in 30-day mortality by the presence of other relevant comorbid conditions for a given patient



Comparison of estimated 30-day mortality by adding relevant comorbid conditions for a given male patient with a moderate nonlacunar stroke. Note that 30-day mortality tripled with the addition of hyperglycemia, atrial fibrillation, and cardiac failure in the same age group.

The authors missed mentioning a more relevant and comprehensive risk score created to estimate clinical outcomes early after admission, the iScore ([www.sorcan.ca/iscore](http://www.sorcan.ca/iscore)). The iScore is a validated risk score that predicts mortality at 30 days and 1 year, death and disability at discharge, and death or institutionalization at discharge.<sup>4,5</sup>

Furthermore, we showed that the iScore helps estimate the risk of intracranial hemorrhage and clinical response after thrombolysis. The iScore comprises clinical parameters and comorbid conditions easily obtained early after hospitalization. More importantly, our group showed that the addition of these relevant comorbid conditions steeply increases the risk of a poor outcome (figure).

Most complex risk scores have good discrimination and calibration.<sup>1,2,5</sup> However, the challenge for clinicians (and readers) is to overcome the common barriers for its daily application in an emergency setting (e.g., by using Web tools, smartphone applications).<sup>5</sup>

Predicting outcomes in medicine is difficult. More challenging is the prediction of functional outcomes after stroke considering the complex interaction between stroke-related factors (e.g., stroke severity and subtype) and relevant coexisting comorbidities (e.g., congestive heart failure, atrial fibrillation, and renal failure).

Several risk scores already exist,<sup>1-4</sup> and more will likely become available. They can be used to stratify patients in clinical trials or when counseling patients and their families. Nevertheless, these risk scores should be seen as a practical instrument to facilitate information and not to substitute clinical judgment.

**Author Response: George Ntaios, Larissa, Greece; Patrik Michel, Lausanne, Switzerland:** We thank Dr. Saposnik and the iScore Research Team for their comments and their interest in our work.<sup>1</sup> As they mention, the iScore is another risk score which was initially introduced for the prediction of death in acute ischemic stroke patients,<sup>4</sup> and later was shown to predict also functional outcome.<sup>5</sup> The latter article was published almost concurrently with the submission of our work to *Neurology*<sup>®</sup>, and regretfully we did not discuss it.

We agree with Saposnik et al. that comorbidities are likely an important prognostic factor. When designing the ASTRAL score, we decided to concentrate on

information immediately available on emergency room arrival only, and clinicians may not know comorbidities at this stage.

However, our plan is to now develop the subacute ASTRAL prognostic score, measured at 24 hours, where comorbidities, acute recanalization treatment, effective recanalization, stroke mechanism, and the clinical course can be added and may enhance the score's predictive power. Also, it would be interesting to see whether the combination of the ASTRAL score and the iScore would result in a better prediction than each score alone.

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## INPATIENT STATIN USE PREDICTS IMPROVED ISCHEMIC STROKE DISCHARGE DISPOSITION

Osamu Kano, Konosuke Iwamoto, Ken Ikeda, Yasuo Iwasaki, Tokyo: Flint et al.<sup>1</sup>

discussed statin use and activities of daily living after stroke. Prior to stroke hospitalization, statin users were more likely to be discharged and less likely to die in the hospital. The authors also noted that the association between statin use and functional outcome is particularly notable for small-vessel stroke. We have 2 questions.

First, statin users had good outcome compared to nonstatin users in stroke patients. Was there any difference between supratentorial and infratentorial lesions on functional status? Some patients with stroke had no disability, so it is important to know whether there were any differences for stroke lesions.

Second, younger patients recover more quickly from stroke. Statins have pleiotropic action in addition to lipid-lowering action, and these actions may contribute to recovery in stroke patients. A higher level of cholesterol may be neuroprotective, so we would like to know the cholesterol level in these patients.

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1. Flint AC, Kamel H, Navi BB, et al. Inpatient statin use predicts improved ischemic stroke discharge disposition. *Neurology* 2012;78:1678–1683.

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## An integer-based score to predict functional outcome in acute ischemic stroke: The ASTRAL score

Gustavo Saposnik, George Ntaios, on behalf of the iScore Research Team, et al.

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