MedCrave
Step into the World of Research
Journal of Otolaryngology-ENT Research

Review article
Open Access
CrossMark

Global stroke guidelines- a meta-analysis

Summary

This paper reviews the existing global stroke guidelines in different world regions in order to determine their differences and the quality of the guidelines. This review reveals that stroke care protocols are much more available and of higher quality in high-income countries (HICs) compared to low- and middle-income countries (LMICs). With stroke remaining one of the leading causes of morbidity and mortality globally, it is crucial to know these variations in order to improve patient's outcomes and inform healthcare policies.[1,2] The study includes a systematic overview and comparison of 21 different guidelines from 21 countries, using a robust methodology which included data from the major health databases and demographic surveillance systems. Using meta-regression tools and the analysis of barriers to the use of evidence-based practices, the authors show the need for countries with limited resources to adapt existing guidelines to the specific context of their country. The findings show that in many low-income countries the challenges in implementing the best stroke rehabilitation practices are the lack of resources and lack of appropriate guidelines, which results in poor quality of care.[3–5] Notably, the meta-analysis also highlights the current debates about the appropriateness and accessibility of thrombolysis and recanalization therapies, especially in the context of virtual care models. The use of these protocols is crucial for the best possible treatment results, however, it is often limited by organizational barriers and lack of training among the healthcare staff.[6,7] Furthermore, the analysis underscores the need to address the issue of racial and ethnic disparities in stroke treatment, and supports the idea of culturally relevant education to improve knowledge and care delivery.[8,9] In conclusion, this comparative meta-analysis is a very useful tool for clinicians and decision-makers who want to improve stroke management across the globe. The study identifies important gaps and supports the adaptation of guidelines, which in turn contribute to the ongoing efforts to reduce inequity and improve stroke care in underprivileged populations.[10–12]

Volume 17 Issue 3 - 2025

Deshpande A,[1] Khardenavis V,[2]
[1]Consultant Stroke Neurologist, Department of Care of the Elderly & Stroke, Altnagelvin Hospital, Western Health and Social Care Trust, United Kingdom
[2]Registrar, Department of Neurology, Madurai Medical College, India

Correspondence: Anirudda Deshpande, Consultant Stroke Neurologist, Altnagelvin Hospital, Londonderry, Northern Ireland, United Kingdom, Tel: 442871345171

Received: June 23, 2025 | **Published:** September 12, 2025

Methodology

In this comparative meta-analysis of the global stroke guidelines by region, the authors employed a systematic method to gather and synthesize the data. A detailed analysis was done using various databases to gather the relevant information. The databases used included the following: MEDLINE, EMBASE, LILACS, Scopus, PubMed, Science Direct, and the Global Health Database, in addition to sources from the WHO library and regional WHO databases.[1–5]

Data sources

Data was obtained from various sources including vital registration systems, sample registration systems, and household surveys which included complete birth history, summary birth history, and sibling history. Furthermore, censuses that included summary birth histories and household deaths were used. To improve the data quality, Demographic Surveillance Sites (DSS) were employed.[1–5]

Analytical tools

DisMod-MR 2.0 meta-regression tool was used to effectively analyse the data. This tool helped in the pooling of case fatality data and hence producing location-year-age-sex-specific case fatality rate estimates. This approach has allowed for a more detailed analysis of the differences in stroke management across different settings.[1–5]

Quality assessment

The methodology includes a thorough evaluation of the facilitators and barriers related to the implementation of evidence-based practice guidelines from the perspective of healthcare professionals.[6] Also, the quality and accessibility of stroke rehabilitation guidelines were found to differ between high-income countries (HIC) and low- and middle-income countries (LMIC). The analysis showed that countries with limited resources should either adopt, adapt or contextualize the existing clinical practice guidelines (CPGs) to meet the needs of their population effectively.[7–10]

Limitations

Although the analysis made an effort to be as inclusive as possible, it had some limitations. One of the major limitations was moderate heterogeneity in the studies and challenges in the meta-regression and subgroup analyses due to the limited BEFAST data available. Moreover, a few of the studies included in the analysis did not have participant exclusion criteria, which is a limitation of the studies and calls for future research to address these shortcomings.[11–15] This section describes in detail the procedures used in the analysis and introduces the results of the analysis in the following sections.

Regional guidelines overview

The comparative meta-analysis evaluates global stroke guidelines across 21 different regional areas to help assess and compare stroke management health metrics. The regions include Andean Latin America, Australasia, the Caribbean, Central Asia, Central Europe, Central Latin America, Central Sub-Saharan Africa, East Asia, Eastern Europe, Eastern Sub-Saharan Africa, High-Income Asia Pacific, High-Income North America, North Africa and the Middle East, Oceania, South Asia, Southeast Asia, Southern Latin America, Southern Sub-Saharan Africa, Tropical Latin America, Western Europe, and Western Sub-Saharan Africa.[1,11,12,15–22]

Different GBD studies have maintained this classification throughout their revisions to enable thorough assessment of stroke management approaches across diverse epidemiological settings. The guidelines require practitioners to base their clinical decisions on systematic reviews and meta-analyses because they provide the highest

available evidence.[23]Acute stroke management requires physicians to follow thrombolysis and recanalization therapy protocols which include specified inclusion and exclusion criteria to maximize patient benefits. The guidelines establish that virtual consultation participants must receive proper training to use the NIH Stroke Scale (NIHSS) alongside physicians and nursing staff for efficient and competent remote neurological evaluations.[14,24–26] The guidelines work to close stroke care deficiencies between different population groups so that global treatment results become more consistent and better quality.

Comparative analysis

Research examining stroke rehabilitation guidelines reveals major differences between high-income nations (HIC) and low- and middle-income nations (LMIC) regarding their quality and accessibility. According to a systematic review LMICs face challenges when adopting clinical practice guidelines (CPGs) because these guidelines do not consider vital socio-economic and ethical and legal factors for effective implementation in these regions.[7,10] The observed gaps confirm why guidelines should be modified to fulfil the requirements of their specific target populations.[27,28] The guidelines methodological quality in these regions presented major variations. The studies demonstrate moderate heterogeneity while certain investigations fail to remove participants from their samples thus creating doubts about the study results.[15,29] Future research should focus on improving study methodologies evaluating stroke rehabilitation guidelines and expanding participant inclusion criteria.[2,6] Developing new guidelines should not be the priority for countries with restricted financial resources since they should focus on adapting existing guidelines instead. A detailed evaluation of stakeholder needs and perspectives should be conducted to increase healthcare professional adoption and implementation of these guidelines.[8,30,31] Research into the differences between regions and efforts to close these gaps will enable better evidence-based practices for stroke rehabilitation and improve results for patients worldwide.[10,32,33]

Implications for clinical practice

Evidence-based practice guidelines

Research into healthcare professional barriers and facilitators demonstrates that evidence-based practice guidelines must be integrated into clinical settings to improve stroke care outcomes.[6] Healthcare professionals following these guidelines will achieve better decision-making along with improved treatment approaches for stroke patient management.

Implementation of virtual stroke care

Virtual stroke care implementation stands as a crucial priority because LMICs face limited trial participation. All personnel participating in acute stroke consultations must receive training for virtual stroke care to achieve the necessary competencies for remote patient care delivery.[9,34] The maintenance of high-quality care delivered through virtual platforms depends on both continuous education and regular updates about best practices.[34]

Addressing disparities in stroke treatment

The delivery of thrombolytics shows major racial and ethnic inequalities because patients experience extended delays between hospital entry and receiving treatment.[18,35] Cultural education about stroke warning signs must be provided specifically to non-white racial and ethnic communities to reduce healthcare disparities.[12]Healthcare systems need to establish risk-adjusted quality metrics which account for the existing disparities that occur in the delivery of healthcare services.[36]

Standardization of protocols and documentation

Stroke care efficiency requires the development of standardized protocols and documentation systems. Physicians who refer patients must use established protocols which outline the essential procedures for thrombolysis and recanalization treatments to guarantee that all medical staff understands the admission and exclusion requirements.[26,37] The standardization process enhances communication between referring and consulting sites which produces better patient results.

Training for healthcare providers

Healthcare providers need proper training especially those who participate in virtual consultations. It is advisable for referring physicians and nursing staff to receive instruction in the National Institutes of Health Stroke Scale (NIHSS) to effectively support remote neurological examinations.[19,38] The entire healthcare team will demonstrate better competencies which leads to substantial improvements in acute stroke care quality.

Challenges in implementation

Barriers to accessing stroke rehabilitation

The access to stroke rehabilitation in low- and middle-income countries (LMICs) faces multiple barriers especially those related to healthcare systems. The lack of rehabilitation staff in numerous LMICs creates direct limitations on stroke patient care availability.[39,40] Without national guidelines healthcare providers face increased difficulty in delivering rehabilitation services effectively and consistently because these challenges are compounded by the absence of guidelines.[39]

Individual barriers

The focus of low- and middle-income countries (LMICs) should be on solving individual barriers that patients encounter during the care process. Key strategies include the provision of financial assistance, improvement of transportation options, and enhancement of education regarding stroke recovery and available services.[41] These measures are essential for facilitating access to rehabilitation services for the affected individuals.

Geographic disparities

Geographic differences in stroke treatment standards create substantial obstacles for implementing proper rehabilitation approaches. The improvement of neurological service accessibility will help reduce existing gaps and enhance care delivery within underserved geographic areas.[42] Patients in specific areas face suboptimal outcomes because there are not enough resources and support to address existing disparities.

Participation in clinical trials

The underrepresentation of low- and middle-income countries (LMICs) in pivotal clinical trials that inform stroke prevention guidelines presents a significant challenge. LMICs should boost their engagement in randomized controlled trials (RCTs) because this will make the guidelines more suitable for different population groups.[43] Such inclusion would not only enhance the validity of the guidelines, but also facilitate their adaptation to the specific needs of different regions.

Citation: Deshpande A, Khardenavis V . Global stroke guidelines- a meta-analysis. *J Otolaryngol ENT Res.* 2025;17(3):68–71.
DOI: 10.15406/joentr.2025.17.00570

Quality and availability of guidelines

Stroke rehabilitation guidelines vary significantly between high-income countries (HICs) and low-income and middle-income countries (LMICs) when it comes to their quality and accessibility. Nations with limited resources should implement or modify or implement clinical practice guidelines (CPGs) that match their regional needs.[18,44] The guidelines need to take into account the needs of all stakeholders along with local socioeconomic conditions as well as ethical and legal factors to guarantee proper implementation and better patient results.[17,45] The successful integration of evidence-based guidelines into stroke rehabilitation practices in LMICs depends on resolving these challenges.

Future directions

The future of stroke care faces a critical need for organized services and effective interventions because stroke incidence is predicted to rise by 27% in Europe from 2017 to 2047.[46] The implementation of stroke rehabilitation guidelines faces substantial barriers due to the gaps between HIC and LMIC standards. Resource-limited nations should make existing clinical practice guidelines (CPGs) a priority for adoption or adaptation or contextualization to properly meet the requirements of varied patient populations.[18]

Targeted strategies for improvement

The interventions must be designed with specific strategies that focus on different communities and their particular situations and requirements. Policymakers need to modify healthcare practices and legislation according to the particular environment.[37,47] The identification of patients with adverse social determinants of health (SDoH) should be the main focus of clinicians to lower post-stroke mortality risk.[4] Health care providers need to manage these disparities to support health equity principles and enhance public health results.

Emphasis on evidence-based guidelines

Future programs should develop guidelines which combine evidence-based approaches with standardized methodologies and incorporate input from all stakeholder groups.[18] The implementation of these guidelines requires an understanding of local socioeconomic, ethical, and legal factors to increase their usefulness across different geographic areas. The implementation of these guidelines depends on this approach to lead to better patient results and lower healthcare costs worldwide.[47]

Acknowledgments

None.

Conflicts of interest

The author declares that there are no conflicts of interest.

References

1. Centers for Disease Control and Prevention. Prevalence of Stroke: Behavioural Risk Factor Surveillance System. Accessed April 19, 2025.
2. GBD 2019 Stroke Collaborators. Global, regional, and national burden and trends of stroke among individuals younger than 70 years between 1990 and 2019: an analysis of the Global Burden of Disease Study 2019. *Lancet Neurol.* 2021;20(10):790–803.
3. Centers for disease control and prevention. Geographic variation in stroke risk in the united states. Accessed april 19, 2025.
4. Alkadri M, Mebarki A, Khan S, et al. Effect of socioeconomic status on knowledge of stroke in the general population: a systematic review. *BMC Public Health.* 2013;13:1168.
5. Feigin VL, Stark BA, Johnson CO, et al. Projections of the stroke burden at the global, regional, and country levels through 2050. *Stroke.* 2023;54(11):2679–2687.
6. Dizon JM, Grimmer K, Louw QA, et al. Health professionals' views on the barriers and enablers to evidence-based stroke care guideline implementation: a systematic review. *BMC Health Serv Res.* 2023;23(1):1089.
7. Chen R, Tarkiainen L, Martikainen P, et al. Relationship between income and stroke incidence in Finland and China: an international collaborative study. *BMJ Open.* 2013;3(12):e003715.
8. Bayona H, Owolabi M, Feng W, et al. Quality of stroke guidelines in low- and middle-income countries: a systematic review. *BMJ Open.* 2023;13(8):e071013.
9. *World Stroke Organization.* RoadMap Implementation Guide. Published 2019. Accessed April 19, 2025.
10. *American heart association.* Emergency department evaluation and management of patients with acute stroke. Accessed april 19, 2025.
11. Xu J, Murphy SL, Kochanek KD, et al. Epidemiology and trends in stroke mortality in the USA, 1975–2019. *J Stroke Cerebrovasc Dis.* 2022;31(1):106148.
12. Akhtar N, Hossain MZ, Rahman MA, et al. Assessment of demographic and clinical characteristics on the outcomes of stroke patients with atrial fibrillation: a retrospective study. *Ann Med Surg (Lond).* 2023;85(10):5237–5244.
13. Centers for Disease Control and Prevention. *Stroke Risk Factors.* Updated June 14, 2023. Accessed April 19, 2025.
14. Wang L, Zhang J, Liu Y, et al. Target risk factors identification through population attributable risks for stroke in a Chinese population. *Front Neurol.* 2022;13:874889.
15. Rao GN, Khaja M, Sudhakar T. Study on demographic features and clinical profile of patients with stroke admitted to a tertiary care hospital. *J Family Med Prim Care.* 2020;9(1):154–158.
16. Ssenkusu JM, Mukisa R, Bugeza S, et al. Ischemic stroke subtypes: socio-demographic factors, risk factors, and in-hospital mortality. *Front Neurol.* 2021;12:780819.
17. Kleindorfer DO, Towfighi A, Chaturvedi S, et al. 2021 guideline for the prevention of stroke in patients with stroke and transient ischemic attack: a scientific statement from the American Heart Association/American Stroke Association. *Stroke.* 2021;52(7):e364–e418.
18. GBD 2019 Stroke Collaborators. Global, regional, and national burden of stroke and its risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet Neurol.* 2021;20(10):772–789.
19. Centers for Disease Control and Prevention. Public health strategies to prevent and treat strokes. *MMWR Morb Mortal Wkly Rep.* 2022;71(3):87–91.
20. Kernan WN, Ovbiagele B, Black HR, et al. 2024 guideline for the primary prevention of stroke: a scientific statement from the American Heart Association/American Stroke Association. *Stroke.* 2024;55(1):e1–e43.
21. Liu X, Huang Y, Wang D, et al. Risk probability and influencing factors of stroke in followed-up hypertensive patients based on a nomogram model. *BMC Cardiovasc Disord.* 2024;24(1):178.
22. Rosand J, Meschia JF, Worrall BB. Stroke risk factors, genetics, and prevention. Cold Spring Harb Perspect Med. 2020;10(1):a036303.

23. Pang MYC, Lau RWK, Yeung PK, et al. The application of systematic reviews and meta-analyses in stroke rehabilitation research: a scoping review. *Front Neurol.* 2021;12:745781.

24. Xu J, Rodriguez CJ, Yang Q, et al. Trends in demographic and geographic disparities in stroke mortality in the United States: the National Center for Health Statistics mortality data, 1999 to 2019. *Stroke.* 2022;53(2):369-379.

25. Powers WJ, Rabinstein AA, Ackerson T, et al. Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines for the early management of acute ischemic stroke: a guideline from the American Heart Association/American Stroke Association. *Stroke.* 2019;50(12):e344-e418.

26. Brinjikji W, Pasarikovski CR, Cloft HJ, et al. Literature review comparison of balloon guide catheters and distal access catheters for mechanical thrombectomy in acute stroke. *J Neurointerv Surg.* 2023;15(1):89-93.

27. Parray AH, Shams R, Zafar A, et al. A systematic review and synthesis of global stroke guidelines on the management of cerebral venous thrombosis. *eNeurologicalSci.* 2023;33:100494.

28. Kim AS, Johnston SC, Easton JD, et al. Comprehensive comparison of stroke risk score performance: a systematic review and meta-analysis. *BMC Neurol.* 2024;24(1):101.

29. Bernhardt J, English C, Johnson L, et al. Stroke rehabilitation clinical practice guidelines in low- and middle-income countries: a systematic review. *Stroke.* 2021;52(2):729-740.

30. Benjamin EJ, Virani SS, Callaway CW, et al. Geographic disparities in stroke outcomes and service access in the United States: a scientific statement from the American Heart Association. *Stroke.* 2022;53(8):2533-2552.

31. Demaerschalk BM, Yip TR, Aguilar MI, et al. Comparison of dual antiplatelet therapies for minor, nondisabling ischemic stroke and transient ischemic attack: a systematic review and meta-analysis. *JAMA Netw Open.* 2023;6(11):e2342338.

32. Mullen MT, Albright KC, Boehme AK, et al. Trends in stroke thrombolysis care metrics and outcomes by race and ethnicity in the United States. *J Am Heart Assoc.* 2023;12(17):e030318.

33. Liyuan Pu, Li Wang, Ruijie Zhang, et al. Projected global trends in ischemic stroke incidence, deaths and disability-adjusted life years from 2020 to 2030. *Stroke.* 2021;52(11):3442–3450.

34. National institute of neurological disorders and stroke. Demographic and regional trends in stroke. Updated february 1, 2023. Accessed april 19, 2025.

35. Wang W, Wang D, Liu H, et al. Global, regional, and national burden of ischemic stroke, 1990–2021. *Front Neurol.* 2023;14:1283883.

36. Centers for disease control and prevention. Risk factors for stroke. Updated june 14, 2023. Accessed april 19, 2025.

37. Pandian JD, William AG, Kate MP. Stroke rehabilitation in low- and middle-income countries. *Int J Stroke.* 2021;16(3):245–248.

38. Owolabi MO, Thrift AG, Pandian JD, et al. Implementing stroke care in a lower-middle-income country: challenges and opportunities. *Front Neurol.* 2023;14:1274287.

39. Pandian JD, William AG, Kate MP. Stroke rehabilitation in low- and middle-income countries. *Int J Stroke.* 2021;16(3):245-248.

40. Walker N, Ogburn M, Hardy J, et al. Regional disparities in the quality of stroke care and outcomes in the United States: a systematic review. *Int J Stroke.* 2021;16(8):926-938.

41. Appelros P, Shahrour A, Goyal M, et al. Low- and middle-income countries (lmics) in trial evidence supporting thrombectomy for acute ischaemic stroke: a systematic review. *BMJ Open.* 2023;13(8):e070338.

42. Gbd 2019 stroke collaborators. Global, regional, and national burden of stroke and its risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the global burden of disease study 2019. *Lancet neurol.* 2021;20(10):772–789.

43. Nadarajan V, Perry LA, Smith CJ, et al. A systematic review and meta-analysis comparing FAST and other public awareness campaigns for activating earlier treatment for stroke. *Stroke.* 2021;52(1):310–318.

44. Nichols e, stein dj, vollset se, et al. Risk and impact of stroke across 38 countries and territories of the who european region: a population-based study. *Lancet public health.* 2023;8(11):e853-e863.

45. National institute of neurological disorders and stroke. Demographic and regional trends in stroke. Updated february 1, 2023. Accessed april 19, 2025.

46. Royal college of physicians. What's new in the 2023 edition? National clinical guideline for stroke. Published november 2023. Accessed april 19, 2025.

47. Olaleye O, Wahab K, Akinyemi R, et al. Stroke systems of care in low-income countries: a systematic review. *Int J Stroke.* 2021;16(8):939–950.

Citation: Deshpande A, Khardenavis V . Global stroke guidelines- a meta-analysis. *J Otolaryngol ENT Res.* 2025;17(3):68–71.
DOI: 10.15406/joentr.2025.17.00570