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OPTIMIZING POST-STROKE OUTCOMES: A COMPREHENSIVE REVIEW OF MEDICATION ADHERENCE, QUALITY OF LIFE AND INNOVATIVE INTERVENTIONS IN SECONDARY PREVENTION

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Abstract:

Globally, stroke continues to be a leading cause of mortality and long-term impairment. A major barrier to preventing subsequent strokes is poor medication adherence, which raises the risk of recurrence and has a detrimental impact on health-related quality of life (HRQoL). This study examines factors impacting adherence and the efficacy of novel interventions by synthesizing evidence from 30 important studies published up until 2026, including cohort studies, cross-sectional analysis, qualitative research, and randomized controlled trials. After a stroke, persistent cognitive impairment can affect executive functioning and memory, making it challenging for patients to follow complicated drug schedules. inadequate patient activation, polypharmacy, physical infirmity, communication issues including aphasia, and inadequate health literacy are further barriers. Different age groups have different adherence patterns. While younger survivors frequently struggle with long-term treatment persistence due to psychological variables and decreased perception of risk, elderly persons face issues linked to frailty and pharmaceutical burden. Socioeconomic inequities, financial restraints, and restricted healthcare access all contribute to nonadherence, especially in rural and resource-constrained areas.

Poor oral anticoagulant adherence dramatically raises the likelihood of unfavourable outcomes and death in patients with atrial fibrillation. There is a reciprocal association between medication adherence and HRQoL, with non-adherence worsening functional results and poor quality of life decreasing treatment compliance. HRQoL is also influenced by geographic location, availability to rehabilitation, and a smooth transition back into regular life.

Mobile health reminders, pharmacist-led pictogram labeling, multimedia instructional tools, and customized visual aids are examples of modern therapies that prioritize patient-centered strategies. These techniques increase medication adherence, boost self-efficacy, lower the risk of stroke recurrence, and improve stroke survivors' long-term quality of life when paired with multidisciplinary care and ongoing lifestyle counselling.

Keywords: *Stroke recurrence, Medication adherence, Secondary prevention, Health Related Quality of life (HRQoL), Stroke survivors, Transient ischemic attack (TIA), Cognitive impairment, Patient education*

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INTRODUCTION:

Stroke continues to be one of the world's leading causes of death and long-term disability, placing a heavy burden on patients, caregivers, healthcare systems, and society at large. Stroke survivors still suffer a significant risk of recurrent cerebrovascular episodes, despite improvements in acute stroke care and rehabilitation. Effective secondary prevention is a top public health priority since recurrent strokes are frequently linked to greater disability, worse functional outcomes, increased healthcare utilization, and higher mortality than first-ever stroke episodes [16,18,22]. Long-term use of evidence-based pharmacological therapy, such as statins, antiplatelet medicines, oral anticoagulants, antihypertensive drugs, and antidiabetic drugs when clinically warranted, is the mainstay of secondary preventive efforts [12,16]. It has been demonstrated that these treatments considerably lower the risk of subsequent stroke and other vascular problems. However, consistent patient adherence to recommended treatment plans is crucial to their efficacy. Among stroke survivors, medication non-adherence is still a common issue and is known to be a significant factor in avoidable stroke recurrence, poor clinical outcomes, and higher healthcare expenses [1,12,29].

Medication adherence after stroke is influenced by a complex combination of patient-related, clinical, socioeconomic, and healthcare-system variables. One of the most commonly reported barriers is cognitive impairment, which frequently lasts for years following the initial stroke occurrence and causes difficulties in memory, attention, and executive functioning. A patient's capacity to handle complicated drug regimens and sustain long-term adherence may be significantly hampered by such deficiencies [3]. Physical handicap, communication challenges like aphasia, limited health literacy, psychological distress, fear of drug side effects, and the burden of polypharmacy are further obstacles [2,5,8,29]. Additionally, medication adherence and effective self-management among stroke survivors have been found to be significantly predicted by patient activation, which is defined as a person's knowledge, confidence, and capacity to control their own health [24].

Adherence patterns are also impacted by age-related variations. Frailty, several comorbidities, and complicated drug schedules are common problems for elderly stroke survivors, making them more susceptible to inadvertent non-adherence [1]. On the other hand, due to psychosocial variables, conflicting life obligations, and a diminished awareness of future stroke risk, younger stroke survivors frequently exhibit lower long-term persistence with secondary preventative drugs [6]. These results imply that adherence therapies should be customized based on the age and unique circumstances of each patient.

Geographical and socioeconomic differences are additional barriers to the best possible adherence. Financial limitations, poor access to healthcare services, pharmaceutical shortages, transportation challenges, and few opportunities for follow-up care are common problems for patients living in rural or resource-constrained areas [14,26]. Qualitative research has also shown that poor treatment persistence and deliberate non-adherence are largely caused by a lack of communication between patients and healthcare providers about the advantages of medications, their side effects, and the significance of lifelong therapy [2,5].

Medication adherence is directly linked to health-related quality of life (HRQoL), an increasingly significant patient-centered outcome, in addition to lowering the risk of recurrent stroke. Physical functioning, emotional health, social engagement, and vocational productivity are all frequently compromised in stroke survivors, which negatively impacts quality of life [18,21,22]. Research indicates that there is a reciprocal relationship between HRQoL and adherence, with poor adherence raising the risk of recurrent events and functional decline and decreased quality of life potentially lowering a patient's motivation and ability to stick to long-term treatment plans [23]. HRQoL in stroke survivors has also been demonstrated to be influenced by variables such

age, work status, access to rehabilitation services, social support, and cultural context [19,20,25].

Recent research has concentrated on creating novel, patient-centered strategies to enhance drug adherence and enhance secondary preventive initiatives in recognition of these difficulties. Short messaging service (SMS)-based reminder systems and mobile health (mHealth) platforms are examples of digital health technologies that have shown encouraging outcomes in increasing adherence rates and encouraging medication-taking behaviour [4]. Similarly, it has been demonstrated that pharmacist-led counselling services that make use of pictograms, visual aids, and customized patient education techniques improve medication comprehension, self-efficacy, and treatment compliance, especially for people who struggle with communication or have low health literacy [17,27,28,30]. Lifestyle counselling therapies, systematic behavioural-change programs, multidisciplinary care models, and hospital-initiated adherence support measures have all shown promise in enhancing long-term medication compliance and lowering the risk of recurrent stroke [7,9,10,13,15]. A thorough review of recent research is necessary since there is mounting evidence that medication adherence is associated with stroke recurrence, functional recovery, and quality of life. Thus, the purpose of this review is to assess the factors that influence medication adherence among stroke survivors, investigate how it relates to health-related quality of life, and critically evaluate current interventions intended to maximize secondary prevention and enhance long-term outcomes after stroke.

LITERATURE SEARCH STRATEGY

A thorough literature search was carried out across major biomedical databases, including PubMed/MEDLINE, Embase, and the Cochrane Library, to find relevant peer-reviewed publications published up to 2026. Medical Subject Headings (MeSH) terms and text keywords, such as "stroke," "transient ischemic attack", "medication adherence", "patient compliance", "quality of life", "secondary prevention", "telehealth," and "pictorial support," were used in the search process. Studies that assessed medication adherence, persistence, or HRQoL in post-stroke or transient ischemic attack (TIA) populations, or those looked into focused interventions intended to enhance these outcomes, were included. Thirty core studies, including cross-sectional analyses, prospective cohorts, qualitative interviews, and randomized controlled trials (RCTs), were included in the final selection. To guarantee a globally relevant synthesis of the data, these investigations included a variety of patient demographics, geographic locations (including urban, rural, and developing regions), and clinical sub-acute or chronic settings.

DETERMINANTS AND BARRIERS TO MEDICATION ADHERENCE

A complex interaction of patient-centered, clinical, and socioeconomic factors determines medication adherence in stroke survivors.

- **PATIENT-LEVEL AND COGNITIVE FACTORS**

One of the biggest obstacles to long-term adherence is cognitive deterioration. Even five years after the occurrence, longitudinal data shows that post-stroke cognitive impairment continues to be the main cause of inadvertent non-adherence because patients experience memory loss, executive dysfunction, and complicated regimens [3]. Additionally, a patient's adherence behaviour is strongly correlated with their level of internal activation, which includes their knowledge, abilities, and confidence in managing their health; better medication compliance is consistently correlated with higher patient activation [24]. Age-specific issues also arise throughout the lifespan: young ischemic stroke survivors struggle with long-term medication persistence, frequently because they feel less vulnerable or want to resume a normal lifestyle free from chemical dependence [6], while elderly patients face vulnerabilities associated with polypharmacy and frailty [1].

- **SOCIOECONOMIC AND GEOGRAPHICAL DISPARITIES**

Adherence patterns are significantly influenced by geographic and economic situations. Adherence is severely hampered in rural or low-resource environments by structural obstacles such budgetary limitations, restricted access to basic care, and unstable drug supply chains [14, 26]. Intentional non-adherence is frequently encouraged by unclear communication from healthcare providers regarding drug side effects, purpose, and the need for lifelong therapy, according to qualitative data from primary care and online survivor communities [2, 5, 8].

Table 1. Barriers to Medication Adherence

Category of Barrier	Contributing Factors
Physical and Cognitive	Executive dysfunction, frailty, physical impairment, and memory problems
Behavioural and Psychological	Fear of adverse consequences, low perceived risk (particularly in young people), and poor patient activation

Socioeconomic	Financial hardship, remote location, and limited access to primary care
Educational and Systemic	Poor provider communication and complicated regimens (polypharmacy)

HEALTH-RELATED QUALITY OF LIFE (HRQoL) IN STROKE SURVIVORS

A stroke dramatically reduces a patient's HRQoL in the social, psychological, and physical dimensions [18, 22]. The research demonstrates a reciprocal, cyclical relationship between HRQoL and medication adherence: patients with low quality of life frequently lack the mental or physical capacity to follow treatment, and those who don't experience recurrent events or poor functional recovery, which worsens their quality of life [23].

- **RISK FACTORS AND MODIFYING VARIABLE**

Depending on patient demographics and treatment arrangements, the factors influencing post-stroke HRQoL differ significantly:

- Age and Employment: During the rehabilitation period, middle-aged stroke survivors (those under 65) confront unique psychosocial issues, since their inability to return to work negatively impacts their financial stability and mental health [19, 25].
- Rehabilitation Care: Long-term functional recovery and future HRQoL ratings are directly predicted by the nature and caliber of inpatient and outpatient rehabilitation programs [20].
- Regional Differences: In order to accurately quantify and treat the unique life-disruption profiles of survivors in developing countries, culturally adapted measures are crucial. One example of this is the Post-stroke Quality of Life Index, which was created in Sri Lanka [21].

INTERVENTIONS TO ENHANCE ADHERENCE AND SECONDARY PREVENTION

To counteract unsatisfactory adherence, contemporary clinical research has focused substantially on structured, multidisciplinary, and novel patient-centered therapies.

- **DIGITAL AND TAILORED BEHAVIORAL INTERVENTIONS**

Mobile health, or mHealth, has become a useful and scalable tool. A randomized behavioural intervention that uses prescription-tailored short messaging services (SMS) to provide scheduled, patient-specific reminders and educational cues has been shown in the SMS4Stroke research to dramatically improve medication adherence [4]. Similarly, the SPRINT INDIA experiment and other structured, semi-interactive stroke prevention packages have demonstrated the viability of employing process-evaluated, structured teaching frameworks to scale secondary prevention in densely populated, developing regions [15].

- **PICTORIAL AND VISUAL SUPPORT SYSTEMS**

Traditional text-heavy labelling are ineffective for individuals with post-stroke communication impairments including aphasia or limited health literacy. The combination of co-designed graphical support with pharmaceutical pictograms has been demonstrated to significantly improve medication safety, regimen comprehension, and long-term compliance [17, 27]. Comparative investigations show that, while tailored computer systems enable reliable tracking, simplified pictorial information booklets and video narrative techniques are nonetheless extremely effective in increasing a patient's self-efficacy with medication use [28, 30].

- **MULTIDISCIPLINARY AND LIFESTYLE PROGRAMS**

Integrated methods are necessary for the transition from acute care to the community. The significance of hospital-initiated, multiprofessional interventions (coordinating pharmacists, neurologists, and nurses) to smoothly transfer patients into adherence habits prior to discharge is highlighted by randomized studies like as the ADMED AVC research [9]. Furthermore, programs that emphasize lifestyle counselling [13], behaviour change skills (Living Well After Stroke) [7], and particular intervention development frameworks [10] verify that teaching patients how to modify their lifestyle habits in addition to taking target medications (like oral anticoagulants for strokes caused by atrial fibrillation) results in the strongest defence against recurrence [11].

CONCLUSION:

Achieving optimum secondary stroke prevention needs more than just writing a prescription. Cognitive decline, age-specific psychosocial demands, socioeconomic position, and systemic educational disparities are all contributing factors to suboptimal medication adherence. According to recent research, noncompliance actively lowers health-related quality of life and encourages avoidable stroke recurrences.

Modern stroke neurology needs to take a comprehensive strategy in order to overcome over these barriers. Increasing patient activation and self-

efficacy has been demonstrated through the use of digital mHealth reminders, co-designed graphical assistance for aphasic patients, and interdisciplinary behavioural counselling. In order to maximize long-term survival and quality of life for stroke survivors, future clinical processes must consistently incorporate these customized therapies to fill the gap between clinical efficacy and real-world persistence.

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