Putting It All Together for Best Stroke Practice, All the Time

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See related article, p 1387.

Each year nearly 800,000 people in the United States have a clinically evident stroke. Despite the availability of an effective and time-dependent treatment, intravenous recombinant tissue-type plasminogen activator (r-tPA), in 2011, only 33.8%\(^1\) of eligible ischemic stroke patients received treatment within 60 minutes from time of hospital arrival, as recommended by current acute stroke guidelines.\(^2\) This suboptimal expediency of treatment, nearly constant for a decade, represents lost opportunity for optimal neurological outcome and reduced mortality. The pooled analyses of the Alteplase Thrombolysis for Acute Noninterventional Therapy in Ischemic Stroke (ATLANTIS), European Cooperative Acute Stroke Study (ECASS), and National Institute of Neurological Disorders and Stroke r-tPA Stroke Study (NINDS) r-tPA trials by Hacke et al\(^3\) in 2004 showed a strong association between early treatment and improved outcomes in patients with ischemic stroke treated with r-tPA. A recent analysis of the Get With The Guidelines Stroke registry by Saver et al\(^4\) confirmed that earlier treatment yields better patient outcomes.

The American Heart Association/American Stroke Association Target Stroke initiative was created to provide a framework through which hospitals could reduce their door-to-needle (DTN) times. In the development of the Target Stroke program, best practice strategies were identified by a multidisciplinary work group after reviewing published literature and expert consensus. Strategies proven successful in reducing time to treatment of ST-segment–elevation myocardial infarction were identified as best practice strategies that could be easily and effectively adopted by acute care hospitals in the treatment of stroke. Eleven such strategies were promoted, including prehospital notification; the use of single-call stroke team activation; rapid triage, imaging, and laboratory testing; and the direct prehospital transport to the computed tomographic scanner, among others.\(^5\)

In this issue, Xian et al\(^6\) provide an insightful analysis of the adoption and relative efficacy of these Target Stroke strategies. Baseline data about the use of these best practice strategies were obtained via a survey of 350 hospitals entering the Target Stroke program and later compared with post-implementation data. Hospitals were asked to rate their use of the best practice strategies on a scale of none of the time, some of the time, or all of the time. The frequency of use for each strategy was analyzed against the hospital reported DTN time to determine the impact of each strategy. Hospitals that always used a rapid triage protocol, single-call activation system, the presence of trainees, and those that stored r-tPA in the Emergency Department were those likely to have the shortest treatment times. The strategies with the greatest impact were also ones most infrequently used. The effects of implementation of these strategies were cumulative; hospitals using more of the strategies had shorter times to treatment, with each strategy saving \(\approx 1.3\) minutes off a hospital’s DTN time, for a total of 14 minutes if all strategies were used.

Although one of the central goals of the Target Stroke campaign was to identify strategies that could be universally adoptable, herein lies the study’s major criticism, one of selection bias. Hospitals surveyed were not representative of the overall hospital population; instead, they were more likely to be academic centers with larger patient volumes, greater procedural experience with r-tPA administration, and shorter DTN times—in short, they were not the limited-resource community hospitals most likely to benefit from the systemic overhaul that Target Stroke represented. There is, thus, a question of generalizability of these findings to hospitals dissimilar to those represented in the survey, such as rural life-line hospitals with lower patient volumes. In a 2012 study of implementation of similar concurrent strategies in a Helsinki, Finland, hospital system where DTN times were reduced to 20 minutes, Meretoja et al\(^7\) faced similar criticism of generalizability, though the follow-up study of implementation of the Helsinki model in a Melbourne, Australia, hospital provided proof of concept that such systemic improvements could be transferable.\(^8\)

The hospitals surveyed were a self-selected population enrolling in a quality improvement program. As such, they are hospitals already interested in actively improving the system of stroke care at their facility. However, it is important to note that this selection bias is not a factor that reduces the study’s validity. Any intervention, medical or systematic, is likely to yield the greatest benefit in those willing to adhere to a prescription for improvement. Furthermore, the rise of regionalization of stroke care and mandated shunting of stroke patients to primary stroke centers legislated in multiple states suggest that the hospitals surveyed will be the ones most likely to receive stroke patients.\(^9\) Indeed, the idea that patient volume and quality of care are interrelated has been validated in a study by Bray et al,\(^10\) which showed that stroke centers that have experienced higher patient volumes often achieve faster DTN treatment times.

Despite its emphasis on producing an optimal process for rapid treatment at all hospitals, the current study also speaks to the need to individualize the approach to achieving rapid treatment on a case-by-case, hospital-by-hospital basis. By
using multivariate analyses to account for differences in demographic and clinical features on a case-by-case basis, this study added additional value by identifying the highest yield targets for further study and development of strategies personalized to the needs of individual patients and the general patient base representative of a given hospital’s demographic and clinical cohort. Of concern, 10% of hospitals did not administer r-tPA during the entire study, and 1 hospital (volume unknown) reported no ischemic events during the study. Because stroke is a high-frequency condition, this suggests that even in hospitals eager to engage in quality improvement activities, acute strokes are being missed. Additional study is necessary to determine whether this is the case.

A key strategy in the Target Stroke Initiative is the use of a team-based approach, yet the authors succumb to the thought process that events in the chain of survival that happen outside the hospital are out of the hospital’s control. By stating that prehospital notification is a prehospital or emergency medical services factor rather than a hospital factor, the role of the hospital in promoting a culture of rapid effective care is unnecessarily limited. If we are to make inroads into the problem of patients not recognizing the time importance of stroke, all those who come in contact with the patient must be on message, embracing their individual roles in promoting quality stroke care. Outreach efforts to inform and reinforce the importance of prehospital notification, which is an effective means of priming the receiving facility with a sense of urgency that starts the evaluation and treatment process off right, is critical.

It would be easy for critics of this study to question its impact, given that the implementation of each strategy would only improve times to treatment by slightly more than a minute. Although each strategy could represent a mere 1.3 minutes, however, their value lies in the cumulative improvement in treatment times. The average DTN time nationally is ≈72 minutes; a reduction of 14 minutes would bring the average into the guideline recommended treatment within 60 minutes of arrival. On a patient level, 14 minutes saved through the implementation of all strategies represents 28 million neurons, a total that for the patient may mean a difference in functional independence and reduced time in a rehabilitation facility.

Despite being deemed best practices, this study illustrates that often time-saving strategies are not adopted in their entirety. Additional research is required to determine why hospitals fail in their adoption or implementation of seemingly simple best practice strategies. Incomplete (less than always) adoption of individual strategies for improving treatment times was a common theme among hospitals, despite the apparent efficacy of these strategies. Efforts to improve adherence to the prescribed strategies should be pursued. The greatest hurdle in achieving low DTN times does not appear in the implementation of a novel intervention. It is the same hurdle faced by nearly every public health initiative, turning use of a positive initiative from some of the time into all of the time.

Disclosures

None.

References


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