UNIVERSITY^{OF} BIRMINGHAM University of Birmingham Research at Birmingham

Lasting impairments following transient ischemic attack and minor stroke: a systematic review protocol

Hede Ebbesen, Birgitte; Modrau, Boris; Kontou, Eirini; Finch, Emma; Crowfoot, Gary; Crow, Jennifer; Heron, Neil; Hodson, Tenelle; Skrubbeltrang, Conni; Turner, Grace

DOI: 10.3389/fneur.2023.1177309

License: Creative Commons: Attribution (CC BY)

Document Version Publisher's PDF, also known as Version of record

Citation for published version (Harvard):

Hede Ebbesen, B, Modrau, B, Kontou, E, Finch, E, Crowfoot, G, Crow, J, Heron, N, Hodson, T, Skrubbeltrang, C & Turner, G 2023, 'Lasting impairments following transient ischemic attack and minor stroke: a systematic review protocol', *Frontiers in neurology*, vol. 14, 1177309. https://doi.org/10.3389/fneur.2023.1177309

Link to publication on Research at Birmingham portal

General rights

Unless a licence is specified above, all rights (including copyright and moral rights) in this document are retained by the authors and/or the copyright holders. The express permission of the copyright holder must be obtained for any use of this material other than for purposes permitted by law.

•Users may freely distribute the URL that is used to identify this publication.

•Users may download and/or print one copy of the publication from the University of Birmingham research portal for the purpose of private study or non-commercial research.

•User may use extracts from the document in line with the concept of 'fair dealing' under the Copyright, Designs and Patents Act 1988 (?) •Users may not further distribute the material nor use it for the purposes of commercial gain.

Where a licence is displayed above, please note the terms and conditions of the licence govern your use of this document.

When citing, please reference the published version.

Take down policy

While the University of Birmingham exercises care and attention in making items available there are rare occasions when an item has been uploaded in error or has been deemed to be commercially or otherwise sensitive.

If you believe that this is the case for this document, please contact UBIRA@lists.bham.ac.uk providing details and we will remove access to the work immediately and investigate.

Check for updates

OPEN ACCESS

EDITED BY Jiang Li, Geisinger Medical Center, United States

REVIEWED BY Edward Feldmann, Brown University, United States Jesper Petersson, Region Skane, Sweden

*CORRESPONDENCE Birgitte Hede Ebbesen ⊠ bihc@rn.dk

RECEIVED 01 March 2023 ACCEPTED 20 April 2023 PUBLISHED 12 May 2023

CITATION

Hede Ebbesen B, Modrau B, Kontou E, Finch E, Crowfoot G, Crow J, Heron N, Hodson T, Skrubbeltrang C and Turner G (2023) Lasting impairments following transient ischemic attack and minor stroke: a systematic review protocol.

Front. Neurol. 14:1177309. doi: 10.3389/fneur.2023.1177309

COPYRIGHT

© 2023 Hede Ebbesen, Modrau, Kontou, Finch, Crowfoot, Crow, Heron, Hodson, Skrubbeltrang and Turner. This is an openaccess article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Lasting impairments following transient ischemic attack and minor stroke: a systematic review protocol

Birgitte Hede Ebbesen^{1,2,3}*, Boris Modrau³, Eirini Kontou^{4,5}, Emma Finch^{6,7,8}, Gary Crowfoot⁹, Jennifer Crow¹⁰, Neil Heron^{11,12}, Tenelle Hodson¹³, Conni Skrubbeltrang¹⁴ and Grace Turner¹⁵

¹Department of Physiotherapy and Occupational Therapy, Aalborg University Hospital, Aalborg, Denmark, ²Department of Health Science and Technology, Aalborg University, Aalborg, Denmark, ³Department of Neurology, Aalborg University Hospital, Aalborg University, Aalborg, Denmark, ⁴Mental Health and Clinical Neurosciences, School of Medicine, University of Nottingham, Nottingham, United Kingdom, ⁵Institute of Mental Health, Nottinghamshire Healthcare NHS Foundation Trust, Nottingham, United Kingdom, ⁶Research and Innovation, West Moreton Health, Ipswich, QLD, Australia, ⁷Speech Pathology Department, Princess Alexandra Hospital, Woolloongabba, QLD, Australia, ⁸School of Health and Rehabilitation Sciences, The University of Queensland, Brisbane, QLD, Australia, ⁸School of Nursing and Midwifery, College of Health, Medicine and Wellbeing, University of Newcastle, Callaghan, NSW, Australia, ¹⁰Department of Brain Sciences, Imperial College London, Imperial College Healthcare NHS Trust, London, United Kingdom, ¹¹Centre for Public Health, Queen's University Belfast, Belfast, Ireland, ¹²School of Medicine, Keele University, Staffordshire, United Kingdom, ¹³School of Health Sciences and Social Work and The Hopkins Centre, Menzies Health Institute Queensland, Griffith University, Nathan, QLD, Australia, ¹⁴Medical Library, Aalborg University Hospital, Aalborg, Denmark, ¹⁵Institute of Applied Health Research, University of Birmingham, Birmingham, United Kingdom

Introduction: The focus on medical management and secondary prevention following Transient Ischemic Attack (TIA) and minor stroke is well-established. Evidence is emerging that people with TIA and minor stroke can experience lasting impairments as fatigue, depression, anxiety, cognitive impairment, and communication difficulties. These impairments are often underrecognized and inconsistently treated. Research in this area is developing rapidly and an updated systematic review is required to evaluate new evidence as it emerges. This living systematic review aims to describe the prevalence of lasting impairments and how they affect the lives of people with TIA and minor stroke. Furthermore, we will explore whether there are differences in impairments experienced by people with TIA compared to minor stroke.

Methods: Systematic searches of PubMed, EMBASE, CINAHL, PsycINFO, Cochrane Libraries will be undertaken. The protocol will follow the Cochrane living systematic review guideline with an update annually. A team of interdisciplinary reviewers will independently screen search results, identify relevant studies based on the defined criteria, conduct quality assessments, and extract data. This systematic review will include quantitative studies on people with TIA and/or minor stroke that report on outcomes in relation to fatigue, cognitive and communication impairments, depression, anxiety, quality of life, return to work/education, or social participation. Where possible, findings will be grouped for TIA and minor stroke and collated according to the time that follow-up occurred (short-term < 3 months, medium-term 3–12 months, and long-term > 12 months). Sub-group analysis on TIA and minor stroke will be performed based on results from the included studies. Data from individual studies will be pooled to perform meta-analysis where possible. Reporting will follow the Preferred Reporting Items for Systematic review and Meta-Analysis Protocol (PRISMA-P) guideline.

Perspectives: This living systematic review will collate the latest knowledge on lasting impairments and how these affect the lives of people with TIA and minor stroke. It will seek to guide and support future research on impairments emphasizing distinctions between TIA and minor stroke. Finally, this evidence will allow healthcare professionals to improve follow-up care for people with TIA and minor stroke by supporting them to identify and address lasting impairments.

KEYWORDS

transient ischemic attack, TIA, minor stroke, mild stroke, impairments, systematic review, protocol

1. Introduction

Evidence of lasting impairments following transient ischemic attack (TIA) and minor stroke has emerged over the last two decades. These impairments include fatigue, cognitive difficulties, depression, and anxiety (1-6). Some people with TIA experience lasting impairments despite a diagnosis of TIA where definitions state that symptoms should resolve completely within 24h. The lack of consensus on how TIA should be defined is problematic. The timebased definition states that symptoms should resolve within 24h (7), whereas the tissue-based definition is not limited by time, but based on the absence of an acute infarction on imaging (8). Definitions of minor stroke also vary (9). The extent of disability can be used to define whether a stroke is minor or not. However, several different measures are used to identify the level of disability. The National Institute of Health Stroke Scale (NIHSS) is commonly used to define minor stroke, with a score of 5 or less being considered a minor stroke (10). Yet, variability exists with cut-offs within the literature (11, 12). Another way of defining minor stroke is to broadly describe it as an ischemic event resulting in minor neurological impairment or disability (13).

Persons with TIA and minor stroke are often quickly discharged from acute health services and have limited follow up through services such as outpatient clinics. The importance of secondary prevention to avoid recurrent events is well established and clearly outlined in international guidelines (7). In contrast, there are no guidelines that specifically address how best to support people with lasting impairments following TIA or minor stroke to resume usual daily activities.

Two quantitative systematic reviews (1, 2) on lasting impairments following TIA and/or minor stroke have been published. Moran et al. found high levels of cognitive impairment and depression following TIA or minor stroke (2). Cognitive impairments in TIA or minor stroke were reported in 13 of 31 studies but variations were reported in the measurement tools and prevalence (17% to 54%) (2). A limited number of studies reported evidence of anxiety (14, 15) and fatigue in both TIA and minor stroke (16-18). In their systematic review, Rooij et al. found high variation in reported rates of cognitive impairment following TIA and concluded that mild cognitive impairment is present in more than one third of people who experience TIA (1). The findings from these reviews provide evidence of lasting impacts related to cognition, fatigue, and psychological well-being. However, an updated review in this rapidly evolving field of research that more comprehensively captures the lasting impacts of TIA and minor stroke is warranted. For instance, recent research has published and solidified findings around emotional impairments following TIA and minor stroke (4, 6, 18), fatigue following minor stroke (17), and impairments in communication, quality of life, social participation and return to work following minor stroke (9). Also the qualitative research describes life-altering experiences following TIA or minor stroke with changes in multiple life-domains, which were overlooked and undetected by healthcare professionals (19).

An updated, living systematic review that evaluates new evidence, as it emerges, is required to capture the rapidly growing body of research in this area. Thus, we aim to describe a protocol for a living systematic review on lasting impairments following TIA or minor stroke. The review will be an updated version of the systematic review by Moran et al. (2). Furthermore, it will be an extended version by including additional impairments identified in the recent literature. The review will guide future research and support healthcare professionals to deliver evidence-based care.

2. Materials and methods

This protocol describes a living systematic review which is defined as "a systematic review that is continually updated, incorporating relevant new evidence as it becomes available" (20, p. 6). The Cochrane guidelines for a living systematic review will be followed (20). Reasons for making the systematic review living are the rapidly growing research in this area and the need for timely updates on the available evidence. There is still uncertainty in the existing body of literature on lasting impairments following TIA or minor stroke and a living systematic review will allow to regularly incorporate new and relevant research. The reporting of the protocol also follows the Preferred Reporting Items for Systematic review and Meta-Analysis Protocol (PRISMA-P) guideline.

2.1. Eligibility for study inclusion

2.1.1. Participants

Participants in the included studies must be 18 years or older. If younger participants are included 90% of the total sample must be over 18 years of age (2), since this review aims to describe the adults experiences which can differ from that of children. All studies that state inclusion of participants with TIA, minor stroke, mild stroke, non-disabling stroke, or reversible stroke will be included. All stated definitions on TIA or minor stroke will be eligible and so no limitations on neuroimaging, outcome scores or similar will be used. This is to ensure the inclusion of relevant studies despite the inconsistencies in TIA and minor stroke definitions and terminology used in the published research literature. Studies including participants who have received reperfusion therapy is also eligible for inclusion as long as they are diagnosed minor stroke at discharge. Studies including other types of stroke or neurological disorders will only be included if it is possible to extract outcomes and data separately for TIA and/or minor stroke. Participants with described "silent" strokes are not included in the review, since it is not possible to determine symptoms and impairment in relation to ischemic lesions occurred back in time.

2.1.2. Design and outcome

All study designs with quantitative outcomes are eligible for inclusion except singe-case designs, reviews, or expert opinions. Interventional studies where the intervention comprises of interventions post discharge on participant with TIA or minor stroke will be included if it is possible to extract data on participants who only receive usual care, since this is not a review of the effects of interventions.

Studies reporting on the following outcomes will be included: fatigue, cognitive and communication impairments, depression, anxiety, quality of life, return to work/education or social participation. There will be no restrictions on the length of follow-up or time since TIA or minor stroke.

2.2. Information sources

Systematic searches will be conducted in PubMed (National Library of Medicine), Embase (Elsevier), CINAHL with Full Text (Ebsco), PsycInfo (APA PsycNet), and Cochrane Library (Wiley).

References from included studies will be scanned and tracked through the cited reference search in Scopus (Elsevier) to secure the inclusion of all relevant studies.

2.3. Search strategy

A comprehensive search strategy has been developed using both controlled vocabulary terms (i.e., MeSH terms) adapted for each database and natural language words for TIA and a variety of words covering different impairments. Search terms have been established by initial searches in all included databases and builds upon the strategy developed in a previously published review by Moran et al. (2). The search strategy was created in cooperation with specialist medical librarians.

To combine and expand upon the previous review Moran et al. (2) the searches will be limited to publication years from 2013. There will be no restrictions to language.

A detailed draft of search strategies for all databases can be found in Additional File 1.

Search strategies have been peer reviewed by a specialist medical librarian outside the author group and will be run annually to identify new relevant studies. The search strategy will also be updated every year to ensure that it reflects the relevant terminology in the research area and the included search databases.

2.4. Data management and selection process

Records will be imported to, and the review process handled in, the systematic review software Covidence (21).

Two interdisciplinary reviewers will independently screen title and abstracts to include full text articles. Any disagreements will be resolved by consensus. Interdisciplinary reviewers will independently screen the retrieved full text articles for the defined inclusion criteria.

The described procedure for data management and selection of full text articles will be applied every year for the updated searches.

2.5. Quality assessment

Quality assessment will be assessed by two independent reviewers. Based on the study design of the included studies, appropriate checklists from the Joanna Briggs Institute will be used to asses quality and risk of bias (22). When one or more from the author group are listed as authors of included studies, other members of the author group will perform the quality assessment and data extraction.

The described procedures for quality assessments and risk of bias will be applied every year for new relevant studies identified in the updated searches.

2.6. Data extraction and analysis of results

Data will be extracted in duplicates by two independent reviewers and compared to reach consensus on the final data extraction. A data extraction form will be developed to extract data on bibliographic information, study design, population, risk of bias assessments, possible comparators, measurement tool and outcomes (both numerical results and effect estimates) (23). The data extraction will be handled in Covidence and Microsoft Excel/Research Electronic Data Capture (REDCap). In case of missing data the original investigators of the study will be contacted to obtain the relevant data. If the same study is published in multiple publications, the review authors will extract and combine any relevant data. If in doubt of which data to include, the original publication will be prioritized.

Results of lasting impairments will be categorized and summarized according to the domains of identified difficulties (depression, anxiety, fatigue, quality of life, communication, and cognitive impairments, return to work/education and social participation). Furthermore, results will be reported based on length of follow-up (short-term < 3 months, medium-term 3–12 months, and long-term > 12 months). If appropriate sub-group analysis on definitions of TIA and minor stroke will be performed based on the results and participant characteristics in the included studies.

The results for the individual outcomes will be pooled to conduct meta-analysis if studies demonstrate clinical and methodological homogeneity. Only studies that demonstrate moderate or low risk of bias will be included in meta-analysis. Homogeneity will be evaluated based on the comparability of study designs, results confidence intervals and risk of bias as well as statistically using Chi-square in conjunction with I² statistics where I²<60% is considered homogeneous a random-effects model will be used to pool estimates (23–25). If deemed suitable meta-analysis will also be performed for the sub-group populations. Sensitivity analysis will be performed and these will be specified during the selection process as described by the Cochrane Handbook of Systematic Reviews (25).

A narrative synthesis of results will be provided when a metaanalysis is not appropriate due to heterogeneity.

2.7. Transitioning out of living mode

Whether or not the living systematic review should continue to be in living mode will be evaluated each year (20). This review will transition out of living mode if the described uncertainties in lasting impairments following TIA or minor stroke no longer exists or if no new research emerges that can impact the conclusions of the review (20). When the review transitions out of living mode, this will be described in the latest update.

3. Synthesis of results

Results will be presented in accordance with the described domains, length of follow-up and sub-group analysis. All included studies will be summarized in a table presenting study design, participant characteristics, sample size, outcomes, and measurement tools used.

When updates of the living systematic review have been performed, new studies will be presented in "What's New" tables as proposed by Cochrane guidelines (20). A new publication of the systematic review with summarized results and meta-analysis will be conducted when the authors assess that new evidence alters the nature and understanding of impairments following TIA or minor stroke.

4. Discussion

Research in the area of lasting impairments following TIA and minor stroke is increasing. This highlights the need for an updated systematic review to collate the emerging evidence. New findings generated in this review will support improvements in knowledge and understanding in this area. By comprehensively understanding the global evidence base surrounding lasting impacts of TIA and minor stroke, it is anticipated that this review can help to inform the development of interventions that meet the needs of these populations. Furthermore, it will help identify research gaps that can be targeted in the future.

A challenge in research and clinical settings is the lack of consensus regarding the definition used for the diagnosis of TIA or minor stroke. Internationally, there are ongoing discussions on how to differentially diagnose TIA and minor stroke. This discrepancy in diagnosis can result in patients with the same symptom duration and imaging being diagnosed as TIA in some countries and minor stroke in others. This discrepancy was underlined by Easton and Johnston in their opinion statement "Time to Retire the Concept of Transient Ischemic Attack" (26). They state that TIA is minor stroke. They argue, that as the quality of imaging improves evidence of permanent tissue damage will be present in many of these transient events. Using the tissue-based definition of TIA (8) this will result in many of these patients being diagnosed with minor stroke instead of TIA. This discrepancy in definitions and inequality to access imaging also challenges sub-group analysis based on the presence of acute infarction, since undetected or unreported ischemic lesions might be present.

The different approaches used to diagnose TIA and minor stroke challenges the ability to compare cohorts between studies and countries. It is also a limitation to this systematic review since it is estimated that different definitions are used in the research literature. We have chosen a pragmatic, real world approach to this and include studies stating inclusion of people with TIA or minor stroke. This is anticipated to strengthen the clinical relevance of the review where sub-group analysis will provide more clarity on symptoms and differences between definitions of TIA and minor stroke.

In many countries eligibility to access post stroke pathways and services often relies on a diagnosis of stroke. People with a diagnosis of TIA can thus be denied access to the support they may require to manage lasting impairments that impact their quality of life, ability to return to work, and participate socially. The results from this living systematic review will provide updated knowledge on lasting impairments following TIA or minor stroke and, where impairments could differ between the two. This will guide future research and provide valuable information for healthcare professionals to inform improvements in patient care.

Author contributions

GT established the author group. BH, BM, EK, EF, GC, JC, NH, TH, CS, and GT contributed to the idea and content of the protocol including search terms and eligibility criteria for included studies. BH made the first drafts for the protocol in cooperation with GC and JC. All authors contributed to the article and approved the submitted version.

Funding

This work was supported by Aalborg University Hospital, Denmark for publication fees.

Acknowledgments

The authors would like to thank Librarian Pil Jakobsen Medical Library, Aalborg University Hospital, Denmark for reviewing the search strategies.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fneur.2023.1177309/ full#supplementary-material

10.3389/fneur.2023.1177309

References

1. Van Rooij FG, Kessels RPC, Richard E, De Leeuw FE, Van Dijk EJ. Cognitive impairment in transient ischemic attack patients: a systematic review. *Cerebrovasc Dis.* (2016) 42:1–9. doi: 10.1159/000444282

2. Moran GM, Fletcher B, Feltham MG, Calvert M, Sackley C, Marshall T. Fatigue psychological and cognitive impairment following transient ischaemic attack and minor stroke: a systematic review. *Eur J Neurol.* (2014) 21:1258–67. doi: 10.1111/ene.12469

3. Turner GM, Calvert M, Feltham MG, Ryan R, Marshall T. Ongoing impairments following transient ischaemic attack: retrospective cohort study. *Eur J Neurol.* (2016) 23:1642–50. doi: 10.1111/ene.13088

4. Sackley CM, Mant J, McManus RJ, Humphreys G, Sharp L, Mares K, et al. Functional and emotional outcomes after transient ischemic attack: a 12-month prospective controlled cohort study. *Int J Stroke*. (2019) 14:174749301882315. doi: 10.1177/1747493018823158

5. Van Rooij FG, Plaizier NO, Vermeer SE, Góraj BM, Koudstaal PJ, Richard E, et al. Executive function declines in the first 6 months after a transient ischemic attack or transient neurological attack. *Stroke.* (2017) 48:3323–8. doi: 10.1161/STROKEAHA.117.018298

6. Carnes-Vendrell A, Deus J, Molina-Seguin J, Pifarré J, Purroy F. Depression and apathy after transient ischemic attack or minor stroke: prevalence, evolution and predictors. *Sci Rep.* (2019) 9:16248. doi: 10.1038/s41598-019-52721-5

7. Fonseca AC, Merwick Á, Dennis M, Ferrari J, Ferro JM, Kelly P, et al. European stroke organisation (ESO) guidelines on management of transient ischaemic attack. *Eur Stroke J.* (2021) 6:CLXIII-CLXXXVI. doi: 10.1177/23969873211027003

8. Easton JD, Saver JL, Albers GW, Alberts MJ, Chaturvedi S, Feldmann E, et al. Definition and evaluation of transient ischemic attack: a scientific statement for healthcare professionals from the American heart association/American stroke association stroke council; council on cardiovscular surgery and anesthesia; council on cardio. Stroke. (2009) 40:2276–93. doi: 10.1161/STROKEAHA.108.192218

9. Finch E, Foster M, Fleming J, Cruwys T, Williams I, Shah D, et al. Exploring changing needs following minor stroke. *Health Soc Care Community*. (2020) 28:347–56. doi: 10.1111/hsc.12866

10. Yakhkind A, McTaggart RA, Jayaraman MV, Siket MS, Silver B, Yaghi S. Minor stroke and transient ischemic attack: research and practice. *Front Neurol.* (2016) 7:1–7. doi: 10.3389/fneur.2016.00086

11. Roberts P, Krishnan S, Burns S, Ouellette D. Inconsistent classification of mild stroke and Implecations on health services delivery. *Arch Phys Med Rehabil.* (2020) 101:1243–59. doi: 10.1016/j.apmr.2019.12.013

12. Fischer U, Baumgartner A, Arnold M, Nedeltchev K, Gralla J, De Marchis GM, et al. What is a minor stroke? *Stroke.* (2010) 41:661–6. doi: 10.1161/STROKEAHA.109.572883

13. Green TL, King KM. The trajectory of minor stroke recovery for men and their female spousal caregivers: literature review. *J Adv Nurs*. (2007) 58:517–31. doi: 10.1111/j. 1365-2648.2007.04321.x

14. Bruggimann L, Annoni J, Staub F, von Steinbuchel N, Van der Linden M, Bogousslavsky J. Chronic posttraumatic stress symptoms after nonsevere stroke. *Neurology.* (2006) 66:513–6. doi: 10.1212/01.wnl.0000194210.98757.49

15. Brittle NG. Functional, cognitive and emotional outcomes after transient ischaemic attack: A systematic review and controlled cohort study. M. Phil thesis. University of Birmingham. (2012).

16. Radman N, Staub F, Aboulafia-Brakha T, Berney A, Bogousslavsky J, Annoni J. Poststroke fatigue following minor infarctions: a prospective study. *Neurology*. (2012) 79:1422–7. doi: 10.1212/WNL.0b013e31826d5f3a

17. Harbison J, Walsh S, Kenny R. Hypertension and daytime hypotension found on ambulatory blood pressure is associated with fatigue following stroke and TIA. *QJM*. (2009) 102:109–15. doi: 10.1093/qjmed/hcn146

18. Winward C, Sackley C, Metha Z, Rothwell P. A population-based study of the prevalence of fatigue after transient ishcemic attack and minor stroke. *Stroke*. (2009) 40:757–61. doi: 10.1161/STROKEAHA.108.527101

19. Crowfoot G, van der Riet P, Maguire J. Real-life experiences of people with transient ischaemic attack or minor stroke: a qualitative literature review. *J Clin Nurs.* (2018) 27:1381–98. doi: 10.1111/jocn.14271

20. Brokker J, Synnot A, McDonald S, Elliott J, Turner Tthe Living Evidence Network. Guidance for the production and publication of Cochrane living systematic reviews: Cochrane reviews in living mode. Cochrane. (2019).

21. Covidence. Better systematic review management. (n.d.). Available at: https://www.covidence.org

22. Joanna Briggs institute. Critical appraisal tools. (n.d.). Available at:
 $\mbox{https://jbi.global/critical-appraisal-tools}$

23. Wang WW, Yang ZR, Zhou QX, Shi SY, Zhang G, Zhan SY, et al. Introduction to COSMOS-E: guidance on conducting systematic reviews and Meta-analyses on etiology of observational studies. *Zhonghua Liu Xing Bing Xue Za Zhi*. (2020) 41:2149–59. doi: 10.3760/cma.j.cn112338-20191024-00758

24. Heron N, Kee F, Donnelly M, Cupples ME. Systematic review of rehabilitation programmes initiated within 90 days of a transient ischaemic attack or minor stroke: a protocol. *BMJ Open.* (2015) 5:2–7.

25. Higgins J, Thomas J, Chandler J, Compston M, Li T, Page M, et al. Cochrane handbook for Systamtic reviews of interventions. Vol. 6.3. (2022).

26. Easton JD, Johnston SC. Time to retire the concept of transient ischemic attack. JAMA. (2022) 327:813–4. doi: 10.1001/jama.2022.0300