

A REVIEW OF PATIENT EDUCATION STRATEGIES IN CHRONIC CONDITIONS, LIKE EPILEPSY AND POST-STROKE CARE

Rajesh Pandita*, Rachna Patel

Institute of Management Studies, Indus University, Ahmedabad, Gujarat, India

Correspondence: rajesh.eris1@gmail.com

ABSTRACT

"Every patient holds a perspective regarding their condition."

Since the inception of patient care within the healthcare sector, patient education has been a vital component. It involves systematic efforts to alter patient behaviour and facilitate improvements in the skills, knowledge, and attitudes essential for maintaining or enhancing health outcomes. Rooted in the Latin term "doctor," which comes from "docere," meaning "to educate," it falls upon every physician to educate patients, their families, and the broader community.

The aim of this research is to critically review and evaluate patient education strategies employed in the management of chronic conditions, specifically epilepsy and post-stroke care, to determine their effectiveness in improving patient outcomes and self-management.

Family physicians play an essential role in spearheading patient education initiatives. By leveraging their position as primary care providers, they foster enduring and trustworthy relationships with patients. This unique bond helps to promote and facilitate shifts in health-related behaviours. Consequently, patient education is a fundamental aspect of residency training for family doctors.

Improving patients' quality of life through structured, regular interactions should be the foremost aim of patient education to optimize outcomes. However, the limited time allocated for each patient visit—usually under five minutes in urban settings and much shorter in public hospitals—indicates that patient education remains significantly inadequate in India. Due to this reduced Turnaround Time (TAT), comprehensive patient education programs are largely unfeasible.

KEYWORDS

patient education, care, quality of life, epilepsy, post-stroke, India.

INTRODUCTION

Worldwide, chronic diseases are prevalent and play a major role in mortality and health complications. In the United States, 60% of individuals have a chronic condition, leading to annual healthcare costs nearing \$USD4.5 trillion.[1]

In India, patient education for chronic neurological conditions like epilepsy and stroke remains suboptimal, often hindered by limited health literacy, poor accessibility, and inconsistent follow-up care. The turn-around-time (TAT)—the delay between diagnosis, counselling, and initiation of appropriate therapy—significantly affects long-term outcomes.

Prolonged TAT can lead to poor medication adherence, recurrent events (e.g., seizures or strokes), and preventable disability, especially in rural or resource-constrained settings. A study by Gourie-Devi et al. (2017) emphasized the urgent need for structured epilepsy education programs to reduce stigma and improve compliance. Similarly, Pandian et al. (2018) highlighted that delayed post-stroke rehabilitation and inadequate caregiver education directly contribute to poor functional recovery. These delays underscore the need for streamlined patient education and early intervention protocols to improve outcomes in chronic neurological care in India. [2,3] With more than 80% of medical consultations worldwide about chronic diseases, these ailments are the main cause of seeking medical attention. Chronic illnesses are linked to significant psychosocial impairment and a worse quality of life in addition to their harmful biological effects.[4]

The diagnosis and treatment methods for chronic illnesses have been significantly improved by recent developments in medical research. Our knowledge of the causes of chronic illnesses has significantly increased over the last ten years as a result of advancements in epidemiology and public health. This has brought attention to the negative effects of unhealthy behaviours and lifestyles, such as alcohol drinking, tobacco use, poor eating habits, psychological stress, and physical inactivity. Innovative medical practices, pharmacological advancements, and new technology have all helped manage chronic illnesses and improve patient outcomes. [5, 6]

Since patient education remains less of a priority of the clinicians in India, due to very high patient turnover on daily basis, a literature review was completed from 2000 to 2022. However, owing to the nature of the review, a few studies were included from prior of 2000 to get more insight of the patient education.

Literature Review:

- Records identified through PubMed, Scopus, EMBASE, Google Scholar, (n = 203)

After Screening:

- Records after duplicates removed (n = 120)
- Records screened by title/abstract (n = 120)
- Records excluded (n = 59)
- Full-text articles assessed for eligibility (n = 61)
- Excluded irrelevant (n = 5)

Studies included in qualitative synthesis (n = 54)

According to a recent WHO report, 5 million people globally are thought to receive an epilepsy diagnosis each year. The incidence rate is around 49 per 100,000 people annually in high-income countries. On the other hand, the incidence rate can rise to 139 per 100,000 people annually in low- and middle-income nations. Stroke remains the second leading cause of mortality and the third leading cause of combined mortality and disability globally, as measured by disability-adjusted life years (DALYs). [7]

The estimated global economic burden of stroke exceeds \$USD 721 billion, equivalent to 0.66% of the global GDP. Between 1990 and 2019, the stroke burden, in terms of the absolute number of cases, increased substantially: incident strokes by 70.0%, stroke-related deaths by 43.0%, prevalent strokes by 102.0%, and DALYs by 143.0%. The majority of the global stroke burden, comprising 86.0% of stroke-related deaths and 89.0% of stroke-related DALYs, is confined to low-income and lower-middle-income countries (LMICs). This data is presented in the World Stroke Organization (WSO) Global Stroke Fact Sheet 2022. [44,45,62]

Healthcare professionals who disseminate Therapeutic patient education (TPE), are designed to empower patients to understand their conditions, actively participate in clinical decision-making, and effectively manage their health. Many educational interventions for patients have demonstrated significant improvements in medical outcomes, self-efficacy, and treatment satisfaction across various chronic conditions. [7,8,9,10] These interventions facilitate lifestyle modifications and enhance adherence to treatment regimens. Developing these skills is crucial for fostering self-efficacy and self-care behaviours, ultimately leading to better biomedical and psychosocial outcomes in individuals with chronic disorders. [11,12,13]

Chronic illnesses, like epilepsy and post-stroke, affect patients who may live a quality of life provided they get proper therapeutic patient education by clinicians or rehab-specialists. However, the following challenges often make it very difficult to impart patient education owing to the varied nature of patients coming from different strata of our Indian society: [14]

THE CHRONIC ILLNESS

- Often refractory to treatment.
- Typically remains asymptomatic except during acute exacerbations.
- The associated pain is generally persistent in nature.
- Subjective symptom severity often shows a weak correlation with objective biological markers.
- Disease progression is unpredictable.
- Potentially modifiable by lifestyle factors.

THE PHYSICIAN

- Oversees treatment while exerting indirect control over disease progression.
- Educates patients on managing their treatment and promotes shared decision-making.
- Primarily manages the condition during its asymptomatic phase.
- Provides acute care during exacerbations.
- Monitors for late-stage complications.
- Facilitates psychological and social support.
- Adapts to evolving medical roles and responsibilities.
- Collaborates effectively within a multidisciplinary team.

THE PATIENT

- May not achieve a cure but can manage the illness.
- Must tailor treatment to align with personal life factors.
- Experiences the illness as asymptomatic outside acute episodes.
- Faces relapse if vigilance wanes.
- Requires training to respond promptly during crises.
- Must accept a certain degree of compromised integrity.

THE TREATMENT

- Essential for maintaining survival and/or daily well-being.
- Effectiveness exhibits significant variability.
- Frequently necessitates patient education for optimal management.
- Requires consistent daily adherence.
- Often time-intensive for the patient.
- Commonly interferes with social activities.

Patient education has a well established role in improving health outcomes, especially for individuals with chronic diseases. Chronic conditions are persistent, and enhancing health literacy and self-efficacy is essential for effective disease management. Patients with a clear understanding of their health conditions are more likely to engage actively in their care, resulting in better health outcomes. As a result, patient education has become an integral aspect of healthcare management, as it strengthens patients' health literacy. [15,16]

Advancements in technology and the widespread accessibility of the Internet have positioned online media as a promising tool for patient education. Many patients have reported dissatisfaction with traditional in-person education, attributing it to factors such as healthcare professionals' heavy workloads, insufficient communication skills, and the challenge of conveying extensive information within constrained time limits. Consequently, online patient education presents a valuable supplementary resource that may help address these issues by offering accessible and comprehensive health information. [17,18]

DISEASE BURDEN:

The global economic burden of epilepsy, determined by multiplying the per capita cost by the estimated 52.51 million people affected by the condition worldwide and adjusting for the treatment gap, is approximately \$USD119.27 billion. [19]

In 2019, approximately 12.2 million new stroke cases were reported globally, contributing to the loss of 143 million disability-adjusted life years (DALYs) and 6.6 million fatalities. As a result, stroke ranked as the second leading cause of mortality and the third leading cause of disability worldwide. [20]

Research indicates that patient education is pivotal in managing chronic non-communicable diseases (NCDs) at both the population and individual levels. [21] Often, patients are merely handed a leaflet and sent home, leading them to rely on informal online chatrooms for support. [22]

Therapeutic Patient Education (TPE) is a structured, evidence-based learning process in which trained healthcare professionals guide patients in acquiring the skills needed to manage their conditions. [23] This approach is patient-centred and incorporates techniques such as skills development and self-monitoring. By involving caregivers and family members, TPE empowers individuals to manage chronic conditions over their lifetime, adapting to changes in their health and encouraging them to modify their lifestyle. Countries within the WHO European Region are at varying stages of incorporating TPE into the foundational curricula for health professional training. [24]

Countries within the WHO European Region are at varying stages of incorporating Therapeutic Patient Education (TPE) into the core curricula of health professional training. To support the implementation and expansion of TPE programs for healthcare providers, policymakers can adopt several strategies:

- Modify workforce regulations to enable collaborative patient education among health professionals, broadening their roles and responsibilities.
- Integrate TPE into the specifications for healthcare provider commissioning.
- Revise educational approaches and introduce accredited programs in patient education for health and allied professionals.
- Mandate TPE training for healthcare professionals, including in undergraduate nursing and medical school curricula.

However, these measures alone are insufficient to guarantee the successful integration of TPE at the population level. Individuals from lower socioeconomic backgrounds often have reduced health literacy, necessitating initiatives that ensure these underserved populations have access to, and can effectively utilize health information. [20,24] Political commitment is essential to overcoming barriers to patient education for those facing the greatest healthcare challenges.

The Special Initiative on Non-Communicable Diseases (NCDs) and Innovation has highlighted the importance of TPE in the broader context of health system transformation for NCD management. TPE must be embedded within professional healthcare training, requiring policy adjustments and investments to develop such programs. This investment can yield significant benefits, strengthening the patient-provider relationship and empowering individuals with the knowledge, skills, and confidence to manage their conditions and seek appropriate care when necessary. [25,26]

A comprehensive step-by-step guide has been developed for policymakers, senior health professionals, and professional healthcare bodies responsible for workforce training and education. This guide aims to support the practical integration of TPE into healthcare systems. [27]

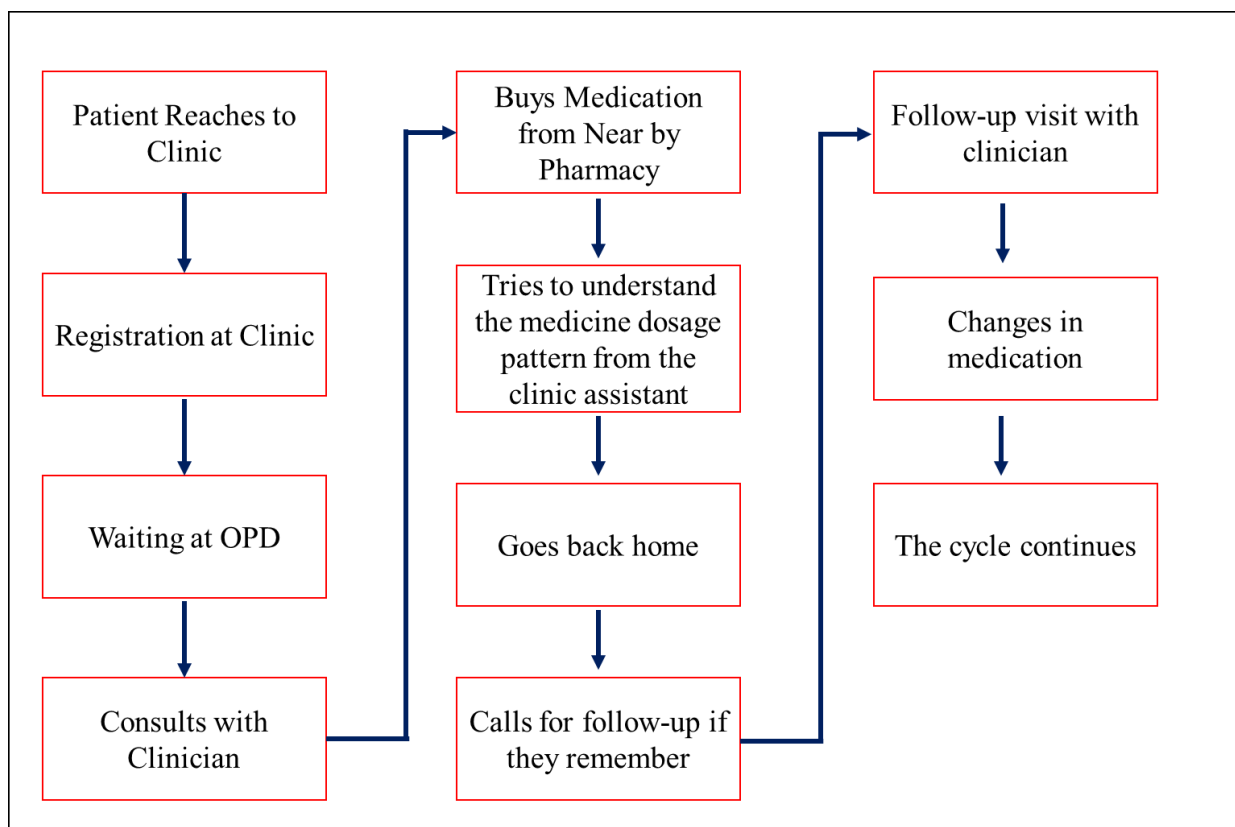
THERAPY ADHERENCE:

Post-stroke quality of life (QOL) in survivors shows a positive association with adherence to pharmacotherapeutic regimens prescribed for secondary prevention. Achieving optimal adherence to pharmacological treatments is crucial for maximizing therapeutic outcomes, thereby reducing morbidity and mortality rates associated with stroke.[27] Improved adherence is linked to a reduction in stroke recurrence and an enhancement of QOL indicators. However, the World Health Organization (WHO) estimates that medication adherence for chronic conditions remains suboptimal, with rates approaching 50%.[28]

Medication adherence transcends mere quantification of pharmacological compliance; it encompasses a holistic assessment of the multifaceted etiologies contributing to a patient's reluctance or incapacity to adhere to recommended therapeutic protocols.[29] It is incumbent upon healthcare practitioners to identify and scrutinize the determinants influencing medication adherence, thereby facilitating the formulation and implementation of targeted interventional strategies. Such strategies aim to foster concordance within the therapeutic alliance, culminating in a synergistic pursuit of predefined health outcomes by both the patient and the medical provider.

Particularly in India, there exists a spectrum of health outcome disparities influenced by socioeconomic variables, which elude complete elucidation through conventional paradigms such as substandard health-related behaviours and practices.[30] A comprehensive understanding of the interplay between socioeconomic, clinical, and health-related quality of life (HRQOL) factors with medication adherence post-stroke is essential.[31]

FIGURE 1 PATIENT JOURNEY IN NEUROLOGY CLINIC.



Patient Journey in Neuro-clinic has always been challenging owing to a lack of education and awareness at large as shown in Figure 1. Observations completed during visits to neuro-clinics outlined this patient journey in Indian setting.

Epilepsy is a prevalent neurological disorder characterized by abnormal movements, which may occur with or without loss of consciousness. Globally, nearly 70 million people are affected by epilepsy. However, it is often underreported, with many cases going unrecognized, potentially affecting over 40 million individuals. In India, the prevalence rate of epilepsy is 5-10 per 1000 population. Epilepsy is presented in two major forms: generalized and/ or partial. [32,33]

Worldwide, misconceptions, fear, and negative public attitudes towards epilepsy lead to discrimination, isolation, and widespread social rejection of individuals with the disorder. [34] Despite its prevalence, epilepsy can be effectively prevented and treated at a manageable cost. Medication adherence is crucial for the effectiveness of antiepileptic therapy, as poor adherence is the primary cause of drug therapy failure in epilepsy. [30] Non-adherence leads to an increase in the frequency and severity of seizures, resulting in more hospitalizations. Consequently, non-adherence directly raises healthcare costs and diminishes the quality of life for patients. Adherence can be defined as the degree to which a patient's behaviour and daily activities align with their physician's recommendations. [35,36]

Stroke ranks as the fourth leading cause of mortality and a significant contributor to severe physical disability among adults in the United States. [37] Medications spanning various classes, including antiplatelet agents, antihypertensives, and statins, substantially mitigate the risk of both initial and recurrent strokes. However, adherence to these medications remains suboptimal among stroke survivors. [38,39]

ADHERENCE CHALLENGES:

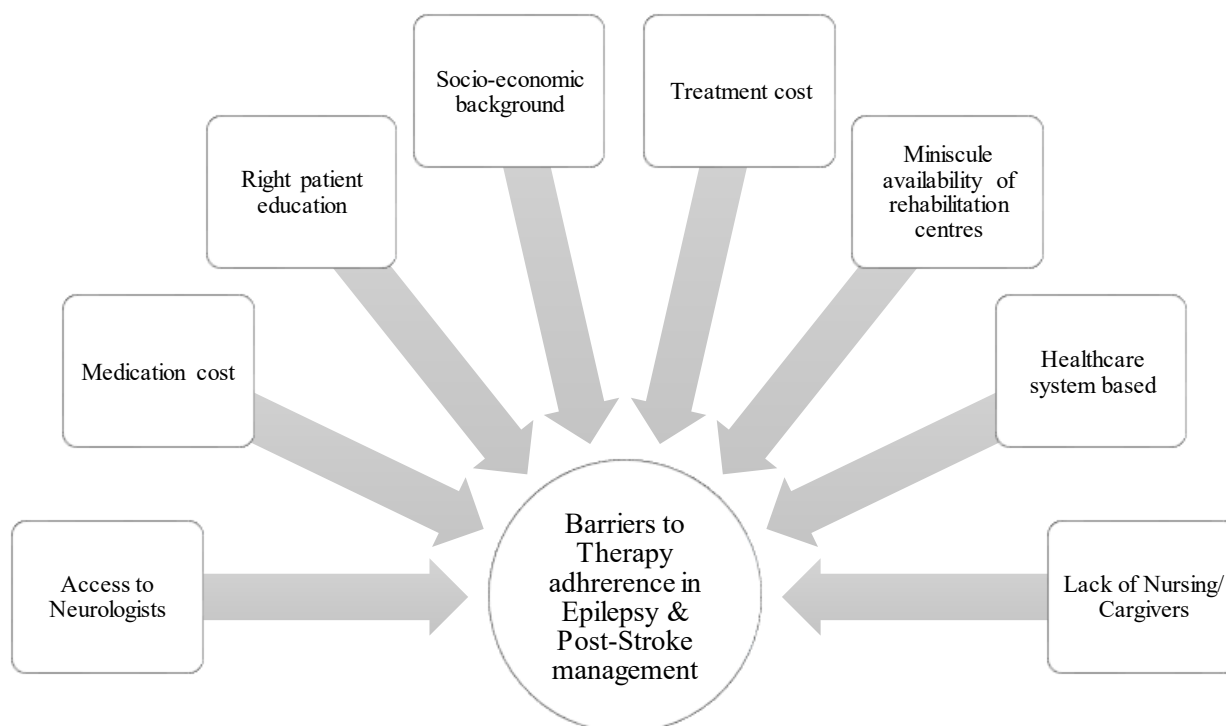
- In a study involving 2,598 patients discharged after stroke or transient ischemic attack (TIA), approximately one in four participants discontinued one or more stroke prevention medications within three months of discharge. [40]
- In India the discontinuation in epilepsy is more than in the US where 1/3rd didn't adhere to the medication.
- For stroke it was as high as 30%, which remains a big concern in patient care. [41,42]
- Another study of 3,571 stroke survivors revealed that roughly one-third of patients exhibited suboptimal adherence to antihypertensive medications during the year following their stroke. [43]

PREDICTORS AND BARRIERS:

- While researchers have identified predictors of non-adherence to cardiovascular medications, few have specifically assessed barriers to adherence in stroke survivors. [44,45]
- Predictors often relate to patient factors such as age, income, and education, which help identify those most in need of adherence interventions but may not be directly modifiable.

In contrast, adherence barriers involve potentially modifiable factors that healthcare providers and systems can address to reduce medication non-adherence. [46,47]

FIGURE 2 BARRIERS TO THERAPY ADHERENCE.



CLINICAL INERTIA:

Clinical inertia, which refers to the inability to adjust treatment in patients who do not achieve evidence-based care targets, plays a significant role in the inadequate management of chronic conditions such as epilepsy and post-stroke care.[48] It is a leading factor behind preventable negative outcomes, disabilities, fatalities, and increased healthcare expenditures. Gaining a comprehensive understanding of clinical inertia and creating specific strategies to address it could help lessen the passive errors that lead to hundreds of thousands of adverse incidents and tens of thousands of avoidable deaths each year in the United States.

Clinical inertia arises from various sources and is influenced by factors related to physicians, patients, and office systems. Physician-related factors include decision-making biases, overestimation of care provided, disagreement with evidence-based care goals, and "soft reasons" for avoiding treatment intensification. Patient-related factors encompass a lack of awareness about the need for therapy intensification, denial or overly optimistic perceptions of chronic disease risks, and reluctance to incur increased costs and side effects associated with more intensive treatments. Office system-related factors include insufficient data to monitor care quality and identify patients needing intensified care, lack of visit planning, inadequate proactive patient outreach, and failure to implement decision support strategies, especially those providing actionable information during office visits. [49]

Therapeutic non-adherence remains the biggest clinical challenge in today's era of disease management. Non-adherence to therapy as prescribed to patients is multifactorial in nature which results in poor quality of life:

- Prescription briefing to the patient during clinic visits
- Proper guidelines and understanding of dosage regimen
- Lack of patient education during the complete patient journey
- Lack of knowledge at the pharmacy level to educate the patient about the importance of medication adherence.

Hence, addressing clinical inertia remains the key to improving clinical outcomes. [50]

COST BURDEN ON PATIENTS:

Epilepsy presents a significant economic burden on individuals with epilepsy (PWE) and their families, particularly those from lower socioeconomic backgrounds, who are more susceptible to restricted access to quality healthcare. Beyond limited employment opportunities, PWE experience additional financial strain, including transportation costs and lost wages, exacerbated by disruptions in the availability of free antiepileptic drugs (AEDs) in publicly funded healthcare facilities.

The economic impact of epilepsy has not been extensively studied in the Indian context. The costs associated with epilepsy care can be broadly categorized into direct, indirect, and intangible costs. Direct costs include medical expenses related to prevention, diagnosis, treatment, and rehabilitation, as well as non-medical expenses such as travel and housekeeping. This encompasses outpatient treatment, diagnostic charges, radiological investigations, and the cost of AEDs, among other expenses. Indirect costs include the loss of time, productivity, and wages incurred by both the individual and their family. Intangible costs, which are difficult to measure, include psychosocial pain, stigma, and suffering. Due to the inherent difficulties in quantifying indirect costs such as caregiver time, lost productivity due to disability and premature mortality, and lost opportunities from premature cessation of schooling and employment, these factors are often excluded from many studies. Additionally, costs associated with pretreatment help-seeking, managing comorbid conditions, side effects of AEDs, and intangible costs are also frequently omitted from analyses. Consequently, the actual economic burden of epilepsy is likely significantly higher than current evidence suggests. [51]

Thomas et al. reported in their multicentred study that the annual indirect expenditure that patients incur in neurological conditions is INR ₹ 10,031 (\$USD 118.53). The annual economic burden of epilepsy was estimated to be 88.2% of the Gross National Product (GNP) per capita and 0.5% of the total GNP, amounting to INR ₹68.75 billion (US\$1.7 billion). [52]

On the other hand, Stroke patients incur a financial burden of up to INR ₹ 50,000 (\$USD 590.81), with a significant proportion experiencing disabilities related to comprehension and speech. The economic burden associated with stroke-related hospitalization is substantially high, underscoring the necessity for government-funded health insurance to cover stroke-related medications and reduce out-of-pocket expenses for patients receiving treatment in healthcare facilities. The study underscores the urgent need for improved schemes to address the escalating threat of strokes in the northeastern regions of India, to effectively tackle this public health challenge. [53]

IMPACT OF PATIENT EDUCATION:

Due to the significant impact of the condition and the growing evidence of a silent stroke epidemic in India, the rehabilitation needs for stroke survivors are expected to be considerable. Therefore, future investments in epidemiological research on stroke in India will likely contribute to the development of more effective preventive strategies against stroke and its associated mortality. Additionally, such research may improve the organization of cost-efficient stroke care services and rehabilitation programs, addressing the unmet needs of stroke survivors and their caregivers.[54]

It is crucial for patients and the community to be educated on the signs and symptoms of stroke. Promoting patient engagement in self-care to the fullest extent possible is essential. Assistive devices should be provided in accordance with current guidelines. An occupational therapist should conduct a home assessment and provide recommendations to enhance the patient's independence. Coordinated care involving multiple healthcare providers aids families in planning care strategies and informs them that the patient may experience fatigue, irritability, agitation from minor events, and decreased interest in daily activities. The therapist should recommend home-based speech therapy, encourage family involvement, and provide practical instructions to assist the family between speech therapy sessions. [60,61]

If necessary, consultation with a physician regarding potential antidepressant therapy for the patient should be considered. The therapist should encourage patient participation in community-based stroke support groups to foster a sense of belonging and companionship, as well as engagement in hobbies, recreational, and leisure activities.

Maintaining social connections to prevent isolation and encouraging family support with positive reinforcement is important. Additionally, families should be reminded to attend to their health and well-being. [55]

The knowledge of caregivers and emergency medical personnel regarding the identification of status epilepticus (SE) and the administration of rescue medications may result in improved patient outcomes and reduced adverse effects associated with SE. Currently, no prior interventional studies have assessed knowledge specifically related to SE. However, an Iranian study has examined educational interventions targeting febrile seizures.[56]

Health information delivery methods in educational interventions vary from traditional approaches (such as leaflets, brochures, or instructor-led programs) to advanced digital platforms (including podcasts, webinars, and health applications). The effectiveness of these methods is influenced by factors such as the demographic characteristics of the population, the design of the study, and the timing of interventions administered from initial assessments to follow-up evaluations. [57,58]

Patient Education empowers individuals with epilepsy by enhancing their self-confidence, proficiency in self-management, awareness of their specific needs, and ability to access necessary resources. Consequently, it facilitates their active participation in patient-centered care.[59,63]

CONCLUSIONS:

Patient education can significantly impact the comprehensive clinical outcome and can support evaluating health intervention decrees that can enhance patients' knowledge and competencies over the short term. However, comprehensive patient education's impact on confidence, attitudes, and behaviours remains uncertain in India. Improving the quality of studies, ensuring consistency in outcome measures, and evaluating long-term effects are essential steps to increase confidence in estimates of the impact of educational interventions aimed at enhancing understanding of key concepts for assessing health intervention claims. It is well-established that comprehensive patient education is critical for managing chronic conditions such as epilepsy and post-stroke recovery. This review drives a point on the importance of patient education in these conditions and requests that further large multicentred research studies are needed to be conducted in India to find the unmet needs in patient education for the larger good of our society.

ABBREVIATIONS:

TAT: Turnaround Time

DALYs: Disability-Adjusted Life Years

GDP: Gross Domestic Production

TPE: Therapeutic Patient Education

WHO: World Health Organisation

NCD: Non-Communicable Disease

QOL: Quality Of Life

HRQOL: Health-Related Quality Of Life

TIA: Transient Ischemic Attack

AEDs: Antiepileptic Drugs

GNP: Gross National Product

SE: Status Epilepticus

References:

1. Centers for Disease Control Prevention. Chronic Diseases in USA. Centers for Disease Control and Prevention; 2021. Available from: <http://www.cdc.gov/chronicdisease> [Accessed 24 May 2024].
2. Gourie-Devi, M. (2017). Stigma in epilepsy: The Indian perspective. *Epilepsia Open*, 2(3), 284–291. <https://doi.org/10.1002/epi4.12063>

3. Pandian, J. D., et al. (2018). Stroke in India: Policy gaps and challenges in care delivery. *Journal of the Neurological Sciences*, 388, 59–66. <https://doi.org/10.1016/j.jns.2018.02.003>
4. Natosba J. Burdens and quality of life of chronic disease patients' family caregivers: a systematic review. *Adv Health Sci Res.* 2020;25:412–29. doi:10.2991/ahsr.k.200612.060.
5. Cockerham WC, Hamby BW, Oates GR. The social determinants of chronic disease. *Am J Prevent Med.* 2017;52:S5–12. doi:10.1016/j.amepre.2016.09.010.
6. Skýbová D, Šlachťová H, Tomášková H, Dalecká A, Maďar R. Risk of chronic diseases limiting longevity and healthy aging by lifestyle and socio-economic factors during the life-course—a narrative review. *Medycyna Pracy.* 2021;72:535–48. doi:10.13075/mp.5893.01139.
7. World Health Organization: WHO. (2024, February 7). Epilepsy. <https://www.who.int/news-room/fact-sheets/detail/epilepsy#:~:text=Rates%20of%20disease&text=Globally%2C%20an%20estimated%205%20million,as%20139%20per%20100%20000>.
8. Stacey D, Légaré F, Lewis K, Barry MJ, Bennett CL, Eden KB, et al. Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev.* 2017;4:CD001431. doi: 10.1002/14651858.CD001431.pub5.
9. Anderson L, Jpr B, Am C, Dalal H, Hk R, Bridges C, et al. Patient education in the management of coronary heart disease (review) summary of findings for the main comparison. *Cochrane Database Syst Rev.* 2017;6:CD008895. doi:10.1002/14651858.CD008895.pub3.
10. Falvo D. *Effective Patient Education: A Guide to Increased Compliance.* Boston, MA: Jones & Bartlett Learning; 2004.
11. World Health Organization. *Therapeutic Patient Education: Continuing Education Programmes for Health Care Providers in the Field of Prevention of Chronic Diseases: Report of a WHO Working Group.* Copenhagen: WHO Regional Office for Europe. Available from: <https://apps.who.int/iris/handle/10665/108151>.
12. Strecher VJ, McEvoy DeVellis B, Becker MH, Rosenstock IM. The role of self-efficacy in achieving health behavior change. *Health Educ Q.* 1986;13:73–92. doi:10.1177/109019818601300108.
13. Bandura A. Health promotion by social cognitive means. *Health Educ Behav.* 2004;31:143–64. doi:10.1177/1090198104263660.
14. Peeters B, Van Tongelen I, Duran Z, Yüksel G, Mehuys E, Willems S, et al. Understanding medication adherence among patients of Turkish descent with type 2 diabetes: a qualitative study. *Ethn Health.* 2015;20:87–105. doi:10.1080/13557858.2014.890174.
15. Assal JP. *Therapeutic Patient Education for Chronic Diseases.* In: Gunn SWA, Mansourian PB, Davies AM, Piel A, Sayers BM, editors. *Understanding the Global Dimensions of Health.* Boston, MA: Springer; 2005. doi:10.1007/0-387-24103-5_10.
16. Win KT, Hassan N, Bonney A, Iverson D. Benefits of online health education: perception from consumers and health professionals. *J Med Syst.* 2015;39(3):1–8. doi:10.1007/s10916-015-0224-4.
17. Mollaoğlu M, Beyazıt E. Influence of diabetic education on patient metabolic control. *Appl Nurs Res.* 2009;22(3):183–90. doi:10.1016/j.apnr.2007.12.003.
18. Koivunen M, Hätönen H, Välimäki M. Barriers and facilitators influencing the implementation of an interactive Internet portal application for patient education in psychiatric hospitals. *Patient Educ Couns.* 2008;70(3):412–9. doi:10.1016/j.pec.2007.11.002.
19. Clayman ML, Boberg EW, Makoul G. The use of patient and provider perspectives to develop a patient-oriented website for women diagnosed with breast cancer. *Patient Educ Couns.* 2008;72(3):429–35. doi:10.1016/j.pec.2008.05.032.
20. Begley C, Wagner RG, Abraham A, Beghi E, Newton C, Kwon CS, et al. The global cost of epilepsy: A systematic review and extrapolation. *Epilepsia.* 2022;63(4):892-903. doi:10.1111/epi.17165.
21. Editorial. The rising global burden of stroke. *EClinicalMedicine.* 2023;59:102028. doi:10.1016/j.eclinm.2023.102028.
22. Singh K, Reddy KS, Prabhakaran D. What are the Evidence Based Public Health Interventions for Prevention and Control of NCDs in Relation to India? *Indian J Community Med.* 2011 Dec;36(Suppl 1):S23-31. doi: 10.4103/0970-0218.94705.
23. Waqas A, Correia JC, Ahmad M, Akhtar TN, Meraj H, Angelakis I, Pataky Z. Therapeutic patient education for severe mental disorders: A systematic review. *Glob Ment Health (Camb).* 2024 Oct 10;11:e78. doi: 10.1017/gmh.2024.68.
24. World Health Organization. *Improving patient education: A new guide for policymakers and health professionals to support self-management of chronic conditions.* Available from: <https://www.who.int/europe/news/item/14-11-2023->

25. Bauer MR, Bright EE, MacDonald JJ, Cleary EH, Hines OJ, Stanton AL. Quality of life in patients with pancreatic cancer and their caregivers: A systematic review. *Pancreas*. 2018;47(4):368–75. doi:10.1097/MPA.0000000000001025.
26. Institute of Medicine (US) Committee on the Public Health Dimensions of the Epilepsies, England MJ, Liverman CT, Schultz AM, et al., editors. *Epilepsy across the spectrum: promoting health and understanding*. Washington (DC): National Academies Press (US); 2012. Chapter 7, Educating people with epilepsy and their families [Internet]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK100608/>
27. Yaria J, Gil A, Makanjuola A, Oguntoye R, Miranda JJ, Lazo-Porrás M, Zhang P, Tao X, Ahlgren JÁ, Bernabe-Ortiz A, et al. Quality of stroke guidelines in low- and middle-income countries: a systematic review. *Bull World Health Organ*. 2021 Sep 1;99(9):640-652E. doi: 10.2471/BLT.21.285845.
28. Çevik C, Tekir Ö, Kaya A. Stroke patients' quality of life and compliance with the treatment. *Acta Med Mediterr*. 2018;34:839. doi: 10.19193/0393-6384_2018_3_128.
29. Arif H, Aijaz B, Islam M, Aftab U, Kumar S, Shafqat S. Drug compliance after stroke and myocardial infarction: a comparative study. *Neurol India*. 2007;55(2):130-5. doi: 10.4103/0028-3886.32783.
30. Thomson P, Rushworth GF, Andreis F, Angus NJ, Mohan AR, Leslie SJ. Longitudinal study of the relationship between patients' medication adherence and quality of life outcomes and illness perceptions and beliefs about cardiac rehabilitation. *BMC Cardiovasc Disord*. 2020;20:71. doi: 10.1186/s12872-020-01378-4.
31. Horne R. Compliance, adherence, and concordance: implications for asthma treatment. *Chest*. 2006 Jul;130(1 Suppl):65S-72S. doi: 10.1378/chest.130.1_suppl.65S.
32. Liu Q, Wang M, Guo J, Li J, Li C, Qian M. Effect of socioeconomic status on secondary prevention of stroke. *Int J Qual Health Care*. 2011;23(4):405-12. doi: 10.1093/intqhc/mzr021.
33. Berkovic SF, McIntosh A, Howell R. Familial temporal lobe epilepsy: a common disorder identified in twins. *Ann Neurol*. 1996;40(2):227-35. doi: 10.1002/ana.410400214.
34. Hanneke M. de Boer, Epilepsy stigma: Moving from a global problem to global solutions, *Seizure*, Volume 19, Issue 10, 2010, Pages 630-636, <https://doi.org/10.1016/j.seizure.2010.10.017>.
35. Malek N, Heath CA, Greene J. A review of medication adherence in people with epilepsy. *Acta Neurol Scand*. 2017;135(5):507-15. doi: 10.1111/ane.12703.
36. Horne R, Weinman J, Barber N, Elliott R, Morgan M, Cribb A. *Concordance, adherence and compliance in medicine taking*. 1st ed. London: NCCSDO; 2005.
37. Sabaté E. *Adherence to long-term therapies: evidence for action*. 1st ed. Geneva: World Health Organization; 2003.
38. Gollwitzer S, Kostev K, Hagge M, Lang J, Graf W, Hamer HM. Nonadherence to antiepileptic drugs in Germany: a retrospective, population-based study. *Neurology*. 2016;87(5):466-72. doi: 10.1212/WNL.0000000000002791.
39. Heron M, Hoyert DL, Murphy SL, Xu J, Kochanek KD, Tejada-Vera B. Deaths: final data for 2006. *Natl Vital Stat Rep*. 2009 Apr 17;57(14):1-134. PMID: 19788058.
40. Sacco RL, Adams R, Albers G, Alberts MJ, Benavente O, Furie K, et al. Guidelines for prevention of stroke in patients with ischemic stroke or transient ischemic attack. *Circulation*. 2006 Mar 14;113(10):e409-49. PMID: 16534023.
41. Kumar, Shrawan; Singh, Mamta Bhushan; Kumar, Amit; Padma Srivastava, M V; Goyal, Vinay. Medication Adherence in Indian Epilepsy Patients. *Annals of Indian Academy of Neurology* 24(4):p 501-505, Jul–Aug 2021. | DOI: 10.4103/aian.AIAN_925_20
42. Kalkonde Y, Jadhao S, Deshmukh M, Sen Gupta S, Bang A. Gaps in secondary prevention among stroke survivors in rural Gadchiroli, India: a community-based cross-sectional study. *Wellcome Open Res*. 2020 Nov 3;5:263. doi: 10.12688/wellcomeopenres.16377.1.
43. Rothwell PM, Algra A, Amarenco P. Medical treatment in acute and long-term secondary prevention after transient ischaemic attack and ischaemic stroke. *Lancet*. 2011;377:1681-92. doi: 10.1016/S0140-6736(11)60516-3.
44. Bushnell CD, Zimmer LO, Pan W, Olson DM, Zhao X, Meteleva T, et al. Persistence with stroke prevention medications 3 months after hospitalization. *Arch Neurol*. 2010;67(12):1456-63. doi: 10.1001/archneurol.2010.190.
45. Khan NA, Yun L, Humphries K, Kapral M. Antihypertensive drug use and adherence after stroke: are there sex differences? *Stroke*. 2010;41(7):1445-9. doi: 10.1161/STROKEAHA.110.579375.
46. Osterberg L, Blaschke T. Adherence to medication. *N Engl J Med*. 2005;353(5):487-97. doi: 10.1056/NEJMr050100.

47. Mann DM, Woodward M, Muntner P, Falzon L, Kronish I. Predictors of nonadherence to statins: a systematic review and meta-analysis. *Ann Pharmacother*. 2010;44(9):1410-21. doi: 10.1345/aph.1P150.
48. O'Connor PJ, Sperl-Hillen JAM, Johnson PE, et al. Clinical Inertia and Outpatient Medical Errors. In: Henriksen K, Battles JB, Marks ES, et al., editors. *Advances in Patient Safety: From Research to Implementation (Volume 2: Concepts and Methodology)*. Rockville (MD): Agency for Healthcare Research and Quality (US); 2005 Feb. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK20513/>
49. O'Carroll R, Whittaker J, Hamilton B, Johnston M, Sudlow C, Dennis M. Predictors of adherence to secondary preventive medication in stroke patients. *Ann Behav Med*. 2011;41(3):383-90. doi: 10.1007/s12160-010-9257-6.
50. Chambers JA, O'Carroll RE, Hamilton B, Whittaker J, Johnston M, Sudlow C, Dennis M. Adherence to medication in stroke survivors: a qualitative comparison of low and high adherers. *Br J Health Psychol*. 2011;16(3):592-609. doi: 10.1348/2044-8287.002000.
51. World Health Organization. Epilepsy [Internet]. Available from: <https://www.who.int/news-room/fact-sheets/detail/epilepsy>
52. Feigin VL, Brainin M, Norrving B, Martins S, Sacco RL, Hacke W, et al. World Stroke Organization (WSO): Global Stroke Fact Sheet 2022. *Int J Stroke*. 2022 Jan;17(1):18-29. doi: 10.1177/17474930211065917.
53. O'Connor PJ, Sperl-Hillen JAM, Johnson PE, et al. Clinical inertia and outpatient medical errors. In: Henriksen K, Battles JB, Marks ES, et al., editors. *Advances in patient safety: from research to implementation (Volume 2: Concepts and Methodology)* [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2005 Feb. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK20513/>.
54. Aujoulat I, Jacquemin P, Rietzschel E, Scheen A, Tréfois P, Wens J, et al. Factors associated with clinical inertia: an integrative review. *Adv Med Educ Pract*. 2014;5:141-7. doi:10.2147/AMEP.S59022.
55. Amudhan S, Gururaj G, Satishchandra P. Epilepsy in India II: Impact, burden, and need for a multisectoral public health response. *Ann Indian Acad Neurol*. 2015;18(4):369-81. doi:10.4103/0972-2327.165483.
56. Thomas SV, Sarma PS, Alexander M, Pandit L, Shekhar L, Trivedi C, et al. Economic burden of epilepsy in India. *Epilepsia*. 2001 Aug;42(8):1052-60. doi:10.1046/j.1528-1157.2001.0420081052.x. PMID: 11554893.
57. Kalita J, Bharadwaz MP, Aditi A. Prevalence, contributing factors, and economic implications of strokes among older adults: a study of North-East India. *Sci Rep*. 2023;13:16880. doi:10.1038/s41598-023-43977-z.
58. Kamalakannan S, Gudlavalleti AS, Gudlavalleti VS, Goenka S, Kuper H. Incidence & prevalence of stroke in India: a systematic review. *Indian J Med Res*. 2017;146(2):175-85. doi:10.4103/ijmr.IJMR_516_15.
59. Pandita R, Patel R. A scoping review in Indian post-stroke patients. *Scripta Medica*. 2023;54(4):413-8. doi:10.5937/scriptamed54-46128.
60. Mcllin WM, de Boer HM. Public perceptions about epilepsy. *Epilepsia*. 1995;36(10):957-9.
61. Caveness WF, Gallup GH Jr. A survey of public attitudes towards epilepsy in 1979 with an indication of trends over the past thirty years. *Epilepsy*. 1980;21(5):509-18.
62. Cusack L, Del Mar CB, Chalmers I, Gibson E, Hoffmann TC. Educational interventions to improve people's understanding of key concepts in assessing the effects of health interventions: a systematic review. *Syst Rev*. 2018 May 2;7(1):68. doi:10.1186/s13643-018-0719-4.
63. Pandita R, Patel R. Impact of care gaps in epileptic patients in India—A review. *Preprints*. 2024;2024051147. doi:10.20944/preprints202405.1147.v1.