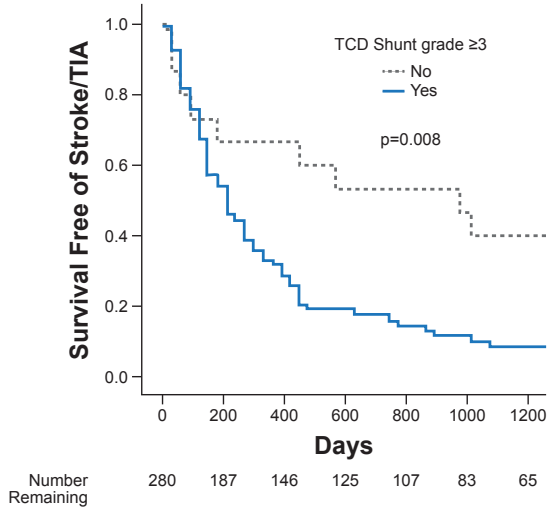
All patients were confirmed to have had a cryptogenic stroke or were suspected of having a paradoxical embolism and were referred to the Urgent Transient Ischemic Attack (TIA) Clinic between the years of 2000 to 2013. Median follow-up was 420 days. At that time, the researchers discovered that 85 patients had a recurrent ischemic stroke or TIA. Occurrence of recurrent stroke or TIA was predicted by TCD shunt of Grade 3 or more (p=0.008; Figure 1), but not by TEE (p=0.6; Figure 2) [Spencer MP et al. *J Neuroimaging* 2004].

Figure 1. Survival Free of Stroke/TIA by TCD Shunt Grade



TCD=transcranial Doppler; TIA=transient ischemic attack.

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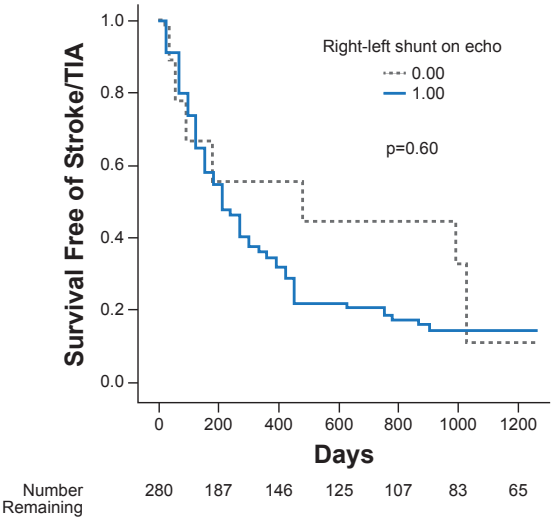
Figure 2. Survival Free of Stroke/TIA by Right-Left Shunt on TEE



TEE=transesophageal echocardiography; TIA=transient ischemic attack.

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In conclusion, because it was more sensitive for the diagnosis of PFO, TCD ultrasound was determined to be the better choice compared with TEE. The study additionally revealed that although TCD is superior to TEE for the ultimate detection of PFO.

Rapid Reperfusion Therapy in Acute Ischemic Stroke Reduces Complications and Improves Outcomes

Written by **Masha Dowell**

The American Heart Association (AHA)/American Stroke Association (ASA) guidelines recommend a door-to-needle (DTN) time of ≤60 minutes for reperfusion therapy for acute ischemic stroke patients [Jauch EC et al. *Stroke* 2013]. The rapid treatment is important for improving stroke outcome, but many studies have concluded that this time frame has been met by <30% of intravenous tissue plasminogen activator (t-PA)-treated stroke patients.

Gregg C. Fonarow, MD, University of California Los Angeles, Los Angeles, California, USA, presented the principal results from the Target: Stroke Initiative, a national program organized by the AHA/ASA, which addresses this timing dilemma by increasing the proportion of stroke patients with DTN time frames of <60 minutes. The primary goal of the study was to treat at least 50% of acute ischemic stroke patients at Get With The Guidelines (GWTG)-Stroke participating hospitals and see that they were treated within 60 minutes of their arrival to the hospital [Fonarow GC et al. *Stroke* 2011]. In performing this assessment, 10 key evidence-based strategies were utilized to meet the goal (Table 1).

Table 1. Evidence-Based Strategies to Reduce DTN Time

1. Hospital prenotification by Emergency Medical Services
2. Rapid triage protocol and stroke team notification
3. Single call/paging activation system for entire stroke team
4. Use of a stroke tool kit containing clinical decision support, stroke-specific order sets, guidelines, hospital-specific algorithms, critical pathways, NIHSS, and other stroke tools
5. Rapid acquisition and interpretation of brain imaging
6. Rapid laboratory testing (including point-of-care testing) if indicated
7. Premixing t-PA medication ahead of time for high likelihood candidates
8. Rapid access to intravenous t-PA in the ED/brain imaging area
9. Team-based approach
10. Rapid data feedback to stroke team on each patient's DTN time and other performance data.

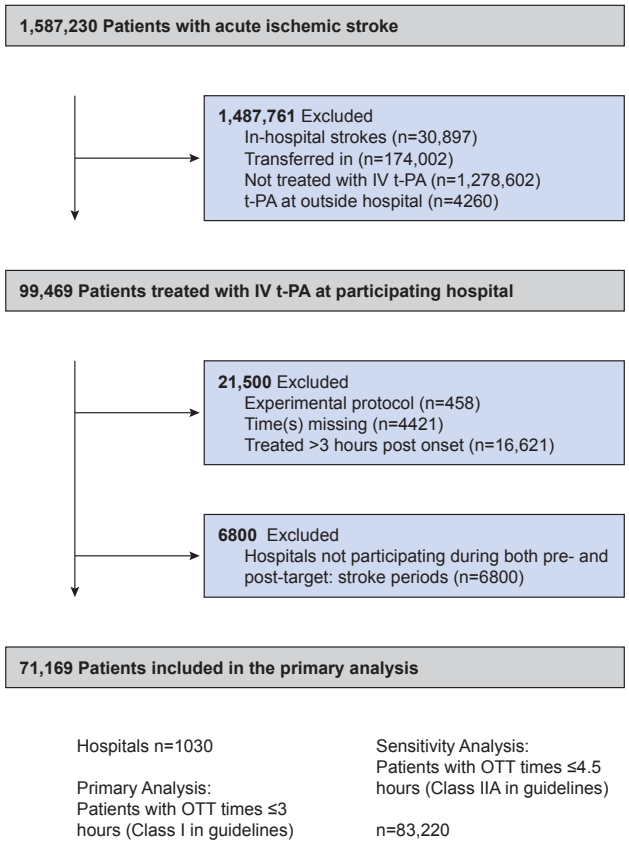
DTN=door-to-needle; ED=emergency department; t-PA= tissue plasminogen activator.

This study included various ongoing adjustments as they related to assessing the variables of patients and characteristics. Assessments were made of in-hospital mortality, discharge destination, ambulatory status, and symptomatic intracranial hemorrhage ≤36 hours following t-PA administration. Patient

profiles included a balance of men and women, median age 72 years, who were of white, Hispanic, and black origins. Of the stroke patients treated with t-PA (n=71,169) 27,319 were pre-intervention and 43,850 were postintervention patients from 1030 GWTG-Stroke participating hospitals (Figure 1).

Prior to the study's initiation in 2009, 15.6% of hospitals had DTN rates of ≤60 minutes in ≥50% of t-PA-treated stroke patients. Median time was 74 minutes in Quarter 4 of 2009, immediately prior to the start of the Target: Stroke initiative. The study's DTN goal was subsequently met by 46.7% of the participating hospitals by 2013 (p<0.0001) and by 53.3% of patients by Quarter 3, 2013 (p<0.0001). The program's goal of DTN times of ≤60 minutes was achieved within 4 years as opposed to the originally projected 15 years.

Figure 1. Selection of Study Population for Target: Stroke



IV=intravenous; OTT=onset to treatment; t-PA= tissue plasminogen activator.

With a target of achieving a more rapid administration of t-PA, there were initial concerns centered on the shorter DTN times as related to rushed overall assessments for acute ischemic stroke patients. The Target: Stroke Initiative research revealed that rapid reperfusion therapy in acute ischemic stroke can be done with process reductions and improved outcomes.

Blood Pressure Variability After ICH Predicts Poor Outcomes

Written by **Mary Mosley**

The Second Intensive Blood Pressure Reduction in Acute Cerebral Hemorrhage Trial [INTERACT2; Anderson CS et al. *N Engl J Med* 2013] showed that early, target-driven (<140 mm Hg) lowering of systolic blood pressure (SBP) was safe and improved functional outcomes compared with guideline-directed BP management (SBP, <180 mm Hg). A post hoc analysis has now shown that within individual variability in SBP during the first 24 hours and days 2 to 7 following acute intracerebral hemorrhage (ICH) predicts outcome, with a linear relationship between the degree of systolic BP variability (BPV) and risk of death or major disability at 90 days (defined as an mRS score of 3 to 6) [Manning L et al. *Lancet Neurol* 2014].

During the hyperacute (first 24 hours) and acute (Days 2 to 7) phases, a higher level of maximum SBP also predicted a poor outcome. These BP findings were independent of mean SBP, said Lisa Manning, MD, University of Leicester, Leicester, United Kingdom, who presented the results.

INTERACT2 was an international, multicenter (21 countries, 144 hospitals), randomized, controlled trial of 2839 patients with spontaneous ICH and an SBP ≥150 mm Hg. BP was measured five times on Day 1, and twice daily on Days 2 to 7. In this analysis 2645 patients were included in Study 1, concerned with the effect of BPV during Day 1 on outcome, and 2347 in Study 2, concerned with BPV during Days 2 to 7. Mean age was 64 years, 63% were men, and 69% to 73% were from the Chinese region.

The key BPV index was the standard deviation of SBP (SD-SBP) derived using all available BP measurements in the two study periods. Three logistic regression models were used to determine the association between BPV and outcomes. Model 1 adjusted for age, sex, and randomized treatment. Model 2 adjusted for these, plus region, high NIHSS, and hematoma volume, and Model 3 further adjusted for mean SBP.

The primary outcome was death or major disability at 90 days. To determine the strength of associations, patients were divided into quintiles of SD-SBP, and the lowest quintile was the reference point. In the hyperacute phase in Model 1, there was a linear association between systolic BPV and risk of the primary outcome (p<0.001). In Model 3, the odds ratio (OR) was 1.41 for the highest quintile of BPV (95% CI, 1.05 to 1.90; p=0.017). In the acute phase, the association between systolic BPV and the primary outcome persisted, although it was slightly