

# Stroke Management Advances and Potential New Treatments

## Abstract

Stroke treatment aims for immediate reperfusion of the ischemic brain, and research is ongoing to find a medicine that might induce artery recanalisation more fully and with fewer side effects. The important studies that have verified the use and safety are covered in this review article. Other thrombolytic and anticoagulant medicines such as tenecteplase, desmoteplase, accord, tirofiban, abciximab, eptifibatide, and argatroban are also evaluated for safety and efficacy. Tenecteplase and desmoteplase are plasminogen activators that have a stronger affinity for fibrin and a longer half-life than alteplase. In preliminary trials, they demonstrated higher reperfusion rates and improved functional outcomes. Argatroban is a direct thrombin inhibitor that is used as an adjuvant to intravenous TPA and demonstrated greater rates of full recanalisation in the ARTTS research, with additional studies presently underway. Adjuvant thrombolysis procedures utilising transcranial ultrasound are also being researched, and have shown greater rates of full recanalization, as seen in the CLOTBUST study. Overall, medicinal therapy for stroke are significant because they are easier to administer than endovascular procedures, and novel medicines such as tenecteplase, desmoteplase, and adjuvant son thrombolysis are showing promising effects and await larger-scale clinical trials.

Stroke is the world's second greatest cause of death and the third major cause of disability-adjusted life years (DALYs). Over the last two decades, the absolute number of persons who experience a stroke each year, the number of stroke survivors, and the worldwide burden of stroke have all increased. This was due to increased life expectancy and lower mortality in the acute period of stroke care. The "pandemic" of stroke survivors should be taken seriously by public health systems and scientific communities. On the other hand, the increasing prevalence of patients affected by stroke sequelae necessitates a significant investment in economic resources for stroke rehabilitation. It turns this ethical obligation into an atomistic purpose. There is a need to increase rehabilitation while also lowering its costs. New neurorehabilitation technology can provide new tools for enhancing efficiency. Despite the great potential of these novel techniques, much effort needs to be done to integrate them into everyday rehabilitation programmes. These devices should be viewed as instruments in the hands of neurorehabilitation teams, to be used within the context of a rehabilitative programme, rather than being rehabilitative in and of themselves. They should, in fact, be incorporated into a complex model in which the goal and actual patient conditions coincide to design training with multimodal conditions mixing classical and well-known conventional therapy with novel approaches, including new technological gadgets.

**Keywords:** wake-up stroke • mechanical thrombectomy • core infarct • penumbra • acute stroke • ischemic stroke • golden hour • thrombectomy • thrombolysis • pharmacology

## Introduction

Stroke is the fourth greatest cause of death in Western culture and a major source of

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chronic disability. The most frequent type of stroke, accounting for approximately 87% of all strokes, is ischemic stroke. The primary goal of contemporary acute stroke care is to prevent infarction in at-risk tissue by restoring blood flow to ischemic penumbral zones. Intravenous (IV) thrombolysis using recombinant tissue plasminogen activator (tPA) has been shown to enhance outcomes in individuals with ischemic stroke who received tPA within 4.5 hours of symptom onset. However, the small treatment time window has significantly reduced the number of stroke patients receiving tPA. As a result, much research has gone into identifying a subset of stroke patients who may benefit from tPA outside the currently approved therapeutic window and/or creating more effective treatment measures. Non-invasive neuroimaging approaches, in particular, have been prominently implicated in providing insights into the existence or absence of salvageable tissues (penumbra), which could potentially be employed to extend the tPA treatment window beyond 4.5 hours. In contrast, the emergence of intra-arterial thrombolysis and endovascular clot retrieval devices (e.g., MERCI, Penumbra, and Solitaire) has shown considerable promise in boosting the effectiveness of vascular recanalization, perhaps extending the therapeutic window even further [1]. Recent research has focused on diffusion-weighted imaging/perfusion-weighted imaging (DWI/PWI), magnetic resonance imaging (MRI), and perfusion CT as imaging signatures for determining the presence or absence of recoverable tissues. The concept of diffusion/perfusion mismatch (DPM) in particular has attracted much attention as an excellent method for detecting the presence of ischemia penumbra. The primary idea behind DPM is that aberrant diffusion zones indicate the ischemic core, which will develop to infarction regardless of treatment. Regions with aberrant perfusion, on the other hand, reflect tissues at danger of infarction if blood flow is not restored promptly. Display acute diffusion/perfusion images as well as ultimate lesions from two patients. The patient in the upper row has matched diffusion perfusion deficits (imaged at 4.30 hours after onset with no tPA), indicating the absence of recoverable tissues. Indeed, the acute diffusion/perfusion impairments correspond to the final lesion in

space. The patient has acute DPM, indicating the existence of an ischemic penumbra. The mismatched region was not recruited into the ultimate infarction, suggesting the potential clinical value of DPM in an acute ischemic stroke. Despite these promising results, DPM's clinical use has been severely limited due to inadequate reliability caused by transient reversal of DWI lesions and the inability of all lesions to progress to the ultimate infarct. Furthermore, there is no agreement on the DWI and PWI thresholds for distinguishing diffusion and perfusion anomalies. As a result, prior to routine clinical applications of DPM, a well-controlled clinical trial is required to rigorously determine its clinical values. Although perfusion CT has been used to identify individuals for reperfusion therapy, its limitations include the requirement for an IV contrast injection, an extra radiation exposure, and less consistent threshold values when compared to DWI/PWI MRI [2].

## Materials and Methods

From 2015 to 2018, we looked back at data of patients with PC stroke who were not given RT at 5 Comprehensive Stroke Centers (four in Brazil and one in the US). At admission and within seven days of that, every patient got a follow-up neuroimaging. A logistic regression analysis' independent factors were used to create a prediction grading score [3].

Living respondents were deemed to have a prevalent stroke if they had a confirmed stroke at their interview. The ICD-10 codes for ischemic stroke (I63), intracerebral hemorrhage (ICH, I61), subarachnoid hemorrhage (SAH, I60), and unspecified stroke (I60) were used to categories all stroke patients. Neurologists with the appropriate training reinter viewed people who had a possible stroke. The investigator was needed to submit a diagnostic certificate and/or an imaging certificate (CT/MRI) from a secondary or higher medical unit to support the stroke diagnosis (Level II and above hospitals). Participants with TIA were not included in the stroke group; TIA was defined as G45 [4].

All adult patients who presented to Mitchells Plain Hospital EC with a confirmed ischemic stroke during the 12-month trial period (from January 1 to December 31, 2019) were eligible for participation. Data were gathered from consecutive adult patients (>18 years

old) who had ischemic strokes that were confirmed by a brain CT scan. Patients with stroke mimics, those without a CT scan of the brain, those transferred from private ECs with incomplete data, and patients who experienced ischemic strokes while being treated as an inpatient were all disqualified [5].

Through referrals from tertiary rehabilitation facilities in Toronto (Ontario) and Montreal (Quebec), Canada, 25 people with chronic stroke were enlisted. The following criteria were required for inclusion: >18 years of age, English or French (Quebec) speaking, unilateral first-time ischemic stroke in the middle cerebral artery area, stroke onset >3 months and 5 years. Significant cognitive deficits (23/30 on the Montreal Cognitive Assessment), severe apraxia (2 SDs below the mean of a healthy control sample on the Waterloo Apraxia test), neglect (>40/100 on the Sunnybrook Neglect Assessment Procedure), neurodegenerative or psychiatric illness, and contraindications to magnetic resonance imaging were the exclusion criteria (MRI). The study was given the go-ahead by the research ethics boards of both the Centre for Interdisciplinary Research in Rehabilitation (CRIR, Montreal) and Sunnybrook Health Sciences Centre (Toronto). Each participant signed a written statement of consent [6].

## Discussion

Complications following a stroke are prevalent, offer impediments to good recovery, or are associated with poor outcomes, and may be avoided or cured. Patients are exposed to different complications during the rehabilitation process as a result of both the stroke and the impairment produced by it. Medical complications in the hospital are widespread and substantially connected with the risk of death and reliance in stroke patients. The majority of the stroke patients in this study had problems. This was comparable to an observational study conducted at a tertiary care teaching hospital in Kadapa, the RANTTAS trial, a study at the University Hospital of Trondheim in Norway, a study in Turkey, and a prospective, multicentre study of stroke patients who had experienced at least one complication in the west of Scotland. However, the complication rate was higher when compared to a study conducted in ten Asian countries, which

revealed that 423 (41.9%) of stroke patients developed complications within the first two weeks, as well as a study conducted in Bromley hospitals NHS Trust, UK, where medical complications were documented in 60% of stroke patients. The higher rate of complications among patients in our study could be attributed to the severity of the disease itself, associated co-morbidities, and the hospital's setup for the management of emergency chronic conditions due to a lack of appropriate laboratories, equipment, medications, and skilled manpower [7].

Even if the severity of the complications varies due to the nature of the disease, because the study was prospective with face-to-face interviews, most patients may have complained about different complications. In addition, laboratory examinations were carefully analysed in order to identify any difficulties. Thus, the high prevalence of problems in this study could be attributed to close monitoring of patients and meticulous as well as prompt note keeping. Improved assessment methods and early rehabilitation as a result of previous research setup use of standardised evaluation and early management techniques. This range of consequences in different settings at different times could be attributed to differences in research design, stroke subtype, co-morbidities, and hospital treatment [8].

Complications following a stroke were widespread and significant contributors to mortality. The severity of the stroke at the time of admission was the most relevant risk factor for complications. Despite treatment in a comprehensive SU and close follow-up in a well-organized service, complications are nevertheless common following a stroke. Knowing the types of common complications and related risk factors allows the clinical team involved in the care of stroke patients to plan and prepare for the best possible care and to take preventative actions [9].

We identified that our hospital's stroke management protocol was suboptimal and falling behind recommended standards due to a lack of appropriate therapy and diagnostic agents for etiologic inquiry, as well as qualified personnel. Furthermore, the country's Ministry of Health should design and execute universal protocol guidelines for in-hospital therapy and post-stroke follow-

up. An expert panel should be convened to develop consensus guidelines for the management of acute stroke of unknown aetiology in settings where rapid access to neuroimaging to determine the underlying aetiology of stroke is not available, as these settings account for a significant proportion of the world's stroke patients. There is an urgent need to build and strengthen existing stroke units, which are well-equipped and staffed critical care units in various hospitals across the country for adequate stroke care, in order to reduce stroke mortality and post-stroke impairment. We still face hurdles, and more study is needed in the area of complications, as optimal prevention, care, and outcomes for many issues have yet to be determined [10].

### Conclusion

Because of the severity of the disease, concomitant comorbidities, and hospital setup, the majority of patients experienced both neurologic and medical problems. During the study period, the most common consequence was brain edoema (increased intracranial pressure), followed by urine incontinence and aspiration pneumonia. More than half of the patients had a prior medication history, and anti-hypertensive drugs were the most often used prestroke medications. During their hospitalisation, the majority of patients received at least one drug, with almost one-third of them receiving it within three hours of their admission. Antiplatelet and statin drugs were the most commonly recommended medications during hospitalisation, mostly for ischemic stroke. Approximately two-thirds of the patients had received medication during discharge, and anti-hypertensive drugs were the most commonly prescribed discharge meds for half of the total discharged patients. Despite the fact that stroke can be treated quality care remains elusive in SSA. In essence, most people in SSA are not receiving the necessary stroke care: awareness, access, and action are still well below par. There was no service for managing patients with acute ischemic stroke.

### Acknowledgments

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### Conflicts of Interest

None

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