Rehabilitation, Recovery and Community Participation following Stroke

Part Three: Optimizing Activity and Community Participation following Stroke

7th Edition, 2025

CANADIAN STROKE BEST PRACTICE RECOMMENDATIONS

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INTRODUCTION AND OVERVIEW

Introduction to the Canadian Stroke Best Practice Recommendations

The Canadian Stroke Best Practice Recommendations (CSBPR) provide up-to-date, evidence-based guidelines for the prevention and management of stroke, to promote optimal recovery and reintegration for individuals with stroke and support their families and informal caregivers. The CSBPR are under the leadership of the Heart and Stroke Foundation of Canada (HSF).

The theme of the 7th Edition of the CSBPR is **building connections to optimize individual outcomes**. Individuals with stroke often present to the healthcare system with multiple co-morbid conditions – some of which may have contributed to their stroke, some of which may be consequences of it, and some of which may be unrelated. Nelson et al. [1] noted that approximately 80% of individuals who survive a stroke have on average five other conditions and a range of psychosocial issues. The interactions among complex co-morbid conditions must be considered to ensure treatment and ongoing care planning is personalized and person-centred.

The healthcare system is often designed to operate in silos, with planning and organization for different conditions being done separately rather than being integrated across conditions, even related vascular conditions. Even within stroke systems of care, locally and regionally, silos can exist, and continuity of care can be fractured. As individuals move through different settings and phases of care after a stroke, they often report feeling anxious and overwhelmed. Providing individualized care and ensuring connections are made within the community have a significant impact on a person's short- and long-term outcomes.

The 7th Edition of the CSBPR takes a broad, wholistic focus and takes into consideration issues of multimorbidity and increasing health complexity of individuals with stroke. In addition, a more purposeful review of sex and gender representation in the seminal clinical trials upon which the recommendations are based has been undertaken to determine the extent to which available evidence has included both male and female participants in sufficient proportions to be able to detect outcomes and generalize to a broader population. These findings are presented in the discussion sections of the module and integrated into the actual recommendations where appropriate. Accompanying performance measures have been expanded to include system indicators, clinical indicators and new patient reported outcome measures, supporting our wholistic focus.

The goal of disseminating and implementing these recommendations is to optimize evidence-based stroke care across Canada, reduce practice variations in the care of individuals with stroke, and narrow the gap between current knowledge and clinical practice.

These recommendations have been developed in collaboration with the Canadian Stroke Consortium, CanStroke Recovery Trials Platform, StrokeCog, and the Canadian Neurological Sciences Federation. We work closely to ensure alignment of recommendations across guidelines where possible and appropriate.

Disclaimer: The Canadian Stroke Best Practice Recommendations (CSBPR) are designed to support implementation of best practices in stroke care across Canada. Healthcare systems, health organizations and professional organizations, as well as legislation and standards, vary provincially. The CSBPR provide guidance on a national level; they do not, overall, account for provincial variations in legislation or standards. The CSBPR are not intended to supersede any provincial or local law or organizational or professional standard. In considering and implementing the CSBPR, users are encouraged to consult and follow all appropriate legislation or standards.

Overview of the Rehabilitation, Recovery and Community Participation following Stroke Module

Stroke is on the rise in Canada with over 108,000 strokes occur in Canada every year. [2]Stroke is a leading cause of adult disability, with 947,895 people 20 years of age and older estimated to be living

with the effects of stroke in Canada.[3] In Canada, one-third of individuals with stroke, usually with transient ischemic attack (TIA) and milder strokes, are discharged back to the community directly from the emergency department.[4] Of those individuals admitted to acute inpatient care, 39% will be discharged to their homes without support services, and an additional 19% will be discharged to their home setting with some support service referrals, 15% will be transferred to an inpatient rehabilitation service, 8% will be transferred to long-term care or complex continuing care.[5] For those who had access to inpatient rehabilitation, the median length of stay was 29 days, 74% were discharged home, with a median Functional Independence Measure [FIM] efficiency of 0.84 FIM points gained per day.[5]

Ultimately, most individuals who experience a stroke will return to the community, to live independently or with some degree of support. The complexity and needs of individuals living in the community following stroke and their families has been increasing with shorter lengths of hospital stay and longer waits for community services. Several interdisciplinary team members and services are often required by individuals recovering from stroke. These individuals and their families have reported that coordination and integration of services are often major challenges as they try to navigate community healthcare services. They report at times feeling as though they have fallen through the cracks and not being able to meet their rehabilitation goals as a result (Community Consultation and Review Panel 2024). In addition, social determinant factors such as socio-economic status, education, and geographic location can also pose additional barriers to accessing care.

The CSBPR 7th edition of the *Rehabilitation, Recovery and Community Participation following Stroke* module has been reorganized to generally align to the International Classification of Functioning, Disability and Health (ICF) Framework. Due to the large size of this module, the 7th edition of the Rehabilitation, Recovery and Community Participation following Stroke module has been divided into three parts:

- ***Part One: Stroke Rehabilitation Planning for Optimal Care Delivery***
- ***Part Two: Delivery of Stroke Rehabilitation to Optimize Functional Recovery***
- ***Part Three: Optimizing Activity and Community Participation following Stroke***

This module*, Part Three: Optimizing Activity and Community Participation following Stroke,* reflects the growing and changing body of research evidence available that focuses on person-centred care, optimizing an individual with stroke's return to their community, longer-term stroke recovery, and engaging in active and meaningful participation. This module emphasizes the importance of regular healthcare follow-up, optimizing secondary prevention strategies, the assessment, diagnosis and management of mood disorders such as anxiety and depression, assessment and management of cognitive status, sleep health and post-stroke fatigue. Further, this module addresses more personal issues that are important and meaningful to individuals recovering from stroke, including return to driving, vocational roles, relationships and sexuality, life roles, leisure, and social participation. Advance care planning and palliative care are also considered.

This module emphasizes the need for coordinated and seamless systems of care that extend beyond the first few months following stroke, building on progress achieved during the initial recovery stages to enable seamless community reintegration. A main goal of these recommendations is to enable individuals with stroke to achieve as much independence as possible and successfully resume life roles and leisure activities. Successful longer-term planning across all transitions requires integrated and coordinated people-centred efforts by all members of care teams involved with individuals who have had a stroke, their families and caregivers, and the broader community. Active engagement of the individual and family at all stages of planning and goal setting is essential.

There is an urgent need to address the gap in supporting social and community participation. Health systems must ensure equitable access to services and resources that facilitate not just physical recovery, but also the resumption of social roles, leisure pursuits, and community engagement that are critical for optimal long-term wholistic health outcomes and adaptation after stroke. The topics addressed in this module are often overlooked in the recovery process and may cause significant challenges for individuals with stroke and their families as they progress from short-term recovery to optimizing longer term health, adaptation and participation. The physical, emotional, psychological, social and

environmental needs of individuals with stroke are considered throughout this set of CSBP recommendations. Considerations for equity in accessing and receiving needed services and facilitating linkages to resources must be addressed at all stages of recovery.

CSBPR Definitions and Descriptions

Stroke Rehabilitation is a progressive, dynamic, goal orientated process that addresses stroke-related impairments, activity limitations and participation restrictions to optimize individuals' physical, cognitive, emotional, communicative, and social functional levels. In the chronic stage of stroke, rehabilitation may also focus on maintaining current functional abilities and preventing or slowing future functional decline and secondary health conditions (such as depression).

Rehabilitation is NOT a setting, rather, it is a process that includes a set of activities that begins soon after the initial event, once the individual with stroke is medically stable to participate and goals for rehabilitation, recovery and participation can be identified.

Rehabilitation occurs across the continuum of stroke care in a variety of formal and informal settings such as acute care or sub-acute care; rehabilitation units, on general or mixed rehabilitation units; palliative care units; in ambulatory or community settings, such as outpatient or day clinics, home-based services (includes early supported discharge and long-term care services), recreation centres, and outreach teams. Rehabilitation considers the individual's goals of care, including integration of appropriate palliative care principles as part of the care continuum.

Palliative Rehabilitation is an integral part of this continuum by focusing on improving quality of life, helping to manage symptoms, maintain functional abilities and support independence (*Refer to CSBPR Stroke Systems of Care, Section 9 Palliative Care)*

Stroke Systems of Care are defined as a comprehensive, diverse and longitudinal system that addresses all aspects of stroke care within an integrated, organized and coordinated approach. A stroke system spans the continuum of care from primary prevention to end of life. A stroke system ensures access to evidence-based therapies which optimize their survival and recovery.

Integrated Stroke Systems consider all aspects of planning and delivering care, such as access, assessment, treatment, clinical evidence, data, outcomes, benchmarking, guidelines, planning, organization of services, funding, and education.

Spasticity *Spasticity is manifested as velocity- and muscle length–dependent increase in resistance to externally imposed muscle stretch. It results from hyperexcitable descending excitatory brainstem pathways and from the resultant exaggerated stretch reflex responses. Other related motor impairments, including abnormal synergies, inappropriate muscle activation, and anomalous muscle coactivation, coexist with spasticity and share similar pathophysiological origins.*[6]

Depression following stroke: There is a substantially increased prevalence of depression following stroke and has been reported in up to 24% of individuals. *Within this module, we consider depression following stroke.* The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) category that applies is *mood disorders due to another medical condition such as stroke with depressive features, major depressive-like episode, or mixed-mood features*. It is often associated with large vessel infarction. [7]

- An individual who is a candidate for this diagnosis would present with depressed mood or loss of interest or pleasure along with four other symptoms of depression (e.g., weight loss, insomnia, psychomotor agitation, fatigue, feelings of worthlessness, diminished concentration, suicidal ideation) lasting two or more weeks.
- Several mechanisms, including biological, behavioural, and social factors, are involved in its pathogenesis.

- Symptoms usually occur within the first three months after stroke (early onset depression following stroke); however, may occur at any time (late onset depression following stroke). Symptoms resemble those of depression triggered by other causes, although there are some differences - individuals with stroke with depression following stroke experience more sleep disturbances, vegetative symptoms, and social withdrawal.

Vascular Depression is a concept incorporating a broader range of depressive disorders. Vascular depression is related to small-vessel ischemia and people experiencing vascular depression may have white matter disease seen on brain imaging. Vascular depression also includes post-stroke depression as a sub-category. Individuals with stroke with vascular depression have later age of onset, greater cognitive impairment, less family and personal history of depression, and greater physical impairment than geriatric persons with nonvascular depression. They have been found to have different responses to treatment and different prognoses. In addition, persons with vascular depression with executive dysfunction and/or persons who show progression of white matter hyperintensities over time have a poor response to treatment with antidepressants and a more chronic and relapsing clinical course.[8]

Apathy is most commonly defined as a multidimensional syndrome of diminished goal-directed behavior, emotion, and cognition. [9,10] People present with loss of motivation, concern, interest, and emotional response, resulting in a loss of initiative, decreased interaction with their environment, and a reduced interest in social life. It can negatively impact recovery post-stroke. Apathy can occur as an independent syndrome, although it may also occur as a symptom of depression or dementia. [11,12] Apathy has been reported to occur in 29 – 40% of individuals with stroke.[13]

Anxiety following stroke is characterized by feelings of tension, extreme apprehension and worry, and physical manifestations, such as increased blood pressure. Anxiety disorders occur when symptoms become excessive or chronic. In the post-stroke literature, anxiety has been defined both by consideration of the presence and severity of symptoms using validated screening and assessment scales (such as the Hospital Anxiety and Depression Scale), or by defining syndromes using diagnostic criteria (e.g., panic disorders, general anxiety disorder, social phobia).

Pseudobulbar Affect following stroke is characterized by emotional lability – crying and/or laughing that is uncontrollable or exaggerated. The emotional expression is usually brief, lasting seconds to minutes, rather than hours. These emotional responses are incongruent with the underlying mood and are caused by the neurological condition/stroke, rather than depression. However, pseudobulbar affect can also occur with comorbid depression.[14]

Watchful waiting is defined as a period when the individual who has experienced a stroke displays mild depressive symptoms is monitored closely without additional therapeutic interventions to determine whether the mild depressive symptoms will improve. The timeframe for watchful waiting varies in the literature, typically between 2-4 weeks.

Sleep Health is a multidimensional pattern of sleep-wakefulness, adapted to individual, social, and environmental demands, that promotes physical and mental well-being. Good sleep health is characterized by subjective satisfaction, appropriate timing, adequate duration, high efficiency, and sustained alertness during waking hours. [15]

Post-stroke Fatigue is a multidimensional motor-perceptive, emotional and cognitive experience characterized by a feeling of early exhaustion with weariness, lack of energy and aversion to effort that develops during physical or mental activity and is usually not ameliorated by rest. Fatigue can be classified as either objective or subjective. Objective fatigue is defined as the observable and measurable decrement in performance occurring with the repetition of a physical or mental task, while subjective fatigue is a feeling of early exhaustion, weariness and aversion to effort. [16-19]

Characteristics of post-stroke fatigue may include overwhelming tiredness and lack of energy to perform daily activities; abnormal need for naps, rest, or extended sleep; more easily tired by daily activities than pre-stroke; unpredictable feelings of fatigue without apparent reason. Post-stroke fatigue can occur at varying stages of recovery, in both the early phase and on a longer-term basis.

Refer to CSBPR Rehabilitation, Recovery and Community Participation following Stroke Part One: Stroke Rehabilitation Planning for Optimal Care Delivery for additional definitions and descriptions.

Considerations Regarding Stroke Rehabilitation

Screening is a process for evaluating the possible presence of a particular problem. Screening is a purposeful action or query for early identification of individuals who may be at risk of developing a specific condition or disorder or problem. Screening may suggest that an issue may exist. Findings from screens can indicate the need for more comprehensive assessment. Screening is usually brief and used to identify possible concerns, not typically to diagnose. Healthcare providers may use preliminary screening measures to support clinical decision making.

Assessment is a process for defining and measuring the nature of a stroke-related health problem, informing a diagnosis, formulating a prognosis, and contributing to developing specific treatment recommendations for addressing the problem or diagnosis. Assessment may also include monitoring response to therapeutic intervention. The purpose of assessment is to gather more specific and detailed information to provide a comprehensive understanding of a potential issue. Assessments will include other information to help provide a broader context of results.

Note: Screening and assessment of individuals following stroke must take into consideration multiple factors. Ideally, both screening and assessment tools should be validated for their specific use and target population to provide the most accurate interpretation of results.

Settings: Settings for stroke rehabilitation care refers to the physical locations where rehabilitation care and services are delivered to, and received by, individuals who have experienced a stroke, their families and caregivers. Rehabilitation assessments and interventions, key components of comprehensive stroke care, are provided in a range of settings such as: acute inpatient care centres, sub-acute care settings; inpatient rehabilitation units: on stroke-specific, general or mixed rehabilitation units; in outpatient clinics, ambulatory or community settings, such as outpatient, day clinics and recreation centres; long-term care, complex care, and an individual's home and place of residence (receiving services such as early supported discharge services and homecare rehabilitation or outreach teams). Care may be provided in person or virtually.

Duration: Length of service or stay for stroke rehabilitation varies depending upon factors such as the types of services required, accessibility of those services and the goals and needs of the individual with stroke, their families and caregivers. In some regions and local areas, the availability of staff and resources may impact duration, and all providers should strive to achieve guideline-directed therapy recommendations.

Timeframe: Stroke rehabilitation requirements often continue for many months and even years after an index stroke. Currently in Canada, publicly funded healthcare systems tend to allow for stroke rehabilitation within the first six months following stroke onset, even though many individuals with stroke will require some of these services beyond that arbitrary time frame. Rehabilitation is an ongoing process and rehabilitation needs and goals should be re-assessed periodically and plans updated as needed.

Stroke Rehabilitation Delivery: Stroke rehabilitation can be delivered in person or virtually, as both individual sessions and group activities. Decisions regarding mode of delivery of stroke rehabilitation therapies and interventions should be based on the individual with stroke's personal factors, goals of the encounter, type of services to be provided, and the appropriateness and feasibility of each modality.

WHO International Classification of Functioning, Disability and Health [20]

Impairment: Problems in body function or structure such as a significant deviation or loss

Activity limitation: Difficulties an individual may have in executing activities

Participation restrictions: Problems an individual may experience in involvement in life situations

Notable Updates in Rehabilitation, Recovery and Community Participation following Stroke, *Part Three: Optimizing Activity and Community Participation following Stroke*, Update 2025

- **Reorganization of the Rehabilitation Module**: The Stroke Rehabilitation, Recovery and Community Participation module has been divided into three parts, and the topics have been generally restructured to align with the International Classification of Functioning (ICF) framework for improved clarity and flow.
- **Conversion to GRADE ratings:** In moving to GRADE ratings, some consensus-based recommendations from the 6th Edition have now been moved to Clinical Considerations
- **Increased Evidence:** The evidence supporting multiple recommendations throughout this module have been upgraded to a High Level of Evidence coupled with a Strong Recommendation.
- **Relationships, Intimacy, and Sexuality**: Expanded considerations regarding relationships, intimacy, and sexuality in the content of rehabilitation and longer-term recovery have been included.
- **Expanded Inclusion of Healthcare Professionals**: A broader scope of healthcare professionals have been engaged who have expertise to support the ongoing management of medical co-morbidities and other medical needs as part of inpatient and community rehabilitation programs.
- **Utilization of validated tools**: Further emphasis on the use of validated assessment tools across rehabilitation care, including recreation, leisure and social assessments.

Guideline Development Methodology

The CSBPR present high-quality, evidence-based stroke care guidelines in a standardized framework. As healthcare providers across all disciplines implement these recommendations, it is expected that practice variations will be reduced and gaps between evidence and practice will start to close, leading to improved outcomes for individuals with stroke.

The methodology used to develop this module has followed a thorough and rigorous process. *Refer to CSBPR Overview of Methodology for additional detail.* [21] Key steps in our development process have included:

1. Establish an expert interprofessional writing group representing relevant disciplines across the continuum of care and a range of settings and striving for balance regarding geography, gender and overall diversity*. Refer to Appendix One for a list of writing group members and affiliations.*
2. Consult with the Stroke Rehabilitation Community Consultation and Review Panels, comprising individuals with stroke, informal caregivers, and family members.
3. Select clinical questions to address in the module using the population/problem, intervention or exposure, comparison, and outcome (PICO) format, where appropriate and applicable.
4. Conduct a systematic search and appraisal of research literature to March 2025, and update evidence summary. Refer to the assigning evidence levels section of this module for more information on the GRADE approach.
5. Conduct a systematic search and appraisal of external reference guideline recommendations.
6. Scientific writing group and the community consultation panels develop, review and finalize a set of recommendations, address clinical questions, review and discuss benefits, risks, and harms of

proposed recommendations, and adhere to the elements of the Agree II criteria where appropriate. [22]This includes consideration of individual values and preferences, informed by the community consultation panels and available evidence.

7. Scientific Writing Group rates the strength of the recommendations and the quality of evidence following GRADE criteria.[23-25]
8. Review of the proposed module by the Canadian Stroke Best Practices Advisory Committee, and incorporation of edits as required, with further consideration of benefits, risks, and harms.
9. Review of the proposed module by external leading experts in Canada and internationally, and incorporation of edits as required. *Refer to Appendix Two for a list of External expert reviewers*
10. Obtain final approval and endorsement and undertake French translation.
11. Update educational materials and implementation resources.
12. Disseminate through publication and public release knowledge translation activities.
13. Continue with ongoing review and update process.

More detail for each of these steps is available in the CSBPR *Overview, Methods and Knowledge Translation* manual on the Canadian Stroke Best Practices website. www.strokebestpractices.ca [21]

Assigning Evidence Levels

The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) [26] methodology and terminology has been applied throughout these guidelines. With GRADE, each recommendation was assessed for:

1. The **strength of the guidance** (strong or conditional), based on the balance of desirable and undesirable consequences, quality of evidence, values and preferences of those affected, and resource use.
   - A strong recommendation is one for which the guideline panel is confident that the desirable effects of an intervention outweigh its undesirable effects.
   - A conditional recommendation is one for which the guideline panel finds that the desirable effects probably outweigh the undesirable effects, but appreciable uncertainty exists.

   and
2. The **quality of the evidence** (high, moderate, low) upon which the recommendations are formulated: risk of bias, directness of evidence, consistency and precision of results, risk of publication bias, magnitude of the effect, dose-response gradient, and influence of residual plausible confounding.[25]

The writing group was provided with comprehensive evidence tables that included summaries of high-quality evidence identified through the structured literature searches. The group discussed and debated the quality of the evidence and through consensus developed a final set of proposed recommendations. Each recommendation was assigned a rating as to the strength of the recommendation and the quality of the evidence. Where appropriate and feasible, full GRADE review and analysis using relevant GRADE tables has been conducted (GRADE Handbook).[26]

Clinical Considerations

The CSBPR uses the additional category of clinical considerations, consisting of expert opinion statements. These are included when it is determined that guidance related to common clinical issues would be helpful, but the topic lacked sufficient evidence to form an actual recommendation.

Conflicts of Interest

All potential participants in the recommendation development and review process were required to complete confidentiality agreements and declare all actual and potential conflicts of interest prior to participation. Declared conflicts of interest were reviewed by the co-chairs of the CSBPR Advisory Committee and Heart & Stroke staff to assess the potential impact. Those with significant conflicts with respect to the module topic were not selected for writing group or reviewer roles.

Participants who have conflicts for a particular topic area were identified at the beginning of discussions for that topic and were recused from voting. If a co-chair is in conflict, they were recused from their responsibilities for that discussion and another non-conflicted participant assumes the role for that discussion and vote. Heart & Stroke senior staff members participated in all writing group discussions and intervene if they perceived an untoward bias by a writing group member.

Conflict of interest declarations for the Rehabilitation, Recovery and Community Participation following Stroke, *Part Three: Optimizing Activity and Community Participation following Stroke* module writing group members can be found in Appendix One.

Acknowledgements

Heart & Stroke gratefully acknowledges the Rehabilitation, Recovery and Community Participation following Stroke: *Part Three: Optimizing Activity and Community Participation following Stroke* writing group leaders and members, all of whom have volunteered their time and expertise to develop these new recommendations; M. Patrice Lindsay RN, PhD for her expertise and efforts as senior writer and editor of these recommendations, module and manuscript; and the senior advisors Dr. Anita Mountain, Dr. Debbie Timpson and Dr. Colleen O'Connell. Members of the Canadian Stroke Consortium, Can Stroke Recovery Trials Platform, Canadian Neurological Sciences Federation and the Evidence-based Review of Stroke Rehabilitation team were involved in the development of these recommendations. These recommendations underwent external review, in whole or specific parts respective of expertise, by Paula Barker, Joyce Chen, Jill Congram, Kenneth Curtis, Luciana de Olivera Nerves, Celina Ducroux, Hillel M Finestone, Margaret Grant, Mary Halpine, Anne Harris, Sylvie Houde, Zainab Al lawati, Dorothy Kessler, Jaylyn Leighton, Swati Mehta, Stuart Miller, Jennifer Milliken, Asha Shelton, Shamala Thilarajah, Ankur Wadhwa, Ismalia De Sousa, Marika Demers, Sarah J. Donkers, Kate Hayward, Alyson Kwok, Alexander Lo, Lauren Mai, Susan Marzolini, Erin McHattie, Catherine Sackley, Lisa Sheehy, Hardeep Singh, and Ricardo Viana. We thank the Canadian Stroke Best Practices Advisory Committee members: Anita Mountain (Co-Chair), Dylan Blacquiere (Co-Chair), Eric E. Smith (Past Chair), Gord Gubitz, Dar Dowlatshahi, Margie Burns, Emma Ferguson, Thalia S. Field, Farrell Leibovitch, Christine Papoushek, Michael D Hill, Pascale Lavoie, Erin McHattie, Colleen O'Connell, Debbie Timpson, Theodore Wein, Manraj Heran, Katie Lin, Richard H Swartz, Adam Kirton, Ruth Whelan, Trish Helm-Neima, Kathleen McKeen, Shannon Bayluk, Janice Daitchman, and Katie White. System implications were reviewed by Mary-Lou Halabi, Leslie James, and Geoffrey Law. The performance measures were reviewed and updated by members of the Heart & Stroke health systems quality council including Patrice Lindsay, Debbie Timpson, Sacha Arsenault, Shannon MacDonald, Raed Joundi, Alison McDonald, Colleen O'Connell and Amy Yu. We acknowledge and thank members of the CSBPR Vascular Cognitive Impairment 7th edition, 2024 writing group for their contributions. We acknowledge and thank Norine Foley and the evidence analysis team at workHORSE; Laurie Charest of Heart & Stroke for her coordination of the CSBPR teams and processes; and Francine Forget Marin and the Heart & Stroke internal teams who contributed to the development and publication of these recommendations (Translation, Communications, Knowledge Translation, Engagement, Health Policy, and Digital Solutions).

Community Consultation and Review Panel

Heart & Stroke is especially grateful to the members of the *Stroke Rehabilitation Planning for Optimal Care Delivery and the Delivery of Stroke Rehabilitation to Optimize Functional Recovery* Community

Consultation and Review Panels who worked in tandem with the scientific writing group for this module and shared their personal experiences and insights on living with stroke and optimizing recovery and health outcomes. CCRP members include Allan Beaver, Suzanne Belanger, Suzanne Cady, Sheila Farrell, Katie Fung, Margie Hesom, Elizabeth Pease, Wes Reinhardt, Lori Beaver, Glen Brouwer, Maureen Brouwer, Janice Daitchman, Lilli Law, Ed Mitchell, Jennifer EJ Monaghan, Urainab Peerbhoy, Alda Tee (writing group liaison), and Kara Patterson (writing group liaison).

Funding

The development of the CSBPR is funded by Heart & Stroke. No funds for the development of these recommendations are received from commercial interests, including pharmaceutical and device companies. Scientific writing group members and external reviewers are volunteers who do not receive any remuneration for their participation.

Citation information

Citing the Rehabilitation, Recovery and Community Participation following Stroke: *Part Three: Optimizing Activity and Community Participation following Stroke*, 7th Edition, Update 2025

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The recommendations in this module are also published in the American Journal of Physical Medicine & Rehabilitation

Yao JK, Salbach NM, Lindsay MP, et al.; on behalf of the Canadian Stroke Best Practice Recommendations Advisory Committee, in collaboration with the Canadian Stroke Consortium, Canadian Neurological Sciences Federation, and CanStroke Recovery Trials Platform. Canadian Stroke Best Practice Recommendations Rehabilitation, Recovery, and Community Participation Following Stroke, Part Three: Optimizing Activity and Community Participation Following Stroke, 7th Edition Update, 2025. American Journal of Physical Medicine & Rehabilitation:10.1097/PHM.0000000000002845, November 19, 2025. | DOI: 10.1097/PHM.0000000000002845

English link:
https://journals.lww.com/ajpmr/fulltext/9900/canadian_stroke_best_practice_recommendations.806.aspx

French link:
https://journals.lww.com/ajpmr/fulltext/9900/canadian_stroke_best_practice_recommendations.806.aspx

Comments

The Heart and Stroke Foundation of Canada's stroke team invites your comments, suggestions, and inquiries about the development and application of the CSBPR at strokebestpractices@heartandstroke.ca.

REHABILITATION, RECOVERY AND COMMUNITY PARTICIPATION FOLLOWING STROKE MODULE

Part Three: Part Three: Optimizing Activity and Community Participation following Stroke, 7th edition update, 2025

Section 1 Mood and Depression

1. Mood and Depression, Recommendations 2025

Note, Multiple mood disorders are associated with stroke. This section addresses the most prevalent disorders. These are defined here and then referred to where appropriate within the recommendations that follow.

Refer to the Definitions and Descriptions included in the Overview for additional information related to this section.

1.0 General Recommendations

i. Individuals who have experienced a stroke should be considered at risk for post-stroke depression, which can occur at any stage of recovery [Strong recommendation; High quality of evidence].

ii. Individuals with stroke, their family and caregivers should be given information and education about the potential impact of stroke on mood as well as be provided with applicable resources and supports to manage altered mood states following stroke [Strong recommendation; Low quality of evidence].

iii. Individuals with stroke, their family and caregivers should be provided with the opportunity to talk about the impact of stroke on their lives and mental health at all stages of care [Strong recommendation; Low quality of evidence]. *Refer to the CSBPR Stroke Systems of Care Module for further information on Patient and Family Education, and Community Follow-up.*

1.1 Screening for Post-Stroke Depression

i. All individuals with stroke should be screened for post-stroke depression if deemed medically appropriate given the high prevalence of post-stroke depression and the evidence for treating symptomatic depression post stroke [Strong recommendation; Moderate quality of evidence]. *Note: 'Medically appropriate' excludes individuals with stroke who are unresponsive or who have deficits that interfere with screening for mood disorders. Any pre-stroke mental health or cognitive diagnoses should be taken into consideration during the screening process.*

ii. Screening should be undertaken by trained professionals using a validated screening tool [Strong recommendation; Moderate quality of evidence].

iii. Stroke assessments should include evaluation of risk factors for depression, particularly a history of depression to ensure adequacy of assessment and access to appropriate treatment [Strong recommendation; Low quality of evidence]. *Refer to note below for list of risk factors.*

iv. For individuals who experience some degree of communication challenge or deficits following stroke, appropriate screening strategies that do not rely on verbal communication should be implemented for possible post-stroke depression to ensure adequate screening

and assessment and access to appropriate treatment [Strong recommendation; Low quality of evidence].

Note: Common risk factors associated with post-stroke depression include increased stroke severity, functional dependence, presence of cognitive impairment, and history of previous depression. Increased functional dependence (e.g. requiring help with activities of daily living) and having a history of pre-stroke depression may be the two most salient risk factors for the development of post-stroke depression. Communication deficits and social isolation may also be considered as possible risk factors for depression. Refer to CSBPR Stroke Systems of Care Module for information on depression in family and informal caregivers of people with stroke.

Section 1.1 Clinical Considerations: Timing of Screening for Post-Stroke Depression

1. Screening for post-stroke depression may take place at various stages throughout the continuum of stroke care, especially at transition points, as time of onset for post-stroke depression can vary and include:
    a. At transfer from an inpatient acute setting to an inpatient rehabilitation setting;
    b. From an inpatient rehabilitation setting before return to the community;
    c. During secondary prevention clinic visits;
    d. Following discharge to the community, during follow-up appointments with consulting specialists, and during periodic health assessments with primary care practitioners.
2. Screening for depressive symptoms could be considered during the initial acute care stay, if deemed medically appropriate, particularly if evidence of depression or mood changes are noted or if risk factors for depression are present, as outlined in section 1.1, iii.
3. Repeated screening may be required since the ideal timing for screening for post-stroke depression is unclear.

1.2 Assessment for Post-Stroke Depression

i. Individuals with stroke who have screening results that indicate a risk for depression should be assessed in a timely manner by healthcare professionals with expertise in diagnosis, management and follow-up of depression [Strong recommendation; Moderate quality of evidence].

1.3 Non-Pharmacological Management of Post-Stroke Depression

i. It is reasonable to consider psychological interventions (such as cognitive-behavioural therapy, interpersonal therapy, problem-solving therapy, motivational interviewing, acceptance and commitment therapy), as one of the first line treatments for depressive symptoms post stroke as a monotherapy, provided individuals with stroke have sufficient cognitive and language skills to actively engage in therapy [Strong recommendation; Moderate quality of evidence].

ii. Treatment for post-stroke depression may include psychological interventions in combination with antidepressants for appropriate individuals [Strong recommendation; Moderate quality of evidence].

iii. Supervised exercise, ideally performed at least three times per week, is recommended to reduce depressive symptoms in people post-stroke with mild depressive symptoms [Strong recommendation; High quality of evidence] and moderate depressive symptoms [Strong recommendation; Moderate quality of evidence]. [27]

Section 1.3 Clinical Considerations

1. Other approaches to adjunctive treatment of post-stroke depression are emerging, with research in very early stages. These may include mindfulness and recreational therapies

such as music therapy, and pet therapy. These therapies could be considered on an individual basis at the discretion of the treating healthcare professional in consultation with the individual with stroke and their family if appropriate.

2. Other therapies including repetitive transcranial magnetic stimulation, or, for severe refractory depression, electro-convulsive therapy or deep brain stimulation. These have all been suggested in the literature but lack sufficient evidence for routine use and require more research. *Note these interventions are not yet available/approved specifically for use in post-stroke depression in Canada.*

1.4 Pharmacotherapy for Post-Stroke Depression

i. Individuals with stroke with mild depressive symptoms or those diagnosed with minor depression may initially be managed by "watchful waiting" [Strong recommendation; Moderate quality of evidence]. *Refer to the Definitions and Descriptions included in the Overview for definition of watchful waiting.*

   a. Pharmacological treatment should be considered and started if depression is persistent or worsens and interferes with clinical goals [Strong recommendation; Moderate quality of evidence].

ii. People diagnosed with a depressive disorder following stroke should be considered for a trial of antidepressant medication [Strong recommendation; High quality of evidence].

iii. No one drug or drug class has been found to be superior for post-stroke depression treatment. Side effect profiles, however, suggest that some selective serotonin reuptake inhibitors may be favoured in this patient population [Strong recommendation; Moderate quality of evidence].

   a. Choice of an antidepressant medication will depend upon symptoms of depression, potential side effects of the medication, patient medical profile, and possible drug interactions with other current medications and medical diagnoses [Strong recommendation; Moderate quality of evidence].

iv. Response to treatment should be monitored regularly by a health professional. Monitoring should include evaluation of any changes in the severity of depression, review of potential side effects, and update of ongoing management plans [Strong recommendation; Moderate quality of evidence].

v. If a good response is achieved, treatment should be continued for a minimum of 6 to 12 months [Strong recommendation; Moderate quality of evidence].

   a. If the individual's mood has not improved 2-4 weeks after initiating treatment, assess individual adherence to medication regime. If compliant, then consider increasing the dosage, adding an additional medication, or changing to another antidepressant [Strong recommendation; Moderate quality of evidence]. *Refer to CANMAT Mood and Anxiety guidelines on pharmacotherapy.* [27]

   b. Following the initial course of treatment, ongoing pharmacological treatment could be considered on an individual basis (consider previous history and risk factors for recurrence of depression) [Strong recommendation; Low quality of evidence].

   c. If a decision is made to discontinue an antidepressant, it should be tapered over one to two months [Strong recommendation; Low quality of evidence].

vi. Following initial treatment for post-stroke depression, individuals should continue to be monitored for recurrence of depression [Strong recommendation; Low quality of evidence].

Note: Examples of a 'good response' may be indicated by positive changes in thoughts and self-perceptions (e.g., hopelessness, worthlessness, guilt), emotional symptoms (e.g., sadness,

tearfulness), neurovegetative symptoms (e.g., sleep, appetite), and improved motivation to carry out daily activities.

Section 1.4 Clinical Considerations

1. The involvement and feedback of individuals with stroke, their family and caregivers are an important component of ongoing monitoring for post-stroke mood changes and conditions.
2. Counselling and education should include information about potential recurrence of symptoms, emerging symptoms to be aware of, the importance of adherence with prescribed medication regime, and contacting their primary care physician or mental health expert should those signs reappear.

1.5 Prophylactic Treatment for Post-Stroke Depression

i. While prophylactic pharmacotherapy has been shown to prevent post-stroke depressive symptoms [Strong recommendation; High quality of evidence], its impact on function is less clear. At this time, routine use of prophylactic antidepressants for ALL individuals with stroke is not recommended as the risk–benefit ratio has not been clearly established [Strong recommendation; Moderate quality of evidence].

ii. Psychological interventions (such as problem-solving therapy, cognitive-behaviour therapy) have been shown to have efficacy for prophylactic treatment for post-stroke depression and should be considered where appropriate [Strong recommendation; Moderate quality of evidence].

Section 1.5 Clinical Considerations

1. Further research is required to determine individuals who have experienced a stroke who are at higher risk for mood disorders, choice of antidepressant agents, optimal timing and duration of intervention.

1.6 Other Mental Health States

i. Screening for anxiety may be considered in individuals with stroke as increased prevalence has been demonstrated following stroke [Strong recommendation; Moderate quality of evidence].

   a. A validated screening tool should be used to detect presence of pre-existing or new anxiety [Strong recommendation; Moderate quality of evidence].

   b. Individuals who have had a stroke with resulting communication limitations should be screened for anxiety using appropriate methods validated with individuals experiencing aphasia [Strong recommendation; Moderate quality of evidence].

ii. Psychological interventions (such as cognitive-behaviour therapy) have been shown to have efficacy for anxiety and should be considered for individuals following stroke [Strong recommendation; Moderate quality of evidence].

iii. Anxiety may appear in people who have experienced a stroke who are not clinically depressed. It also frequently co-exists with depression following stroke. For individuals with stroke with marked anxiety with or without clinical depression, it is reasonable to offer pharmacotherapy [Strong recommendation; Low quality of evidence].

iv. Apathy may appear in people who have experienced a stroke who are not clinically depressed. It also frequently co-exists with depression following stroke. For individuals with stroke with marked apathy, with or without clinical depression, it is reasonable to offer nonpharmacological intervention such as exercise or music therapy [Strong recommendation; Low quality of evidence].

a. Psychostimulants may be considered in select individuals; however, evidence remains limited [Strong recommendation; Low quality of evidence].

b. Although evidence is limited in individuals with stroke, psychotherapy may be considered as an adjunct to pharmacotherapy [Strong recommendation; Low quality of evidence].

v. Pseudobulbar Affect: In cases of severe, persistent tearfulness, emotional incontinence or lability, a trial of antidepressant medication should be considered [Strong recommendation; High quality of evidence].

a. Some selective serotonin reuptake inhibitors may be considered over others for this population due to side effect profiles [Strong recommendation; Low quality of evidence].

b. There is no evidence for non-pharmacologic interventions for this condition [Strong recommendation; Low quality of evidence].

Rationale

Post-stroke mood disorders, including depression and anxiety, are highly prevalent among individuals with stroke. Approximately one-third of all individuals who experience stroke will exhibit symptoms of depression at some time following the stroke event (acute, sub-acute and at long-term follow-up). A substantially increased prevalence of depression following stroke has been reported in up to 24% of individuals with stroke (24% vs. 8% compared to general population). [28] Anxiety and apathy have been reported in 20-30% of people who have experienced stroke, either alone or in combination with a diagnosis of post-stroke depression. [29,30]

Severity of functional limitations, stroke severity, cognitive impairment, age of stroke onset, and a previous history of depression have all been identified as important risk factors for the development of post-stroke depression. Symptoms such as persistent sadness, hopelessness, irritability, and withdrawal from social activities can impede motivation and engagement in rehabilitation. Additionally, mood disorders can complicate the recovery process by affecting cognitive function and overall health outcomes. Post-stroke depression is associated with poorer functional recovery, increased risk for dependence, reduction in social participation, and increased mortality. Early identification and intervention, including psychological support and medication, where appropriate, are essential for managing mood disorders.

Families and caregivers of individuals with stroke are also at risk for depression, with the reported incidence as high as 30% to 60% of caregivers experiencing depressive symptoms.

Individuals with stroke, family and caregivers stress the importance of healthcare providers recognizing mental health needs, and ensuring access to assessment, management and support throughout stroke recovery, using an individualized approach. They emphasize the connection between mental health, physical health and recovery, and the importance of addressing mental health to optimize outcomes, both for the individual with stroke, their family and caregivers. Knowing that recovery is not a linear or time dependent process, and that different fears, anxieties and emotions can come in waves, consistent follow-up care allows an individual to access or re-access support at the time when it is most needed.

System Implications

To achieve timely and appropriate assessment and management of mental health and mood states, organizations should optimize the following system components:

1. Education for primary care providers and healthcare providers across the continuum of stroke care on recognition, assessment, and management of post-stroke depression and anxiety, and the importance of physical and social activity and access to community support programs.

2. Establish a screening process and care path to help identify and manage post stroke depression, including a care pathway that would help support timely access to healthcare professionals with expertise in mood disorders.
3. Availability of screening tools that are sensitive to unique circumstances, such as individuals with stroke with communication or cognitive impairments. Tools should also be culturally safe and appropriate.
4. Timely access to appropriate mental health specialists, throughout rehabilitation journey and transition points, who are able to diagnose and evaluate severity of depression and provide guidance for ongoing treatment and management.
5. Timely access to and availability of specialized therapies to manage post-stroke depression, including counseling and psychotherapy as required without financial barriers.
6. The development and implementation of an equitable and universal pharmacare program, implemented in partnership with the provinces, designed to improve access to cost-effective medicines for all people in Canada regardless of geography, age, or ability to pay. This program should include a robust common formulary for which the public payer is the first payer.
7. Mechanisms to ensure good communication and information flow between the range of specialists and programs beyond the core stroke care providers to meet the varied needs of individuals post stroke (e.g., mental health specialists, cognitive specialists, geriatric programs).
8. Processes for ongoing monitoring of any individual who experienced a stroke with positive screening for depression during screening and assessment process.
9. Education and support for family members and caregivers of individuals who have had a stroke highlighting the impact of depression and of potential social isolation, and the need to ensure there are opportunities for social integration even for individuals whose physical, communication or cognitive impairments limit their ability to return to prior social activities.
10. Processes to provide education and ensure that the caregivers' emotional needs are monitored and addressed, ideally through involvement of the primary healthcare team.
11. Processes to screen and assess for other mood related conditions (e.g., anxiety, apathy) following stroke.

Performance Measures

System Indicators

1. Availability of inpatient and community-based education and resources for individuals with stroke experiencing mood and mental health issues.
2. Availability of healthcare providers with expertise in mental health as part of all stroke programs.
3. Proportion of individuals with stroke experiencing mood and or depression following stroke.

Process Indicators

4. Proportion of individuals with acute stroke with documentation indicating initial screening for post-stroke depression was performed (either informally or using a formal screening tool) in the acute care, rehabilitation, long-term care and community settings (e.g., homecare) setting. (aligns to Accreditation Canada)
5. Proportion of individuals with acute stroke referred for additional assessment or intervention for a suspected diagnosis of depression.
6. Proportion of individuals with stroke diagnosed with post-stroke depression who are treated with antidepressants and/or psychotherapy.

Patient-Oriented Indicators

7. Changes in depression ratings from initiation of treatment, measured wat regular intervals, transition points and when changes in health status, using standardized depression rating scales.
8. Changes in quality of life of individuals with stroke who experience changes in mood or depression, measured using a standardized scale and at regular follow-up intervals.
9. Changes in quality of life of family members caring for individuals with stroke who experience changes in mood or depression, measured using a standardized scale and at regular follow-up intervals.

Implementation Resources and Knowledge Transfer Tools

Resources and tools listed below that are external to Heart & Stroke and the Canadian Stroke Best Practice Recommendations may be useful resources for stroke care. However, their inclusion is not an actual or implied endorsement by the Canadian Stroke Best Practices team or Heart & Stroke. The reader is encouraged to review these resources and tools critically and implement them into practice at their discretion.

Health Care Provider Information

- Canadian Stroke Best Practice Recommendations: Rehabilitation, Recovery and Community Participation following Stroke, Part One: Stroke Rehabilitation Planning for Optimal Care Delivery module; and Part Two: Delivery of Stroke Rehabilitation to Optimize Functional Recovery, Update 2025
- Heart & Stroke: Taking Action for Optimal Community and Long-Term Stroke Care: A resource for healthcare providers: https://www.strokebestpractices.ca/resources/professional-resources/tacls
- Can J Psychiatry: Canadian Network for Mood and Anxiety Treatments (CANMAT) 2023 Update on Clinical Guidelines for Management of Major Depressive Disorder in Adults: https://pubmed.ncbi.nlm.nih.gov/38711351/
- Evidence-based Review of Post-Stroke Depression (EBRSR): http://www.ebrsr.com/evidence-review/18-post-stroke-depression
- Stroke Engine: Assessments by topic: Mood/Depression: https://strokengine.ca/en/assessments-by-topic/
- NHS Stroke Recovery: https://www.nhs.uk/conditions/stroke/recovery/
- APA Diagnostic and Statistical Manual of Mental Disorders (DSM): https://www.psychiatry.org/psychiatrists/practice/dsm

Resources for Individuals with Stroke, Families and Caregivers

- Heart & Stroke: Signs of Stroke: http://www.heartandstroke.ca/stroke/signs-of-stroke
- Heart & Stroke: FAST Signs of Stroke…what are the other signs?: https://www.heartandstroke.ca/stroke/signs-of-stroke/fast-signs-of-stroke-are-there-other-signs
- Heart & Stroke: Your Stroke Journey: https://www.heartandstroke.ca/-/media/pdf-files/canada/your-stroke-journey/en-your-stroke-journey-v20.pdf

- Heart & Stroke: Post-Stroke Checklist: https://www.heartandstroke.ca/-/media/1-stroke-best-practices/resources/patient-resources/002-17_csbp_post_stroke_checklist_85x11_en_v1
- Heart & Stroke: Rehabilitation and Recovery Infographic: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/rehabilitation-nov2019/csbp-infographic-rehabilitation.pdf?rev=a2cff1fb27424c84bbd44b568d58d1b4
- Heart & Stroke: Transitions and Community Participation Infographic: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/transition-of-care-nov2019/csbp-infographic-transitions-and-participation.pdf?rev=595e990a17e14232aa3b1c731d983ce3
- Heart & Stroke Enabling Self-Management Following Stroke Checklist: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/resources/patient-resources/csbpr-enabling-self-management-following-stroke-checklist-jan2021-final.pdf?rev=03b045c41df04abfb7f4cb652869f031
- Heart & Stroke: Virtual Healthcare Checklist: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/resources/patient-resources/csbp-infographic-virtual-healthcare-checklist.pdf?rev=bf2f5b0e9e4a49cfbfc251208b6a15e2
- Heart & Stroke: Recovery and Support: https://www.heartandstroke.ca/stroke/recovery-and-support
- Heart & Stroke: Online and Peer Support: https://www.heartandstroke.ca/heart-disease/recovery-and-support/the-power-of-community
- Heart & Stroke: Services and Resources Directory: https://www.heartandstroke.ca/services-and-resources
- Heart & Stroke: Recovery and Relationships:

  https://www.heartandstroke.ca/stroke/recovery-and-support/relationships
- Heart & Stroke: Depression, Energy, Thinking and Perception:

  https://www.heartandstroke.ca/stroke/recovery-and-support/emotions
- Heart & Stroke: Depression: https://www.heartandstroke.ca/stroke/recovery-and-support/emotions/depression
- Heart & Stroke: Support for Family Care Partners:

  https://www.heartandstroke.ca/stroke/recovery-and-support/family-care-partners-need-care-too
- Heart & Stroke: Recognizing and Handling Stress: https://www.heartandstroke.ca/heart/recovery-and-support/emotions-and-feelings/stress
- Aphasia Institute: https://www.aphasia.ca/
- CanStroke Recovery Trials: Tools and Resources: https://canadianstroke.ca/tools/
- Stroke Engine: http://www.strokengine.ca/
- American Stroke Association: Pseudobulbar Affect (PBA): https://www.stroke.org/en/about-stroke/effects-of-stroke/emotional-effects/pseudobulbar-affect
- Anxiety Canada: https://www.anxietycanada.com/

Summary of the Evidence

Post-stroke depression (PSD) is a common consequence of stroke, although reported estimates may be unreliable given possible under-reporting of unusual mood, and the variability in the methods used to assess and define cases of depression. In a systematic review of 61 prospective, observational

studies of post-stroke depression conducted in hospital-, rehabilitation-, and population-based settings, Hackett & Pickles [31] estimated that approximately one-third of all individuals who experience stroke exhibited depressive symptoms at some point following the event (i.e., at acute, sub-acute or long-term follow-up). The overall pooled frequency estimate of PSD was 31% (95% CI 28% to 35%). Ayerbe et al. [32] reported that most cases of PSD develop within the first three months post stroke in a prospective study including 3,689 patients included in the South London Stroke Register. Salinas et al.[33] reported that of 1,424 postmenopausal women included in the Women's Health Initiative who experienced a first-ever stroke, new-onset PSD occurred in 21.4% of participants, an average of 16 months post stroke. Jorgensen et al. [28] reported the incidence of persons developing depression was significantly higher compared with those of the general population matched for age and sex. During a 2-year observation period, the incidence of depression was 25.4% vs. 7.8% (adj hazard ratio [HR]=4.09, 95% CI 4.00-4.18). In the prospective *Depression Predictors after Ischemic Stroke* study *(DEPRESS),* Guiraud et al. [34] reported that among 251 patients with new onset stroke, the incidence of depression was 19% at two months and 24.3% at 6 months. Risk factors for the development of PSF include increasing age, living alone, high levels of comorbidity, a history of depression, female gender, physical disability (modified Rankin Scale [mRS] score >2 at discharge), increased initial stroke severity, cognitive impairment and prior history of stroke. [28,32,34,35]

The best time to screen formally for the possible presence of PSD is not certain. Although incident rates decline over time and there is a general trend toward improvement in depressive symptomatology during the first-year post stroke, PSD may prove to be persistent for a longer duration for a significant proportion of individuals. Screening for depression should be considered during the acute inpatient stay, at the point of transition to, or during inpatient rehabilitation, upon discharge to the community and during periodic health assessments. Swartz et al.[36] describes the feasibility of using the 2-item version of the Patient Health Questionnaire during routine clinical practice using 1,500 outpatients attending a stroke prevention clinic. All patients were able to complete the screen, 89% of whom did so in less than 5 minutes. Karamchandani et al. [37] reported that 70% of patients of patients were eligible for depression screening prior to hospital discharge or transfer to another service. The remaining patients were not eligible due to aphasia, other medical condition, hospice/comfort measures, or prolonged intubation.

The diagnostic accuracies of several PSD screening tools have been examined. Meader et al. [38] included the results of 24 studies and evaluated the performance of 18 previously validated scales. The three best performing scales for the identification of any depression included Center of Epidemiological Studies-Depression Scale (CES-D) with a sensitivity and specificity of 75% and 85%, the Hamilton Depression Rating Scale (HDRS, sensitivity 84%, specificity 83%) and the 9-item version of the Patient Health Questionnaire (PHQ-9, sensitivity 86%, specificity 79%). The best two performing scales for the identification of major depression were HDRS and the PHQ-9. In a Canadian study, Prisnie et al. [39] including 122 outpatients attending a stroke prevention clinic, the diagnostic accuracies of the PHQ-9 and PHQ-2 were evaluated. Using a cut-point of 13, the sensitivity and specificity of the PHQ-9 was 81.8% and 97.1%, and 75.0% and 96.3%, for PHQ-2, using a cut point of 3.

For pharmacological treatment, selective serotonin reuptake inhibitors (SSRIs) are the most frequently used form of antidepressants to treat post stroke depression. In a recently updated Cochrane review, the results of 65 RCTs representing 3,342 participants with post-stroke depression, were included. [40] The treatments evaluated included pharmacological, non-invasive brain stimulation and psychological interventions, and their combinations. Among the 18 trials evaluating pharmacological agents, 12 compared an SSRI (citalopram, fluoxetine, paroxetine and sertraline) with placebo. Other agents assessed included tricyclic antidepressants (TCA), and other varied agents (deanxit, aniracetam, reboxetine, trazodone and nefiracetam). Overall, pharmacological agents were associated with a significant decrease in the number of people meeting the study criteria for depression at end of treatment (RR=0.70, 95% CI 0.55 to 0.88, 8 trials) and decreased the number of people with inadequate response to treatment (RR=0.47, 95% CI 0.32 to 0.70, 6 trials). The level of certainty for both outcomes was very low. While doses and duration of treatment were not summarized, the authors noted that the interventions in most trials were probably not given for an adequate length of time to show maximal or sustained response. In three trials the combination of pharmacological and psychotherapy resulted in a significant reduction in depression scores at the end of treatment (MD=-

1.60, 95% CI -2.13 to -1.08). Pharmacological treatment was associated with a significantly increased risk of adverse events (RR=1.55, 95% CI 1.12 to 2.15). In another systematic review Xu et al. [41] included the results from 11 RCTs of patients with a clinical diagnosis of post-stroke depression. Treatment with an antidepressant including SSRIs, (n=7), TCAs (n=3) and other agents (n=2) was associated with a significant reduction in depression scores (SMD=-0.96, 95% CI -1.41 to -0.51, p<0.0001), and better response to treatment (RR=1.36, 95% CI 1.01-1.83, p=0.04), compared with a placebo.

Non-pharmacological approaches for the treatment of PSD include different forms of psychotherapy, physical activity, non-invasive brain stimulation, and acupuncture. In the same Cochrane review mentioned above, Allida et al. [40] also evaluated psychological interventions, (individual or group cognitive behavioral therapy, delivered in-person or remotely, motivational interviewing, and group psychotherapy) which were assessed in 22 trials. Compared with usual care and/or attention control, psychological interventions significantly decreased the number of individuals meeting the study criteria for depression at end of treatment (RR= 0.77, 95% CI 0.62 to 0.95), an effect similar to that of pharmacological interventions.

Prevention of PSD

Given the high prevalence of PSD and the negative consequences associated with it, there is increased focus on prevention strategies. The same interventions examined in the recent Cochrane review [40] for the treatment of PSD, were also examined as interventions for the prevention of PSD. Allida et al. [42] included 19 RCTs (21 interventions), involving 1,771 participants recovering from stroke without depression at study entry. Compared with placebo, antidepressants significantly reduced the risk of depression at the end of the treatment period (RR=0.50, 95% CI 0.37 to 0.68, 9 trials), but were not associated with a significant reduction in Hamilton Depression Rating Scale scores (MD=0.59, 95% CI -1.46 to 2.63, 4 trials) or improvement in Barthel Index scores (MD=-3.86, 95% CI -9.48 to 1.77, 3 trials). Compared with usual care, psychological therapy was associated with a significantly lower risk of depression (RR=0.68, 95% CI 0.49 to 0.94, 2 trials). No trials were included that examined noninvasive brain stimulation (NIBS), or combinations of interventions. In a pooled analysis based on 776 observations from 12 RCTs, Salter et al. [43] reported the odds of developing PSD were reduced significantly with the use of prophylactic pharmacotherapy (odds ratio [OR]=0.34, 95% 0.22-0.53, p<0.001). Similar effects have been reported in other systematic reviews.

In a trial that included pharmacological and non-pharmacological study arms with long-term follow-up, Robinson et al. [44] randomized 176 patients without depression to receive escitalopram, problem-solving therapy (PST) or placebo, which was provided for 12 months. At one year, in the per-protocol analysis, adjusted for previous history of mood disorders, patients assigned to the placebo condition were significantly more likely to develop depression compared with those receiving either therapy with escitalopram (adj. HR= 4.5, 95% CI 2.4-8.2) or PST (adj. HR=2.2, 95% CI 1.4-3.5). In a follow-up study, Mikami et al. [45] reported that when escitalopram was discontinued at the end of the study period, persons were more likely to develop major depression and had increased Hamilton Depression Rating Scale (HDRS) scores during the next 6 months, compared with those given placebo or PST. Finally, after a mean duration of 8 years of follow-up, Robinson et al.[46] reported that participants who received PST were significantly less likely to have died, compared with the combined group of escitalopram + placebo. Increasing age and the development of depression were found to be significant predictors of mortality.

Treatment of other Mood States

People with depression may also suffer with a comorbid anxiety disorder, the most common of which is generalized anxiety disorder (GAD). The overall prevalence of anxiety following stroke is 19%-24%, depending on the method used for identification (interview vs. rating scale). [47] Despite the high prevalence of post-stroke anxiety, very few studies have included evaluation of the effectiveness of potential treatments. A Cochrane review [48] identified only 3 RCTs examining pharmacotherapy (paroxetine, buspirone) and a self-help autogenic relaxation CD. While the results from individual trials

were positive, the results could not be pooled. The authors concluded there was insufficient evidence to guide treatment. Another systematic review [49] including the results of 14 RCT, of which two included patients with traumatic head injuries. Interventions included in this review were psychotherapy (n=6), pharmacotherapy (n=4), pharmacotherapy + psychotherapy (n=1), exercise therapy (n=2) and other interventions (forest therapy, relaxation CD and acupuncture + alprazolam). Compared with a control group, both psychotherapy interventions and pharmacotherapy were associated with significant reductions in anxiety scores (SMD= −0.41, 95% CI -0.79 to −0.03, 6 trials and SMD= −2.12, 95% CI -3.05 to -1.18, 4 trials, respectively).

Post-stroke apathy is another form of mood disturbance that occurs not infrequently post stroke with estimates of 36% reported, [50] which are comparable to that of post stroke depression. Nonpharmacological treatments that have been evaluated for post stroke apathy include NIBS, music therapy, cognitive therapy, and occupational therapy. In a network meta-analysis, when all interventions were combined in a pooled analysis, including the results from 8 RCTs of 334 patients with neurological conditions (dementia or mild cognitive impairment) and stroke in one trial, nonpharmacological interventions were associated with a significant reduction in Apathy Evaluation Scale (AES)(MD=-6.88, 95% CI −8.50 to −5.26). [51] In direct comparisons with the control condition, all interventions except music therapy were associated with significant reductions in AES scores. Mean differences ranged from -8.25 to cognitive rehabilitation to -4.87 for occupational therapy. In head-to-head comparisons, no active intervention was superior to another.

Pharmacotherapy can also be used for the treatment of post- stroke emotionalism. In a Cochrane review including 7 RCTs, Allida et al. [52] reported that fluoxetine (20 mg/day for 10 days) was associated with a ≥50% reduction in emotionalism, the primary outcome (RR=0.26, 95% CI 0.09 to 0.77), although data were only available for one small trial with 19 participants. The use of SSRIs was also associated with a significant improvement (reduction) in tearfulness when compared to placebo (RR=0.32, 95% CI 0.12 to 0.86; 3 trials).

Sex & Gender Considerations

While female sex has been consistently identified as a significant risk factor for the development of PSD, there is little research focused on sex differences in treatment. In one of the few trials identified on the topic, The Preventive Effect of Escitalopram on Depression and Related Emotional Disorders in Acute Stroke Patients (EMOTION) trial that included 478 patients, women had a better response to a three-month course of antidepressant medication (10 mg/day escitalopram) compared with men.[53]

Evidence Table and Reference List 1

Section 2 Sleep Health and Post-Stroke Fatigue

2. Sleep Health and Post-Stroke Fatigue, Recommendations 2025

Definitions and Descriptions:

Note: Post-stroke fatigue does not appear to be correlated to the severity of stroke. Individuals who experience very mild stroke may still experience post-stroke fatigue.

Refer to the Definitions and Descriptions included in the Overview for additional information related to this section.

2.0 General Recommendations

i. Individuals should be monitored for post-stroke fatigue throughout the trajectory of stroke recovery as it is a common and disabling condition [Strong recommendation; Moderate quality of evidence].

ii. Healthcare professionals should anticipate the possibility of post-stroke fatigue in individuals with stroke, and mitigate fatigue through assessment, education of the individual and their family, and interventions throughout the stroke-recovery continuum [Strong recommendation; Moderate quality of evidence].

2.1 Screening and Assessment

i. Prior to discharge from acute care or inpatient rehabilitation, individuals with stroke, their family and caregivers should be provided with information regarding sleep patterns and post-stroke fatigue [Strong recommendation; Moderate quality of evidence].

ii. Following return to the community, individuals with stroke should be periodically screened for post-stroke fatigue during follow-up healthcare visits (e.g., primary care, home care, and outpatient prevention or rehabilitation clinics) [Strong recommendation; Low quality of evidence].

iii. Individuals who experience post-stroke fatigue should be screened for common and treatable co-morbidities, conditions and for medications that are associated with and/or exacerbate fatigue or impact sleep [Strong recommendation; Low quality of evidence].

   a. Individuals with stroke should be screened for the possible presence of sleep apnea [Strong recommendation; Low quality of evidence].

   b. If sleep apnea is suspected, individuals with stroke should be referred to a healthcare provider with expertise in sleep health for further assessment and management to improve outcomes including ability to participate in other aspects of stroke rehabilitation [Strong recommendation; Moderate quality of evidence].

Section 2.1 Clinical Considerations

1. Co-morbid conditions that may impact sleep and fatigue may include signs of depression or other mood-related conditions; sleep disorders or factors (e.g. sleep apnea, pain) that decrease quality of sleep; other common post-stroke medical conditions and medications (e.g. infections such as urinary tract infections, dehydration, sedating drugs, hypothyroidism, anemia, nutritional deficiencies) that increase fatigue.

2.2 Management of Post-Stroke Fatigue

i. Individuals with stroke should be cared for by healthcare professionals who are knowledgeable in the symptoms of fatigue and its management [Strong recommendation; Low quality of evidence].

ii. Modafinil may be considered as a treatment for post-stroke fatigue [Conditional recommendation; Low quality of evidence].

iii. Antidepressant medication is not recommended for the treatment of post-stroke fatigue in the absence of other co-morbid indications such as depression and anxiety [Strong recommendation; Moderate quality of evidence].

iv. Cognitive behavioural therapy may be considered as an adjunct treatment for post-stroke fatigue [Strong recommendation; Low quality of evidence].

v. Mindfulness based stress reduction may be considered as an adjunct treatment for post-stroke fatigue [Strong recommendation; Low quality of evidence].

vi. Progressive exercise and graded return to activity are recommended to improve deconditioning and physical tolerance [Strong recommendation; Low quality of evidence].

vii. Counselling and education should be provided to individuals with stroke, their family and caregivers on post-stroke fatigue, and energy conservation strategies that consider optimizing daily function in high priority activities (e.g. daily routines and modified tasks that anticipate energy needs and provide a balance of activity and rest) [Strong recommendation; Low quality of evidence]. *Refer to Box 2 for additional information on energy conservation strategies.*

viii. Encourage individuals who experience post-stroke fatigue to communicate energy status and rest needs to family members, caregivers, healthcare providers, employers and social groups as a mechanism to increase self-management [Strong recommendation; Low quality of evidence].

2.3 Sleep Hygiene

i. Counselling and education for individuals post-stroke and their family on the establishment of good sleep hygiene behaviours is recommended [Strong recommendation; Low quality of evidence].

Box 2: Examples of Specific Energy Conservation Strategies

The following list includes energy conservation strategies described across a broad literature base. These are provided as helpful information and guidance in counseling individuals who have experienced a stroke; they should not be regarded as evidence-based recommendations.

1. Keep an agenda of energy levels and daily activities and prioritize tasks to be completed when energy level is optimal.
2. Structure the day to include a balance of activities with high and low energy output and scheduled periods of rest; to anticipate energy requirements for each task and for completion of high priority activities.
3. Organize the physical environment to minimize efforts or the need to move around (e.g., use elevator instead of stairs, and have ready access to the most frequently used items) to maximize movement efficiency.
4. Break up tasks into smaller chunks (e.g. throughout the week, do a little bit each day).
5. Place chairs in strategic locations to permit sitting during activities (such as dressing, putting on or removing shoes).
6. Sit rather than stand when possible while doing household activities (such as preparing food or folding laundry).

7. Use appropriate body mechanics, posture, and set up of activities to optimize task efficiency.
8. Establish good sleep hygiene habits with regular sleep patterns and avoiding naps late in the day.
9. Avoid unnecessary sedating drugs (with guidance from health professionals) and excessive alcohol intake (in accordance with Canada's Low Risk Drinking Guidelines).
10. Use energy saving devices, equipment and technology (e.g., electric can opener, grocery delivery) to reduce physical efforts.
11. Engage in enjoyable vocational and leisure activities that are planned ahead to ensure the individual with stroke is well rested prior to activities.
12. Delegate activities that can be done by someone else, such as family members and friends.
13. Develop a plan for eating a healthy balanced diet to help maintain energy levels.
14. Talk to someone about how you are feeling and how well your strategies may be working to address sleep and post-stroke fatigue.

Rationale

Healthy sleep patterns contribute positively to stroke rehabilitation participation and outcomes. Sleep impairments, such as post-stroke fatigue (PSF) occur frequently, affecting more than half of all individuals with stroke at some point in their recovery, and can negatively impact an individual's ability to actively participate in rehabilitation. Post-stroke fatigue is generally under-diagnosed and not routinely assessed in individuals with stroke. While the condition is commonly associated with low mood and sleep disturbances, it can arise in their absence. Individuals experiencing PSF report common experiences including having less capacity and energy, an abnormal tiredness and an overwhelming need for long-lasting sleep, being easily fatigued, fatigue for which there was no obvious cause or explanation and increased stress sensitivity. The condition can occur in anyone who has experienced a stroke and has not been shown to be related to size, location or severity of stroke. PSF can lead to cognitive difficulties, physical limitations, and emotional disturbances, often persisting for years after the stroke. The fatigue can interfere with sleep patterns, reduce physical activity, and ultimately hinder overall recovery. Ensuring access to assessment and treatment modalities for sleep impairments and fatigue may improve mood, cognition, neurological status and mood.

Individuals with stroke report that information and awareness on post-stroke fatigue is crucial for those who have experienced a stroke, their family, caregivers, as well as for healthcare providers, to help bring understanding as to what post-stroke fatigue is, why an individual following stroke may be experiencing fatigue, and strategies that may help. Education and strategies to help manage post-stroke fatigue, such as activity pacing, sleep hygiene, and a healthy balanced diet are very important. Individuals with stroke advocate for improved follow-up care for post-stroke fatigue, as the effects of post-stroke fatigue may be most felt after returning to and participating in their community. Individuals with stroke emphasize that post-stroke fatigue can impact mental health, emotions, language and communication, and overall rehabilitation and recovery.

System Implications

To achieve timely and appropriate assessment and management of sleep health and post-stroke fatigue, organizations should optimize the following system components:

1. Education and increased awareness about sleep health and sleep related conditions for individuals who have experienced a stroke, caregivers, employers and healthcare professionals.
2. Protocols for the inclusion of post-stroke fatigue in screening and assessments at all transition points and stages of care following a stroke.

3. Access to healthcare professionals with expertise in sleep health, and access to timely sleep studies.
4. Resources and mechanisms to plan and deliver community-based services which consider the needs of the individual with stroke, family and caregiver and are focused on energy conservation (e.g., access to assistive devices, transportation, and counseling) without financial barriers.
5. Models of care that include technology such as virtual care, regular telephone follow-up and web-based support to reduce excess visits to healthcare providers that consume energy.
6. Education and increased awareness about post-stroke fatigue and management strategies for individuals who have experienced a stroke, family, caregivers, employers and healthcare professionals.
7. Access to funding to cover costs of sleep support equipment and treatment, including CPAP.

Performance Measures

System Indicators

1. Availability of inpatient and community-based assessment services and resources for individuals with stroke experiencing post-stroke fatigue and other sleep issues.
2. Availability of healthcare providers with expertise in post-stroke fatigue and other sleep issues.
3. Proportion of individuals with stroke who report symptoms of post-stroke fatigue, measured at each transition point as a proportion of all individuals with stroke.

Process Indicators

4. The proportion of individuals with stroke who return to the emergency department or are readmitted to hospital for failure to cope or other fatigue-related reasons.

Patient-Oriented Indicators

5. Changes in quality of life of individuals with stroke who experience post-stroke fatigue and other sleep issues, measured using a standardized scale and at regular follow-up intervals.
6. Changes in fatigue levels for individuals with stroke who experience post-stroke fatigue and other sleep issues, measured using a standardized scale and at regular follow-up intervals.
7. Assessment of potential depression for individuals experiencing post-stroke fatigue and other sleep issues, measured at regular intervals, transition points and when changes in health status, using standardized depression rating scales.

Implementation Resources and Knowledge Transfer Tools

Resources and tools listed below that are external to Heart & Stroke and the Canadian Stroke Best Practice Recommendations may be useful resources for stroke care. However, their inclusion is not an actual or implied endorsement by the Canadian Stroke Best Practices team or Heart & Stroke. The reader is encouraged to review these resources and tools critically and implement them into practice at their discretion.

Health Care Provider Information

- Canadian Stroke Best Practice Recommendations: Rehabilitation, Recovery and Community Participation following Stroke, *Part Three: Optimizing Activity and Community Participation following Stroke*: Box 2: Examples of Specific Energy Conservation Strategies
- Canadian Stroke Best Practice Recommendations: Rehabilitation, Recovery and Community Participation following Stroke, Part One: Stroke Rehabilitation Planning for Optimal Care

Delivery module; and Part Two: Delivery of Stroke Rehabilitation to Optimize Functional Recovery, Update 2025

- Heart & Stroke: Taking Action for Optimal Community and Long-Term Stroke Care: A resource for healthcare providers: https://www.strokebestpractices.ca/resources/professional-resources/tacls
- Multidimensional Fatigue Symptom Inventory: http://www.cas.usf.edu/~jacobsen/HANDOUT.FSI&MFSI.pdf
- Fatigue severity scale: https://www.healthywomen.org/sites/default/files/FatigueSeverityScale.pdf
- Stroke Engine: Fatigue : https://www.strokengine.ca/en/intervention/fatigue/

Resources for Individuals with Stroke, Families and Caregivers

- Heart & Stroke: Signs of Stroke: http://www.heartandstroke.ca/stroke/signs-of-stroke
- Heart & Stroke: FAST Signs of Stroke…what are the other signs?: https://www.heartandstroke.ca/stroke/signs-of-stroke/fast-signs-of-stroke-are-there-other-signs
- Heart & Stroke: Your Stroke Journey: https://www.heartandstroke.ca/-/media/pdf-files/canada/your-stroke-journey/en-your-stroke-journey-v20.pdf
- Heart & Stroke: Post-Stroke Checklist: https://www.heartandstroke.ca/-/media/1-stroke-best-practices/resources/patient-resources/002-17_csbp_post_stroke_checklist_85x11_en_v1
- Heart & Stroke: Rehabilitation and Recovery Infographic: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/rehabilitation-nov2019/csbp-infographic-rehabilitation.pdf?rev=a2cff1fb27424c84bbd44b568d58d1b4
- Heart & Stroke: Transitions and Community Participation Infographic: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/transition-of-care-nov2019/csbp-infographic-transitions-and-participation.pdf?rev=595e990a17e14232aa3b1c731d983ce3
- Heart & Stroke Enabling Self-Management Following Stroke Checklist: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/resources/patient-resources/csbpr-enabling-self-management-following-stroke-checklist-jan2021-final.pdf?rev=03b045c41df04abfb7f4cb652869f031
- Heart & Stroke: Virtual Healthcare Checklist: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/resources/patient-resources/csbp-infographic-virtual-healthcare-checklist.pdf?rev=bf2f5b0e9e4a49cfbfc251208b6a15e2
- Heart & Stroke: Recovery and Support: https://www.heartandstroke.ca/stroke/recovery-and-support
- Heart & Stroke: Online and Peer Support: https://www.heartandstroke.ca/heart-disease/recovery-and-support/the-power-of-community
- Heart & Stroke: Services and Resources Directory: https://www.heartandstroke.ca/services-and-resources
- Heart & Stroke: Low Energy: https://www.heartandstroke.ca/stroke/recovery-and-support/emotions/low-energy
- CanStroke Recovery Trials: Tools and Resources: https://canadianstroke.ca/tools/
- Stroke Engine: http://www.strokengine.ca/

- Central East Stroke Network: https://cesnstroke.ca/post-stroke-fatigue-toolkit/
- Stroke Association: Fatigue After Stroke: https://www.stroke.org.uk/resources/fatigue-after-stroke
- Stroke Association: Post-stroke Fatigue and Tiredness: http://www.stroke.org.uk/about/fatigue
- American Stroke Association: Let's Talk About Feeling Tired After Stroke: https://www.stroke.org/en/-/media/Stroke-Files/Lets-Talk-About-Stroke/Life-After-Stroke/Feeling-Tired-After-Stroke.pdf?sc_lang=en
- CDC: Activity Journal: http://www.cdc.gov/healthyweight/pdf/physical_activity_diary_cdc.pdf
- New Zealand Stroke Education (charitable) Trust: Stroke Recovery Videos: https://stroke.net.nz/videoguide

Summary of the Evidence

Post-stroke sleep disorders

While the incidence of sleep disordered breathing, including obstructive sleep apnea is high post stroke, and is associated with an increased risk of stroke recurrence, screening for sleep apnea is uncommon post stroke and does not appear to be part of routine practice. Brown et al. [54] surveyed a group of 981 participants of the Brain Attack Surveillance program, who had sustained a stroke within the previous 90 days. Within the group, 13.6% of participants self-reported being sleepy during the day and 2.5% reported that they had stopped breathing during the night. Despite, these symptoms, less than 10% of healthcare providers asked patients about their sleep symptoms, while 5.6% were offered a sleep test. In only 2.24% of patients was a sleep test completed.

Post-stroke fatigue

The incidence of PSF is difficult to estimate given that many patients report symptoms of pre-stroke fatigue; however, estimates of the prevalence of PSF are available from two recent systematic reviews. Zhan et al. [55] pooled the results from 66 observational studies including 11,697 participants. The mean time from stroke onset to assessment varied widely from 3 days to 10.6 years, although assessment was conducted within one year in 41 of the studies. The global pooled prevalence of PSF was 46.8% (95% CI 43.4%–50.2%). The prevalence of PSF was higher in participants with depression (48.2% vs. 42.2%) and in women (53.2% vs. 45.0%). Cumming et al. [56] included the results of 49 studies and estimated the prevalence of PSF at any point following stroke. Using the results from 22 studies that used the Fatigue Severity Scale and a cut-off level of ≥4 (or >4 in 3 studies), the prevalence of post-stroke fatigue was 50% (95% CI 43%–57%).

The clinical course of PSF is unclear; therefore, it's even unknown if PSF increases or decreases over time. Snaphaan et al. [57] reported that the prevalence of fatigue was 35% at two months post stroke and 33% at 18 months. 26% of patients reported fatigue at both assessment points, while 9% reported fatigue at baseline but not at follow-up, and 8% reported no fatigue at baseline but did at follow-up. In a systematic review, [58] which included the results of 9 studies, the percentage of patients reporting fatigue increased from assessment time one to time two in 7 studies, while it had decreased between assessment points in 2 studies. In contrast, Cumming et al. [56] reported the estimates of fatigue were relatively stable across time (within 3 months of stroke 55%, 95% CI 25%-85%; 1-6 months 46%, 95% CI 31%-62%; and >6 months 53%, 95% CI 48%-58%). Independent predictors of fatigue that have been identified include depression, low levels of physical functioning, and pre-stroke fatigue. [19]

There are few treatments for post-stroke fatigue that have been evaluated. A Cochrane review [59] included the results from 12 RCTs, 4 evaluating pharmacological and 4 evaluating non-pharmacological approaches. In the remaining 4 trials, PSF was not the primary target of investigation, but fatigue was reported as an outcome. Treatments in these trials included continuous positive airway pressure (CPAP), a chronic-disease self-management program, tirilazad mesylate

and antidepressants. Using the results from 7 trials (5 pharmacological, 2 non-pharmacological), treatment was associated with a significant reduction in fatigue scores (WMD= -1.07, 95% CI -1.93 to -0.21, p=0.014).

Pharmacological agents that have been evaluated in the treatment of PSF include selective serotonin reuptake inhibitors (fluoxetine) and modafinil, an agent that promotes wakefulness and is used to treat excessive daytime sleepiness. In the Modafinil in Debilitating Fatigue After Stroke (MIDAS) trial, 36 participants with PSF an average of 9 months post stroke, received 200 mg modafinil or placebo for 6 weeks. [60] Active treatment was associated with a significantly greater decrease in mean total Multidimensional Fatigue Inventory (MFI)-20 scores (MD= −7.38, 95% CI −21.76 to −2.99; p<0.001), mean Fatigue Severity Scale (FSS) scores (MD= -6.31, 95% CI -10.7 to -1.9, p=0.048) and a significantly greater increase in total mean Stroke-Specific Quality of Life scores (MD=11.8, 95% CI 2.3 to 21.3, p=0.015). Poulsen et al. [61] randomized 41 persons with PSF to receive 400 mg modafinil for 90 days. The results were ambiguous. At 90 days, there was no significant difference between groups in the median MFI-20 GF score (11 modafinil vs placebo 14, p=0.32), or in the median score of other MFI domains (physical fatigue, reduced activity, reduced motivation); however, median FSS and FSS-7 were significantly lower at 90 days for patients in the modafinil group (36 vs. 49.5, p=0.02 and 22 vs. 37.5, p=0.042, respectively). Fluoxetine was examined in a trial including 83 participants with post-stroke emotional disturbances. At an average of 14 months after stroke onset, participants were randomized to receive 20 mg/day of fluoxetine (n=40) or placebo, (n=43) for 3 months. [62] At the end of treatment, there were no significant differences in the number of patients with PSF. At 6 months, 34 patients (85%) in the fluoxetine group reported PSF compared with 40 (93%) in the control group. However, at 3 months, fewer patients in the fluoxetine group reported excessive/inappropriate crying (40% vs. 62.8%, p=0.038), and at 6 months fewer patients in the fluoxetine group were identified with depression (12.5% vs. 30.2%, p=0.05).

Among trials evaluating non-pharmacological treatments for PSF, cognitive behavioral therapy (CBT) may be an effective strategy, although it has not been well-studied. In a small RCT, Nguyen et al. [63] randomized 15 participants with post-stroke fatigue (FSS score ≥4) and/or poor sleep, whose stroke had occurred two years previously. Participants were randomized to receive CBT emphasizing specific napping schedules and re-organising activity levels as a means of energy conservation in addition to pacing and graded activity exposure or treatment as usual (control group) for two months. At the end of the intervention and at 4-month follow-up, there was significantly greater decline in the mean FSS-7 score in the CBT group; however, there was no significant difference in mean change on Brief Fatigue Inventory (BFI), at either assessment point. Zedlitz et al. [64] randomized 83 participants with severe fatigue, >4 months post stroke to participate in a 12-week program consisting of group cognitive treatment (control condition) or group cognitive treatment combined with graded activity training (COGRAT). Cognitive treatment consisted of CBT and compensatory strategy teaching. Those in the COGRAT group also received 24 sessions, each 2-hours in duration of graded activity training, including treadmill walking, strength training, and homework assignments. Participants who received COGRAT were significantly more likely to experience clinically relevant improvement in fatigue severity (57.9% vs. 24.4%, p=0.002).

Mindfulness stress reduction is another non-pharmacological technique that may help to improve PSF. Johansson et al. [65] randomized 29 patients, of whom 18 were recovering from stroke (11 from traumatic brain injury) with mental fatigue to participate in an 8-week program of Mindfulness–Based Stress Reduction (MBSR), which included yoga, body scan, and sitting meditation, or to a wait list control group. Compared with those in the wait-list control group, participants who received the MBSR program immediately reported a significantly greater decrease in Mental Fatigue Scale scores.

There is an association between sleep-disordered breathing (SDB) and vascular morbidity and mortality. SDB independently increases the risk of stroke in the general population and is also associated with stroke recurrence. Sleep-disordered breathing is highly prevalent post stroke. Seiler et al. [66] included 86 studies with over 7,000 patients in the acute, sub acute and chronic stages of stroke. The overall prevalences of SDB with an apnea-hypopnea index (AHI) >5/hr was 71%, 40% for an AHI >20/hr, and 30% for an AHI >30/hr. The overall prevalence of central sleep apnea was lower

with a pooled prevalence of 12% for AHI >5/hr. No data were available for central sleep apnea with an AHI >20/hr or >30/hr.

Sex & Gender Considerations

While women may be at higher risk of PSF, no intervention trials were reviewed that examined sex or gender as a potential determinant of outcome.

Evidence Table and Reference List 2a
Evidence Table and Reference List 2b

Section 3 Cognitive Rehabilitation for Individuals with Stroke

3. Cognitive Rehabilitation for Individuals with Stroke, Recommendations 2025

Notes:

- Evidence supporting rehabilitation for cognitive challenges related to vascular cognitive impairment (*VCI)* is growing, but current evidence is in general derived from investigations with a limited number of patient groups, including stroke, acquired brain injury (ABI), m*ild cognitive impairment (*MCI) or mixed dementia. Studies with these mixed populations were included if they specified inclusion of individuals with a vascular etiology.
- Overall, specific cognitive interventions fall into two broad approaches, emphasizing either teaching compensation strategies or providing direct remediation and cognitive skill training.
  - **Compensation** focuses on teaching strategies, behaviours and/or external tool use to manage impairments and is often directed at specific activity limitations to promote independence. It can include changes in the physical and social environment or changing the way one performs an activity.
  - **Direct remediation** focuses on providing intensive specific cognitive skill training to directly improve the impaired cognitive domain, with the goal of generalization or transfer of benefits to those activities that rely on that domain. It can include therapist-directed adaptive exercises, usually via computer or tablet-based tools directed at specific deficits.
  - Note that commercial brain games are not included in these recommendations. Evidence for functional benefit or impact on activity and participation limitations is limited and requires more research before being integrated into these guidelines.

Refer to the CSBPR7 Vascular Cognitive Impairment module for additional information on assessment, management and rehabilitation for individuals with vascular cognitive impairment. [67]

3.0 Cognitive Rehabilitation for Individuals with Stroke

i. Individuals presenting with stroke or TIA should be screened for any changes in cognition following stroke compared to their pre-stroke cognitive status. [Strong recommendation; Moderate quality of evidence]. *Note, changes can be reported by the individual, family members, caregivers or clinicians. Refer to the CSBPR7 Vascular Cognitive Impairment module Appendix Three for additional information on the presenting signs and symptoms of VCI.* [67]

ii. All individuals with stroke should be assessed to determine their need for cognitive rehabilitation using validated assessment tools where available [Strong recommendation; Low quality of evidence].

iii. Individuals with stroke and cognitive impairments, their family and caregivers should be engaged in the development of a cognitive rehabilitation treatment plan that addresses current impairments and limitations, is goal-oriented and involves shared decision-making [Strong recommendation; Low quality of evidence].

   a. Cognitive rehabilitation treatment plans should consider the evolving nature of VCI and be regularly reviewed and adapted as the individual's cognitive status changes [Strong recommendation; Low quality of evidence].

   b. Interventions should be individualized, based on best available evidence, and have the long-term aim to facilitate resumption or continued safe participation of desired activities (e.g., self-care, home and financial management, leisure, driving, return to work) [Strong recommendation; Low quality of evidence].

   c. Interventions should consider pharmacological and non-pharmacological approaches [Strong recommendation; Low quality of evidence].

iv. The healthcare team should use a multipronged approach for cognitive rehabilitation that includes both domain specific (e.g. attention, memory, executive function) and global strategies (e.g., physical activity and exercise) [Strong recommendation; High quality of evidence].

v. Individuals with stroke and VCI who also have communication limitations should be assessed for cognitive rehabilitation using appropriate validated methods particularly for individuals with aphasia [Strong recommendation; Moderate quality of Evidence].

Section 3.0 Clinical Considerations

1. A comprehensive assessment of cognitive strengths and weaknesses is required to consider the impact of challenges (such as impaired visuo-perceptual function, learning abilities, awareness, and insight of changes) on motivation, ability to engage in planning and treatment, and specific approaches to treatment delivery.
2. For treatment planning, consider the prognosis for cognitive recovery or decline, and the potential impact of other effects of stroke and existing co-morbidities (such as fatigue, pain, depression/ or anxiety) on the individual's ability to participate in and benefit from cognitive rehabilitation.
3. When engaging individuals with VCI, their family and caregivers in cognitive rehabilitation treatment, consider:
    a. Interactive education about cognitive strengths and weaknesses, and implications for treatment, function, safety as well as prognosis.
    b. The prognosis for cognitive recovery or decline that may impact treatment planning and delivery (e.g., related to the time post stroke, severity of vascular pathology).
    c. The availability of social support and the existing physical environment may impact participation, safety, and outcomes. Modifying the social and/or physical environment and embedding structure and routine may be considered to optimize specific cognitive rehabilitation techniques.
4. Both compensatory and remediation approaches may be applied in a person-centred approach to optimize function.
5. In addition to interventions tailored for specific cognitive domains, other approaches that directly impact brain function or health (e.g., non-invasive brain stimulation, physical activity) have received growing attention as modulators of cognition.
6. Multimodal approaches (e.g. diet, social activities, music, health education) may be considered to improve cognitive performance or to prevent cognitive decline.
7. Virtual reality has been studied to address post-stroke attention, memory and executive function impairments and may be considered, but its efficacy has not been established (further research is required).
8. Computer based interventions may be considered as an adjunct to clinician-guided treatment. Research in this area continues to evolve rapidly.
9. Evidence for the impact and outcomes of treatment on activity or participation limitations is limited and requires more research.

3.1 Executive Function

Note: This section includes interventions for the cognitive domain of executive function (planning, organization, self-monitoring and awareness). In most cases this should be considered for mild to moderate executive dysfunction.

i. Cognitive rehabilitation that focuses on executive function deficits may be addressed with both compensatory and remediation strategies that are appropriate to the individual's needs and clinical profile [Strong recommendation; Low quality of evidence].

ii. **Compensation** strategies may include:

   a. Metacognitive strategy training and formal problem-solving strategies, under the supervision of a trained therapist, should be considered for individuals with mild to moderate cognitive deficits [Strong recommendation; Moderate quality of evidence].

   b. In individuals with reduced self-awareness, the use of skill-specific training and explicit feedback may be considered to promote performance of specifically trained functional tasks [Strong recommendation; Low quality of evidence].

   c. Modifications to the environment and external strategies (e.g., written or electronic cues), should be considered for those individuals with mild to severe executive dysfunction [Strong recommendation; Low quality of evidence].

iii. **Remediation** using targeted computer-assisted executive skill training facilitated and guided by a therapist may be considered [Strong recommendation; Low quality of evidence].

3.2 Attention

Note: This section includes interventions for the cognitive domain of attention (e.g., vigilance, working memory). In most cases this should be considered for mild to moderate attention deficits.

i. Cognitive rehabilitation that focuses on attention deficits may be addressed with both compensatory and remediation strategies as appropriate to the individual's needs and clinical profile [Strong recommendation; Low quality of evidence].

ii. **Compensation:** Modifications of cognitive demands by adapting the environment, tasks or treatment sessions (e.g., duration, planned rests, reducing distractions) may be considered [Strong recommendation; Low quality of evidence].

iii. **Remediation:** Targeted cognitive training directed by a therapist, such as time pressure management, attention process training or computer-assisted cognitive rehabilitation may be considered for appropriate individuals [Strong recommendation; Low quality of evidence].

   a. Working memory deficits may be remediated using targeted computerized working memory skill training facilitated and guided by a therapist [Strong recommendation; Moderate quality of evidence].

3.3 Memory

i. Compensation strategies may be considered for individuals with stroke and memory difficulties or impairments including:

   a. Using strategies that provide *external* cues or support (e.g. assistive electronic and non-electronic devices) [Strong recommendation; Moderate quality of evidence].

   b. Using *internal* strategies, for those with mild memory difficulties or impairments. These strategies are taught to the individual and could include strategies to increase memorability (e.g., visual imagery, association, and semantic organization) and training techniques (e.g., self-efficacy training, and spaced retrieval practice) [Strong recommendation; Moderate quality of evidence].

   c. For those with moderate to severe memory impairments, errorless learning applied to specific functional tasks (e.g., preventing mistakes in repeated practice with cues that are reduced as learning is successful) is recommended as an additional training technique [Strong recommendation; Moderate quality of evidence].

Section 3.3 Clinical Considerations

1. Treatment for memory difficulties or impairments may be provided individually or in a group setting.

3.4 Aerobic Exercise

i. Aerobic exercise should be considered where appropriate as a modality to improve attention, working memory and executive function [Strong recommendation; Moderate quality of evidence]. *Refer to CSBPR Rehabilitation, Recovery and Community Participation Part Two, Section 4.4. for additional information on aerobic training.*

ii. **Multimodal approaches:** Aerobic exercise may be combined with cognitive rehabilitation training to improve attention, working memory and executive function in individuals with VCI [Strong recommendation; High quality of evidence]. *Refer to CSBPR Rehabilitation, Recovery and Community Participation Part Two, Section 4.4. for additional information on aerobic training.*

Rationale

Vascular cognitive impairment (VCI) is a frequent consequence of stroke, affecting mental processes such as memory, attention, problem-solving, and executive function. These cognitive challenges can impede an individual's ability to plan daily activities, follow conversations, and make decisions, significantly impacting their independence and quality of life. Many individuals with stroke experience frustration and anxiety due to these cognitive deficits, which can lead to social withdrawal and reduced participation in rehabilitation. Vascular cognitive impairment can complicate recovery, as it can hinder engagement in therapy, ability to follow rehabilitation plans, and the adoption of healthy lifestyle changes.

Individuals with stroke highlight the importance of equitable access to cognitive rehabilitation. They emphasize that individuals with VCI, their family and caregivers should be actively engaged in the development of cognitive rehabilitation treatment plans that are individualized and focus on person-centred goals. Both remedial and compensatory approaches to cognitive rehabilitation are important and helpful to individuals with stroke. Early education focused on awareness of potential cognitive changes following stroke is also highlighted as helpful amongst individuals with stroke. Cognitive challenges may vary depending on setting (e.g., inpatient rehabilitation versus transitioning back into the community), and being aware of what to look for and share back with the healthcare team for further assessment and management is valuable.

System Implications

To achieve timely and appropriate assessment and management of cognition and cognitive rehabilitation needs of individuals with stroke, organizations should optimize the following system components:

1. A sufficient complement of healthcare providers experienced in cognitive rehabilitation available in all regions with access to ongoing education and training in this area.
2. Processes for referral of patients to rehabilitation professionals and programs following diagnosis and when need to re-access over time.
3. Standardized, validated, and expert consensus-based screening and assessment tools and training specific to cognitive impairment and rehabilitation.
4. Processes for timely referral to specialized cognitive rehabilitation services in all centres (for example, electronic referral system and standardized assessment tools).

5. Mechanisms to periodically re-evaluate individuals with vascular cognitive impairment (VCI) as this condition can be progressive over time, to ensure individuals with VCI have access to ongoing rehabilitation to meet their changing needs.
6. Coordination and development of strong partnerships in the community, and adequate resources to ensure access to comprehensive rehabilitation services and support. This is especially important in more rural and remote geographic locations where virtual care technologies should be optimized.
7. Support to family members and caregivers to help them better understand the cognitive changes in the individual with stroke, and to discuss how to access resources for emotional support may include respite in some cases.
8. Access to safe communities and environments for individuals with changing cognitive needs who wish to remain in their homes and communities.

Performance Measures

System indicators

1. Number of inpatient and community-based stroke rehabilitation programs that offer cognitive rehabilitation for primary cognitive deficits.
2. Proportion of virtual care coverage to remote communities to support organized stroke care across the continuum, including providing cognitive rehabilitation assessments and therapies for individuals with stroke.
3. Proportion of individuals with stroke who experience new or worsening cognitive symptoms following stroke.

Process Indicators

4. Proportion of individuals with stroke screened for cognitive impairment.
5. Proportion of individuals with post-stroke cognitive impairment who undergo an initial cognitive rehabilitation assessment following diagnosis during inpatient admission or entry into a community-based rehabilitation program.
6. Proportion of individuals with post-stroke cognitive impairment who receive a referral for inpatient or outpatient cognitive rehabilitation (either facility-based or community- based programs).
7. Median length of time between referral for cognitive rehabilitation to commencement of cognitive rehabilitation therapy.

Patient-Oriented Indicators

8. Self-reported quality of life following diagnosis of post-stroke cognitive impairment using a validated measurement tool, measured longitudinally.
9. Functional outcome scores following diagnosis of post-stroke cognitive impairment, measured longitudinally.

Implementation Resources and Knowledge Transfer Tools

Resources and tools listed below that are external to Heart & Stroke and the Canadian Stroke Best Practice Recommendations may be useful resources for stroke care. However, their inclusion is not an actual or implied endorsement by the Canadian Stroke Best Practices team or Heart & Stroke. The reader is encouraged to review these resources and tools critically and implement them into practice at their discretion.

Health Care Provider Information

- Canadian Stroke Best Practice Recommendations: Vascular Cognitive Impairment Module: https://www.strokebestpractices.ca/recommendations/new-vascular-cognitive-impairment
- Canadian Stroke Best Practice Recommendations: Rehabilitation, Recovery and Community Participation following Stroke, Part One: Stroke Rehabilitation Planning for Optimal Care Delivery module; and Part Two: Delivery of Stroke Rehabilitation to Optimize Functional Recovery, Update 2025
- Heart & Stroke: Taking Action for Optimal Community and Long-Term Stroke Care (TACLS) A Resource for Healthcare Providers:https://www.strokebestpractices.ca/resources/professional-resources/tacls
- Vascular Harmonization Guidelines: http://stroke.ahajournals.org/content/37/9/2220.full
- Evidence-based Review of Post-Stroke Cognitive Disorders (EBRSR): http://www.ebrsr.com/evidence-review/12-post-stroke-cognitive-disorders
- CanStroke Recovery Trials: https://canadianstroke.ca/
- Canadian Consensus Conference on Diagnosis and Treatment of Dementia (CCCDTD)5: Guidelines for management of vascular cognitive impairment: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7657196/
- SIGN (Scottish Intercollegiate Guidelines Network) 168 Assessment, diagnosis, care and support for people with dementia and their carers: https://www.sign.ac.uk/
- AHA/ASA Scientific Statement on Vascular Contributions to Cognitive Impairment and Dementia: https://www.ahajournals.org/doi/full/10.1161/STR.0b013e3182299496
- NHS Psychological care after stroke: https://www.nice.org.uk/media/default/sharedlearning/531_strokepsychologicalsupportfinal.pdf
- Stroke Engine: Assessments by topic: Cognition: https://strokengine.ca/en/assessments-by-topic/
- Stroke Engine: Cognitive Rehabilitation: https://strokengine.ca/en/interventions/cognitive-rehabilitation/
- Aphasia Institute: https://www.aphasia.ca/
- Stroke Engine: http://www.strokengine.ca/

Resources for Individuals with Stroke, Families and Caregivers

- Heart & Stroke: Vascular Cognitive Impairment Infographic and Journey Map: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/vascular-cognitive-impairment/csbpr7-infographic-vci.pdf
- Heart & Stroke: Signs of Stroke: http://www.heartandstroke.ca/stroke/signs-of-stroke
- Heart & Stroke: FAST Signs of Stroke…what are the other signs?: https://www.heartandstroke.ca/stroke/signs-of-stroke/fast-signs-of-stroke-are-there-other-signs
- Heart & Stroke: Your Stroke Journey: https://www.heartandstroke.ca/-/media/pdf-files/canada/your-stroke-journey/en-your-stroke-journey-v20.pdf
- Heart & Stroke: Post-Stroke Checklist: https://www.heartandstroke.ca/-/media/1-stroke-best-practices/resources/patient-resources/002-17_csbp_post_stroke_checklist_85x11_en_v1

- Heart & Stroke: Rehabilitation and Recovery Infographic: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/rehabilitation-nov2019/csbp-infographic-rehabilitation.pdf?rev=a2cff1fb27424c84bbd44b568d58d1b4
- Heart & Stroke: Transitions and Community Participation Infographic: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/transition-of-care-nov2019/csbp-infographic-transitions-and-participation.pdf?rev=595e990a17e14232aa3b1c731d983ce3
- Heart & Stroke Enabling Self-Management Following Stroke Checklist: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/resources/patient-resources/csbpr-enabling-self-management-following-stroke-checklist-jan2021-final.pdf?rev=03b045c41df04abfb7f4cb652869f031
- Heart & Stroke: Virtual Healthcare Checklist: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/resources/patient-resources/csbp-infographic-virtual-healthcare-checklist.pdf?rev=bf2f5b0e9e4a49cfbfc251208b6a15e2
- Heart & Stroke: Recovery and Support: https://www.heartandstroke.ca/stroke/recovery-and-support
- Heart & Stroke: Vascular Cognitive Impairment: https://www.heartandstroke.ca/stroke/what-is-stroke/vascular-cognitive-impairment
- Heart & Stroke: Depression, Energy, Thinking and Perception https://www.heartandstroke.ca/stroke/recovery-and-support/emotions
- Heart & Stroke: Support for Family Care Partners https://www.heartandstroke.ca/stroke/recovery-and-support/family-care-partners-need-care-too
- Heart & Stroke: Recognizing and Handling Stress https://www.heartandstroke.ca/heart/recovery-and-support/emotions-and-feelings/stress
- Heart & Stroke: Online and Peer Support: https://www.heartandstroke.ca/heart-disease/recovery-and-support/the-power-of-community
- Heart & Stroke: Services and Resources Directory: https://www.heartandstroke.ca/services-and-resources
- New Zealand Stroke Education (charitable) Trust: Stroke Recovery Videos: https://stroke.net.nz/videoguide
- CanStroke Recovery Trials: Tools and Resources: https://canadianstroke.ca/tools/
- Stroke Engine: http://www.strokengine.ca/

Summary of the Evidence

Cognitive Rehabilitation

The incidence of post-stroke cognitive impairment during the first year following stroke is estimated at 38% [68] but may be affected by factors such as pre-stroke cognition, stroke severity, stroke type, and assessment method. Cognitive rehabilitation interventions typically focus on common deficits of attention, memory or executive function. In general, interventions may be considered to have one of two objectives: 1) to reinforce or re-establish previous behavioural skills or function (e.g., to remediate with computerized exercises) or 2) to teach compensatory mechanisms (e.g., strategy training) that may be either internal or external to the individual. [69]

In a systematic review including the results of 64 RCTs, including 4,005 individuals with/without cognitive impairment following stroke, trials compared cognitive rehabilitation strategies to improve

cognitive function with a control group. [70] In 21 studies, multiple component interventions were assessed and included physical activity, lifestyle modifications, rhythm and music therapy, patient and family member education, gait training, computer assisted rehabilitation training, acupuncture, sensory training, and aerobic exercise, among others. Multiple component interventions were associated with higher mean Montreal Cognitive Assessment (MoCA) scores, in patients who had sustained a stroke ≤3 months previously (MD=1.56, 95% CI, 0.69 to 2.43), improved measures of memory, (SMD=0.49, 95% CI, 0.27 to 0.72), and better functional status (SMD= 0.33, 95% CI, 0.05–0.62), compared with individuals receiving standard care. There were no significant differences between groups comparing traditional cognitive rehabilitation interventions with a standard control group in any of the outcomes assessed (general cognitive functioning, memory, executive function, or attention), nor was there a difference between groups comparing cognitive rehabilitation interventions vs. wait list control (memory). Rogers et al. [71] included the results of 22 RCTs including 1,098 persons with cognitive deficits following stroke. Trials compared cognitive remediation strategies vs. treatment as usual, placebo, or a waitlist control. Types of interventions included computer training (n=8), therapist led interventions (n=7), pen/paper or workbook (n=3), and group therapy (n=4). Overall, cognitive rehabilitation was associated with a small overall effect (Hedges' *g*=0.48, 95% CI 0.35–0.60). Domains in which cognitive rehabilitation had the greatest impacts were visio-spatial (Hedges' *g*= 0.75, 95% CI 0.18-1.31) and language (Hedges' *g*=0.66, 95% CI 0.35-0.96).

Rehabilitation of executive function

Evidence for the effectiveness of the rehabilitation of executive function and problem solving is less compelling. Rozental-Iluz et al. [72] reported no significant differences between groups in mean scores of The Executive Function Performance Test following 3 months of participation in an interactive video-game group intervention, compared with persons randomized to a traditional group intervention for motor recovery at least 6 months post stroke. A Cochrane review [73] included the results of 19 RCTs of persons with stroke and other acquired brain injuries. Thirteen trials examined strategies restoring components of executive function (restorative and compensative interventions). No significant treatment effects were reported with respect to concept formation, planning, flexibility, working memory, or extended ADLs between intervention and control groups. Poulin et al. [74] included 10 studies examining cognitive rehabilitation strategies to remediate executive function impairments. Nine studies examined an intervention provided during the chronic phase of care. The authors concluded that there is limited evidence to suggest that problem-solving strategies and paging systems are associated with significant improvement in performance on functional tasks that involve executive control, compared to no treatment.

Rehabilitation of attention deficits

A Cochrane review [75] included the results of 6 RCTs evaluating interventions designed to either restore attentional functions or provide compensatory strategies for persons with attention deficits post stroke that were provided for 3 to 11 weeks. At the end of the treatment period, cognitive rehabilitation was not associated with significantly greater improvement in measures of subjective reports of global attention (SMD=0.53, 95% CI -0.03 to 1.08, p=0.06), or with significant long-term improvements (>3 months following the end of treatment) on global attention functions (SMD= 0.16, 95% CI -0.23 to 0.56, p=0.41). In no trials were objective measures of global attention reported, either immediately after treatment, or long-term. Cognitive rehabilitation was associated with significantly greater improvement on divided attention, measured using the Paced Auditory Serial Addition Test (SMD= 0.67, 95% CI 0.35 to 0.98, p<0.001). There were no significant effects on other domains of attention associated with cognitive rehabilitation.

Rehabilitation of memory deficits

In a Cochrane review, das Nair et al. [76] included the results of 13 RCTs (n=514) examining various memory rehabilitation strategies in persons with memory problems following stroke. Interventions

included computerized memory training, strategy training, the use of external memory aides and imagery mnemonics. Memory training was associated with significant improvements in short-term subjective memory measures (SMD= 0.36, 95% CI 0.08-0.64, p=0.01), but not objective memory measures. Training was also not associated with long-term effects of either subjective or objective memory measures, assessed 3-7 months following treatment. Memory self-efficacy training was reported to improve subjective daily memory reports and quality of life in one RCT with 153 stroke patients in the chronic phase of stroke, [77] with benefits persisting at 6 and 14 months. [78]

Physical activity

Physical activity may also be beneficial for the rehabilitation of cognitive impairment post stroke. Oberlin et al. [79] included the results of 14 RCTs and reported a small to moderate mean effect size (Hedges' *g* =0.304, 95% CI 0.14–0.47, p<0.001). Cumming et al. [80] included 9 trials investigating the effect of exercise on cognition in stroke patients, also reported a significant, but small, pooled treatment effect (SMD= 0.2, 95%, CI 0.04 to 0.36, p=0.015).

Virtual reality (VR)

Zang et al. [81] included 23 RCTs including 894 patients recovering from stroke. Participants in these trials were randomized to receive usual care or VR-based interventions (single, or multiple-component interventions) using a screen or a head-mounted device, including games with immersive, semi-immersive, and non-immersive systems, simulating virtual environments. Interventions were provided for an average of 4 weeks (2-5x/week). VR interventions were not associated with significant improvements in global cognition or attention but were associated with significant improvements in executive function (SMD=0.88, 95% CI 0.6 to 1.70), and memory (SMD=1.44, 95% CI 0.21 to 2.68).

Computer-based training

Two recent systematic reviews examined outcomes in cognitive function following rehabilitation using commercially available computer assisted cognitive rehabilitation. Mingming et al. [82] included the results from 10 RCTs including 600 adults with post-stroke cognitive impairments. Participants were randomized to receive computer-based cognitive training (CBCT), using commercially available systems (e.g., RehaCom) or usual cognitive rehabilitation. The duration of therapy ranged from 7 to 60 hours. The training dose and frequency in most studies was 30 min per session with 5 sessions per week. Pooling the results from 6 trials, CBCT was not associated with significant improvement in overall cognition (SMD=0.59, 95% CI -0.06 to 1.24). In contrast, Nie et al. [83] included 32 RCTs in which 1,837 participants, were also randomized to receive computer-assisted cognitive rehabilitation (CACR) using commercially available systems or usual cognitive rehabilitation. CACR was associated with significant improvement in MoCA scores (MD= 2.67, 95% CI 2.21 to 3.13), Mini Mental State Examination scores (MD= 2.51, 95% CI 1.94 to 3.08), Loewenstein Occupational Therapy Cognitive Assessment scores (MD= 8.63, 95% CI 4.99 to 12.28) and Functional Independence Measure and Barthel Index scores at the end of treatment.

Sex & gender considerations

Exalto et al. [84] reported an equal percentage of men and women experienced post-stroke cognitive impairment, (51%), when assessed within 15 months of stroke; however, there were sex differences within the cognitive domains. Compared with women, men had lower odds of impairment of attention and execute function (24% lower) and language (33% lower), while their odds of verbal memory impairment were 43% higher. There were no significant differences between the sexes in information processing speed, language, visuospatial perception/construction, and visuospatial memory. No sex & gender differences were found with respect to response to interventions for cognitive rehabilitation.

Evidence Table and Reference List 3

Section 4 Health Management, and Return to Driving and Vocational Roles

4. Health Management, and Return to Driving and Vocational Roles, Recommendations 2025

4.0 Individuals with stroke, their families, and caregivers should be provided with information, education, training, support and access to services throughout transitions to the community to optimize the return to life roles, activities and social participation [Strong recommendation; Moderate quality of evidence].

4.1 Health Management Following Stroke

i. Individuals living in the community following stroke should have access to regular and ongoing healthcare follow-up appropriate to their individual needs, which may address evaluating progress of recovery, preventing deterioration, maximizing functional and psychosocial outcomes, preventing stroke recurrence, and improving quality of life [Strong Recommendation; Moderate Quality of evidence].

   a. Initial review with primary care providers would ideally occur within the first month following hospital discharge and address the key secondary prevention, medical and functional issues, and provide ongoing follow-up as required [Strong recommendation; Low quality of evidence]. *Refer to CSBPR Secondary Prevention of Stroke module [85] for additional information and the post-stroke checklist.*

ii. Individuals presenting with stroke or TIA should be screened for any changes in cognition following stroke or TIA compared to their pre-stroke cognitive status. [Strong recommendation; Moderate quality of evidence]. *Note, changes can be reported by the individual, family members, caregivers or clinicians. Refer to CSBPR Vascular Cognitive Impairment module [67] Appendix Three for more information on the presenting signs and symptoms of VCI.*

iii. Individuals presenting with stroke or TIA should be screened for any changes in mood and anxiety following stroke compared to their pre-stroke mental health status [Strong recommendation; Moderate quality of evidence].

iv. Secondary prevention of stroke should be optimally managed and risk factor reduction strategies optimized in all settings including long-term care [Strong recommendation; High quality of evidence]. *Refer to CSBPR Secondary Prevention of Stroke module[85] for additional information*

v. Referrals to appropriate specialists should be made to support and manage specific vascular risk factors and lifestyle behaviours and choices where required [Strong recommendation; Low quality of evidence]. *Refer to CSBPR Secondary Prevention of Stroke module[85] for additional information.*

4.2 Functional Health Management

i. Individuals with stroke living in the community who experience a decline in functional status should receive targeted interventions, as appropriate [Strong recommendation; Moderate quality of evidence] even if the change occurs many months/years post-stroke. *Refer to appropriate topics within this module for targeted interventions.*

ii. Processes should be in place for individuals following a stroke to re-access rehabilitation or other supports and services as required based on changing needs during longer-term recovery [Strong recommendation; Moderate quality of evidence].

iii. Individuals with stroke should have access to evidence-based community exercise programs as appropriate [Strong recommendation; High quality of evidence].

4.3 Advance Care Planning

i. The healthcare team should ensure that individual goals of care and advance care planning decisions are reviewed periodically (e.g., annually) with the individual with stroke, their family and caregivers as appropriate, and updated when needed, such as when there is a change in health status [Strong recommendation; Low quality of evidence]. *Refer to CSBPR Stroke Systems of Care Module Section 8 for additional information.*

ii. Advance care planning may include a substitute decision-maker and should reflect provincial legislation [Strong recommendation; Low quality of evidence].

   a. Advance care planning discussions should be documented and reassessed regularly, including at transition points or when there is a change in health status, with the active care team and the individual with stroke or substitute decision-maker, and included on the transition (discharge) summary [Strong recommendation; Low quality of evidence].

iii. Respectful advance care planning should be integrated as part of a comprehensive care plan, taking into consideration values and preferences with information regarding the individual's health status, understanding, prognosis, medically appropriate treatments and future medical care [Strong recommendation; Low quality of evidence].

4.4 Community-Based Palliative Care

i. Referral and liaison with community-based hospice or palliative care services should be coordinated as appropriate based on the individual's goals of care and condition [Strong recommendation; Low quality of evidence]. *Refer to Stroke Systems of Care for additional information.*

4.5 Driving following Stroke

4.5.1 Education and Screening

i. Individuals should be advised to stop driving for at least one month after a stroke, in accordance with the Canadian Council of Motor Transport Administrators (CCMTA) Medical Standards for Drivers [Strong recommendation; Moderate quality of evidence].

ii. The individual with stroke should be made aware whether the local licensing authority has been informed that they have had a change in their medical status that may negatively impact their ability to safely drive [Strong recommendation; Moderate quality of evidence].

iii. Individuals who have had one or multiple TIAs should be instructed to stop driving until a comprehensive neurological assessment is completed, and findings indicate no residual loss of functional ability and discloses no obvious risk of sudden recurrence that could create a hazard while driving, in accordance with the Canadian Council of Motor Transport Administrators (CCMTA) Medical Standards for Drivers [Strong recommendation; Moderate of evidence]. *Refer to individual provincial and territorial laws for requirements for reporting an individual's fitness to drive to driving authorities, and requirements to return to driving.*

iv. Individuals with stroke may be screened for their interest in returning to driving at points of transitions and follow-up visits [Strong recommendation; Low quality of evidence].

4.5.2 Assessment for Fitness to Drive

i. Individuals interested in returning to driving following stroke should be assessed for residual impairments, driving abilities and rehabilitation needs using valid and reliable methods in accordance with provincial/territorial criteria for return to driving [Strong recommendation; Moderate of evidence].

a. Sensory-perceptual assessment should consider vision, visual fields, visual attention, and neglect [Strong recommendation; Moderate of evidence].

b. Motor assessment should consider strength, range of motion, coordination and reaction time [Strong recommendation; Moderate of evidence].

c. Cognitive assessment should consider problem solving, speed of decision making, attention, concentration, impulse control, judgment and reading/symbol comprehension [Strong recommendation; Moderate of evidence].

ii. For individuals who have residual neurological deficits impacting driving ability following stroke, a full comprehensive driving evaluation, including a government-sanctioned on-road assessment, should be considered to determine fitness to drive [Strong recommendation; Moderate quality of evidence].

4.5.3 Rehabilitation and Management for Return to Driving

i. Following a stroke, individuals who have the functional potential and interest in returning to driving should be offered appropriate rehabilitation therapies as required to address functional, sensory-perceptual, motor and cognitive issues and increase the likelihood of being able to return to driving [Strong recommendation; Moderate quality of evidence].

ii. Individuals with stroke who have the functional potential and interest in return to driving may be referred to validated training programs to help prepare for return to driving [Strong recommendation; Moderate quality of evidence].

iii. Individuals with stroke unable to return to driving should be informed about and assisted to access transportation alternatives [Strong recommendation; Low quality of evidence].

iv. Individuals with stroke unable to return to driving should be offered support and/or counselling on coping with the loss of the ability to drive [Strong recommendation; Low quality of evidence].

4.6 Vocational Roles

i. Following a stroke, an individual should be screened for vocational roles and interests, including both paid and unpaid work such as employment, school or volunteering [Strong recommendation; Low quality of evidence].

a. This screening should take place early in the rehabilitation phase and be reassessed at points of transitions as appropriate [Strong recommendation; Low quality of evidence].

b. Findings should be considered in planning for early and ongoing rehabilitation and included in individualized goal setting when appropriate [Strong recommendation; Low quality of evidence].

ii. A detailed cognitive and perceptual assessment with appropriate healthcare professionals should be considered to assist with determining the individual's ability to meet the needs of their current or potential employment requirements and contribute to vocational planning [Strong recommendation; Low quality of evidence].

iii. Individuals with stroke should be encouraged to resume their vocational interests where possible and desired. A gradual resumption could occur when appropriate and adjustments made to accommodate any limitations or residual challenges (such as vision, communication) [Strong recommendation; Low quality of evidence].

iv. Referrals to vocational or educational services, and/or counselling should be initiated and facilitated if an individual with stroke has a goal to return to work or school, to assist with the

process of returning to vocational activities as part of transitions to the community [Strong recommendation; Low quality of evidence].

a. Individuals with stroke should be provided counselling and information about employment benefits and legal rights as required [Strong recommendation; Low quality of evidence].

v. Financial concerns and benefit options should be reviewed and revised, and assistance to create and implement a sustainable financial plan should be provided as needed, during admission and/or prior to discharge, and later in follow-up assessments and transitions [Strong recommendation; Low quality of evidence].

vi. Individuals with stroke should be supported with return to work and education plans which may include engagement with employers/educators and recommendations on work modifications, accommodations and/or graduated return [Strong recommendation; Low quality of evidence].

Rationale

The post-discharge period is consistently reported by individuals with stroke and their families as a stressful and challenging time as they adjust to new roles and potentially altered functional and cognitive abilities. Participation in work and driving after a stroke are essential for promoting independence, improving quality of life, and enhancing overall well-being. Evidence shows that when there is coordination of care beyond the inpatient setting and community support services are provided, outcomes and satisfaction improve. Return-to-work programs tailored to the individual's abilities not only help rebuild confidence but also restore a sense of purpose and financial security. Additionally, regaining the ability to drive can significantly increase a sense of independence, allowing for greater social interaction and community participation as well as the practical aspects of being able to get to appointments and other activities.

Individuals with stroke and their families have expressed how a follow-up visit and or other planned check-ins after returning home would be beneficial. They describe a strong desire to regain control and independence, overcome difficulties with access to services and resources, and emphasize that health systems and services should be designed to support these positive outcomes.

Individuals with stroke also advocated for increased access to individualized rehabilitation services and support. They highlight that the process to return to driving can be difficult and frustrating, and clear information on the process and criteria for return to driving following stroke, as well as information on who to contact for questions is especially valuable. They also stressed the importance of returning to driving when determined safe through working with the healthcare team, recognizing the impact driving can have on independence.

It was important to individuals with stroke that conversations on educational and vocational roles and goals occur early following stroke. They discussed the significance of these goals, especially for younger individuals who experienced a stroke, and advocated for ongoing support once these roles are resumed. When return to previous vocational roles was not possible, participating in peer support programs or other volunteering activities may positively impact wellbeing and provided a sense of purpose.

System Implications

Following stroke, systems should be in place to optimize successful transitions and return to life roles, health management, activities and social participation. These may include:

1. Education and training in person-centred care and shared decision-making skills and strategies for all healthcare professionals, individuals with stroke, families, and caregivers.
2. Adequate and timely follow-up stroke care in all provinces and territories to support community participation.

3. Assistance for individuals with stroke, their families, and caregivers with an evolving care plan and regular follow-up assessments.
4. Access to appropriate (public) transportation that supports people with disabilities.
5. Programs that support timely and affordable access to mobility and other assistive devices for individuals with stroke.
6. Healthcare professionals and caregivers in the community and long-term care settings with stroke care expertise and access to ongoing education.
7. Ongoing support in the form of community programs, respite care, and educational opportunities available to support caregivers who are balancing personal needs with caregiving responsibilities.
8. Processes in place for individual to re-access rehabilitation or other support services as goals or function change and evolve throughout recovery.
9. Strategies to assist individuals with stroke to maintain, enhance, and develop appropriate social support, and to re-engage in desired vocational, social, and recreational activities.
10. Education for individual with stroke, family and caregiver about driving after stroke, and process to resume driving.
11. Coordination between primary care provider and community agencies for referral to appropriate programs and services for assessment of ability to resume driving.
12. Health professionals should advocate to ensure that feasible alternatives to driving are available in the community.
13. Process in place to ensure Advance Care Plans are reviewed and updated if needed, periodically with the individual with stroke. Family and caregivers as appropriate.
14. Communication and referral pathway established between the hospital and community based palliative organizations to ensure individual with stroke is connected appropriately and in a timely manner.

Performance Measures

System indicators

1. Availability of inpatient and community-based assessment services and resources for individuals with stroke discharges from acute care and/or inpatient stroke rehabilitation.
2. Access to a primary care provider following discharge from hospital for an acute stroke.
3. Number of individuals with stroke with documentation that information was given to them or their family on formal and informal educational programs, care after stroke, available services, process to access available services, and services.
4. Proportion of individuals with stroke who are discharged from acute care who receive health insurance.

Process indicators

5. Documentation of shared and collaborative decision-making between healthcare professionals and individuals with stroke regarding individualized transition plans.
6. Proportion of individuals with stroke referred to secondary prevention services by the rehabilitation team upon discharge.
7. Median number of visits to primary care within specified time frames for stroke-related issues following discharge from inpatient care.
8. Median number of visits to an emergency department within specified time frames for stroke-related issues following discharge from inpatient care.

9. Proportion of readmissions from stroke rehabilitation to acute care for stroke-related causes (e.g., medical complications, failure to thrive, decline in health status).
10. Proportion of individuals with stroke who return home following stroke rehabilitation who require community health services (e.g., home care or respite care).
11. Length of time from hospital discharge (whether from acute care or inpatient rehabilitation) to initiation of community health services.
12. Frequency and duration of community health services, stratified by the type of service provided.
13. Proportion of individuals with stroke who return to the community from acute hospital stay or following an inpatient rehabilitation stay who require admission to long-term care or a nursing home within six months or one year.
14. Proportion of acute ischemic stroke clients admitted to acute or rehabilitation inpatient unit with diagnosis of atrial fibrillation on appropriate anticoagulant therapy at discharge (aligns with Accreditation Canada).
15. Proportion of individuals with stroke who have been approached to participate in advance care planning and/or who have a documented conversation with a healthcare provider.
16. Proportion of individuals with stroke who identify a substitute decision-maker.
17. Proportion of individuals with stroke who complete a personal or advance care plan and have it documented on their chart.
18. Proportion of individuals with stroke who had a referral to specialist palliative care services during inpatient care.
19. Proportion of individuals with stroke who are dying following whose symptoms are routinely being assessed and monitored, and care plans adjusted as status changes.
20. Proportion of dying individuals with stroke who were who are cared for under a palliative care approach.
21. Proportion of individuals with stroke who die in the location specified in their palliative care plan.

Patient-Oriented Indicators

22. Proportion of individuals with stroke with an improvement in functional status from time of admission to inpatient rehabilitation unit to time of discharge based on a standardized measurement tool (aligns to Accreditation Canada).
23. Measure of burden of care for family and caregivers living in the community.
24. Proportion of individuals with stroke who report having their ongoing care needs reviewed with their primary care provider within 3 months of hospital discharge.
25. Changes in quality of life measured at regular intervals during recovery and participation, and reassessed when changes in health status or other life events occur (e.g., at 60, 90- and 180-days following stroke).
26. Proportion of patients with stroke with advance care plans whose actual care was consistent with the care defined in their plan.
27. Family and caregiver ratings on the palliative care experience following the death in hospital of a patient with stroke.

Implementation Resources and Knowledge Transfer Tools

Resources and tools listed below that are external to Heart & Stroke and the Canadian Stroke Best Practice Recommendations may be useful resources for stroke care. However, their inclusion is not an actual or implied endorsement by the Canadian Stroke Best Practices team or Heart & Stroke. The reader is encouraged to review these resources and tools critically and implement them into practice at their discretion.

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- Heart & Stroke: Taking Action for Optimal Community and Long-Term Stroke Care: A resource for healthcare providers: https://www.strokebestpractices.ca/resources/professional-resources/tacls
- Stroke Engine: The Functional Independence Measure (FIM®): https://strokengine.ca/en/assessments/functional-independence-measure-fim/
- Stroke Engine: Chedoke-McMaster Stroke Assessment Scale: https://strokengine.ca/en/assessments/chedoke-mcmaster-stroke-assessment/
- Stroke Engine: https://strokengine.ca/en/
- CRAIG: The Craig Handicap Assessment and Reporting Technique (CHART): https://craighospital.org/research/instruments
- KITE UHN: Canadian Stroke Community-based Exercise Recommendations Update 2020: A Resource for Community-based Exercise Providers: https://kite-uhn.com/can-stroke-community-based-exercise-recommendations

Resources for Individuals with Stroke, Families and Caregivers

- Heart & Stroke: Signs of Stroke: http://www.heartandstroke.ca/stroke/signs-of-stroke
- Heart & Stroke: FAST Signs of Stroke…what are the other signs?: https://www.heartandstroke.ca/stroke/signs-of-stroke/fast-signs-of-stroke-are-there-other-signs
- Heart & Stroke: Your Stroke Journey: https://www.heartandstroke.ca/-/media/pdf-files/canada/your-stroke-journey/en-your-stroke-journey-v20.pdf
- Heart & Stroke: Post-Stroke Checklist: https://www.heartandstroke.ca/-/media/1-stroke-best-practices/resources/patient-resources/002-17_csbp_post_stroke_checklist_85x11_en_v1
- Heart & Stroke: Rehabilitation and Recovery Infographic: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/rehabilitation-nov2019/csbp-infographic-rehabilitation.pdf?rev=a2cff1fb27424c84bbd44b568d58d1b4
- Heart & Stroke: Transitions and Community Participation Infographic: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/transition-of-care-nov2019/csbp-infographic-transitions-and-participation.pdf?rev=595e990a17e14232aa3b1c731d983ce3
- Heart & Stroke: Enabling Self-Management Following Stroke Checklist: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/resources/patient-

resources/csbpr-enabling-self-management-following-stroke-checklist-jan2021-final.pdf?rev=03b045c41df04abfb7f4cb652869f031

- Heart & Stroke: Virtual Healthcare Checklist: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/resources/patient-resources/csbp-infographic-virtual-healthcare-checklist.pdf?rev=bf2f5b0e9e4a49cfbfc251208b6a15e2
- Heart & Stroke: Recovery and Support: https://www.heartandstroke.ca/stroke/recovery-and-support
- Heart & Stroke: Online and Peer Support: https://www.heartandstroke.ca/heart-disease/recovery-and-support/the-power-of-community
- Heart & Stroke: Services and Resources Directory: https://www.heartandstroke.ca/services-and-resources
- CanStroke Recovery Trials: Tools and Resources: https://canadianstroke.ca/tools/
- Stroke Engine: https://strokengine.ca/en/
- KITE UHN: Guide "Choosing a Community Exercise Program After Stroke: https://kite-uhn.com/can-stroke-community-based-exercise-recommendations

Summary of the Evidence

Functional Health Management

Functional health management is a holistic and proactive approach to maintaining and improving an individual's ability to perform activities of daily living and to fully engage in social roles across the lifespan, particularly in the presence of chronic conditions, such as stroke and its related disability, or aging-related changes. Targeted interventions such as home-based rehabilitation [86] and exercise programs, [87,88] cardiorespiratory program or resistance training [89] can be helpful to promote independence, prevent decline, and enhance quality of life.

Community-based Palliative Care

No trials, specific to stroke have been published on the topic of palliative care. A Cochrane review [90] included the results from 4 RCTs (1,234 participants, mainly with a diagnosis of cancer) and evaluated the effectiveness of home-based end-of-life care compared to inpatient hospital or hospice care. At 6 to 24 months, individuals who received end-of-life care at home were significantly more likely to die at home (RR=1.33, 95% CI 1.14 to 1.55), aligning with many patients' preferences. However, home-based care was not associated with a significant reduction in unplanned hospital admission (RR=0.89, 95% CI 0.73 to 1.09). Pooled analyses were not conducted on any of the other outcomes (participant health outcomes, patient satisfaction, caregiver outcomes, health service resource use and cost), due to limited data availability.

Advance Care Planning

Although no stroke-specific studies have been published that examine the effectiveness of advance care planning, several exist that include patients with mixed diagnoses, as well as those who are healthy. Malhotra et al. [91] included the results of 132 RCTs that examined the efficacy of ACP interventions in both healthy individuals and those with chronic diseases. Trials were conducted in a variety of settings, including hospitals, communities, primary care clinics, and nursing homes. While ACP interventions had limited impact on distal outcomes such as quality of life, mental health, and healthcare utilization, they consistently improved proximal outcomes, such as enhanced patient–physician communication, reduced decisional conflict, and increased alignment between patient and caregiver preferences. These findings suggest that ACP is more effective in facilitating meaningful

conversations and shared understanding about end-of-life care rather than directly influencing clinical outcomes. Results from a small number of studies also suggest that interventions aimed at increasing advance care planning have been successful in significantly increasing the likelihood that end-of-life wishes are known and respected. In a study of 309 patients admitted to internal medicine, cardiology, or respiratory medicine, Detering et al. [92] randomized patients to receive formal advance care planning from a trained facilitator or usual care. The intervention was based on the Respecting Patient Choices model, which involves reflection on goals, values, and beliefs, documentation of future health care wishes, and appointment of a surrogate decision maker. Of those who died, end-of life wishes were significantly more likely to be known and respected for participants in the intervention group compared with those in the control group (86% vs. 30%, $p<0.01$). Following the death of a loved one, family members of those in the intervention group reported significantly less anxiety and depression and more satisfaction with the quality of their relative's death, compared to control group family members. Kirchhoff et al. [93] randomized 313 patients (and their surrogate decision makers) with congestive heart failure or end-stage renal disease who were expected to experience serious complication or death within 2 years, to receive a patient-centered advance care planning intervention or usual care. The intervention was composed of a 60 to 90-minute interview with a trained facilitator to discuss disease-specific end-of-life care issues and options and documentation of treatment preferences. 110 patients died within the study period, of which 26% required a surrogate decision maker at the end-of-life. Only a single patient in the intervention group and 3 in the control group received end-of-life care that was contrary to their wishes for reasons other than medical futility. With respect to resuscitation preferences, non-significantly fewer patients in the intervention group received care that was contrary to their wishes (1/62 vs. 6/48).

Return to Driving

Since driving was part of many individuals' daily routine prior to stroke, returning to driving is often a high priority for individuals with stroke and their families; however, motor, sensory, and cognitive impairments and visual fields defects can limit an individual's ability to drive safely. Beyond its use for completing everyday tasks and travelling to work, driving is often seen as a symbol of independence and freedom. For those who have suffered a minor stroke or TIA, temporary restrictions place on driving may be confusing and seem unwarranted. Independent predictors of successful return to driving following stroke include independence in activities of daily living and return to paid work. [94] Performance of cognitive measures such as the Trail Making Test and the Snellgrove Maze Test have been shown to predict fitness to drive. [95,96] In one recent study that included 359 participants, 26.7% returned to driving after one month. [94]

Interventions to help individuals with stroke improve driving skills have not been well studied. A Cochrane review [97] included the results from 4 RCTs. The interventions examined included driving simulators (n=2) and skills development using the Dynavision device (n=1) and Useful Field of View training (n=1). No pooled analyses of the primary outcome, performance (pass/fail) during on-road assessment, were possible due to heterogeneity. Based on the results from a single trial, there was no significant difference in the mean on-road scores between groups at 6 months (MD =15.0, 95% CI -4.6 34.6, p=0.13), although participants in the intervention group had significantly higher scores on road sign recognition test (MD=1.69, 95% CI 0.51-2.87, p=0.0051).

Return to Work

Return to work (RTW) is one of the most important issues for the young individual with stroke. Following stroke, the reported rates of RTW vary widely. Using the results from 29 studies, Edwards et al. [98] reported that the overall frequency of return to either full or part-time work, assessed up to 12 years following stroke ranged from 7.3%1-74.5%. Up to 6 months following stroke, 41% of persons had returned to work, increasing to 66% at 4-6 years. Hackett et al. [99] reported that 75% of persons previously employed at the time of stroke had returned to work at one year. Hannerz et al. [100] reported that of 19,985 persons included in the Danish Occupational Hospitalization Register who were 20-57 years and had sustained a stroke, 62.1% were employed 2 years post stroke. At 4 years following

stroke, Trygged et al. [101] reported that 4,867 (69%) of 7,081 Swedes who had been employed prior to stroke, aged 40-59 years had successfully returned to work. The most commonly-cited predictors of successful RTW included independence in ADLs, younger age, milder stroke severity higher cognitive functioning, fewer neurological deficits, strong family support, having realistic and flexible vocational goals, higher income and education, having a white-collar job and being male, [98,100,102,103] while hemorrhagic stroke, increasing age and stroke severity, and depression, have been citing as factors associated with a decreasing probability of RTW. [100,103]

Interventions to help improve the odds of successful RTW have not been well studied. Ntsiea et al. [104] reported that a 6-week individualized workplace intervention program group was associated with an increase in the number of persons who had returned to work following a recent stroke (<8 weeks), compared with persons receiving usual care, at 6 months (60% vs. 20%, p<0.001). Baldwin & Brusco[105] included the results from 6 studies, which examined rehabilitation programs that included vocational training post stroke. Vocational rehabilitation programs were defined as those that included medical, psychological, social, physical and/or occupational rehabilitation activities with the purpose to return to work. Following completion of the programs, the RTW rates varied among the studies from 12% to 49%. The pre-stroke vocation status was reported in 3 studies and ranged from 48% to 100%. Treatment with intravenous thrombolysis was also identified as a treatment that improved the odds of return to work.[106]

Sex & Gender Considerations

While there is limited research focused on sex differences in the areas or return to work or return to driving, the available evidence suggests that men may be more likely to retune to work and return to driving post stroke. In a recent systematic review including the results of 39 studies examining predictors of return-to-work post stroke, Orange et al. [107] reported that male sex was an independent predictor (OR=1.26, 95% CI 1.14-1.40). Using data from 1,354 participants from South Korea who had sustained a first-ever ischemic stroke, Jee et al. [108] conducted face-to-face interviews to identify predictors of return to driving within one year of stroke onset. Of the 640 pre-stroke drivers, 66.1% of participants (410) had returned to driving. In the regression model, male sex was an independent predictor of return to driving (OR=2.80, 95% CI 1.51–5.20). The generalizability of both of these estimates may be limited as they may vary between countries depending on culture and policies.

Evidence Table and Reference List 4a
Evidence Table and Reference List 4b

Section 5 Participation in Social and Leisure Activities Following Stroke

5. Participation in Social and Leisure Activities Following Stroke, Recommendations 2025

***NOTES**:*

Recreation and leisure refer to activities that individuals engage in for enjoyment, relaxation, and personal fulfillment. These activities can range from hobbies, sports, or the arts and they play a vital role in promoting mental and physical health. For stroke survivors, engaging in recreational activities can aid in physical rehabilitation by enhancing motor skills and coordination, while also providing a sense of accomplishment and joy.

Social participation encompasses the ways individuals connect with others and engage in community life. For stroke survivors, maintaining social connections is essential for combating feelings of isolation and depression, which can often accompany the recovery process. Social engagement can also facilitate the sharing of experiences and resources, fostering a supportive network that aids in emotional recovery.

5.1 Recreation, Leisure and Social Participation

i. Individuals with stroke should be screened for goals specific to recreation, leisure and social participation [Strong recommendation, Moderate quality of evidence].

ii. A comprehensive assessment for interest and abilities to resume previous or new recreation, leisure and social activities should be performed using validated assessments when available. [Strong recommendation, Moderate quality of evidence].

iii. Individuals with stroke who experience difficulty engaging in recreation, leisure and social activities should receive individualized plans and therapeutic interventions developed through collaborative goal setting with their healthcare team [Strong Recommendation; High quality of evidence].

iv. Individuals with stroke should be provided with information and referral to community-based resources to meet ongoing physical, social, emotional, intellectual and spiritual needs [Strong recommendation; Moderate quality of evidence].

5.2 Relationships and Sexuality

i. Individuals with stroke, their family and caregivers should be educated and counselled on the potential impact of stroke on interpersonal relationships, including spousal, familial, and other close relationships [Strong recommendation, Moderate quality of evidence].

   a. Topics to address in discussions may include coping, adapting, and adjusting; changed family roles, parental relationships; disrupted social identity, loss of social opportunities, emotional difficulties, impact of post-stroke fatigue on social participation; loneliness and social isolation [Strong recommendation, Low quality of evidence].

ii. All individuals with stroke should be given the opportunity to discuss intimacy, sexuality and sexual functioning at all stages of stroke care and recovery at a time appropriate for the individual [Strong recommendation; Moderate quality of evidence].

   a. Topics to address in discussions may include safety concerns, changes in sexual desire, and the potential impact of stroke on sexuality (e.g., physical, emotional, cognitive and/or communication) and resuming sexual activity [Strong recommendation; Moderate quality of evidence].

iii. Education sessions for individuals with stroke and/or partners may address potential changes in intimacy and sexuality, resumption of intimacy and sexual activities and frequently asked

questions regarding relationships following a stroke [Strong recommendation, Low quality of evidence].

iv. Referral to a sexual health specialist may be considered for individuals with complex and/or persistent sexual difficulties [Strong recommendation, Low quality of evidence].

Section 5.2 Clinical Considerations

1. When addressing intimacy, sexual function, and sexuality, the following factors should be considered regardless of current relationship status, sexual orientation, or gender identity and should be available for all individuals with stroke:
    a. Ensure conversations occur in an environment that prioritize privacy, safety, and comfort for the individual with stroke and includes their close relationships if preferred.
    b. Establish a therapeutic relationship prior to discussing sensitive topics.
    c. Tailor verbal and written information to the individual's cognitive, sensory, and communication abilities.
    d. Initiate these discussions before, and continue them after transitions back to the community, including in supported living environments.
    e. Address the influence of factors such as pain, mood, anxiety, sensorimotor function, communication ability, medication, and spasticity on sexual function.
    f. Discuss indications, contraindications, and side effects of medications to improve sexual function.

5.3 Support for Community Participation

i. Healthcare team members across settings should share information and linkages about local support services and disability benefits with individuals with stroke, their families and caregivers [Strong recommendation; Moderate quality of evidence].
    a. Healthcare team members, individuals with stroke, their families, and caregivers should work together to develop an **accessibility plan** that identifies and helps them to overcome any barriers to participation prior to transition to a home or community-living setting [Strong recommendation; Moderate quality of evidence].
    b. This plan should consider the individual's physical function, communication, emotional, cognitive and perceptual abilities and impairments following stroke focused on the individual's goals for community participation. [Strong recommendation, Moderate quality of evidence].
    c. Regional disability legislation and guidelines should be explained to individuals with stroke, family members and caregivers as appropriate to support transitions and access to required services [Strong recommendation, Low quality of evidence].
    d. Healthcare team members should ensure timely completion of documentation and applications by healthcare team members as required in collaboration with individuals with stroke, their families and caregivers, which can help to minimize delays with accessing eligible services and funding [Strong recommendation, Low quality of evidence].

Rationale

Resuming social and leisure activities following a stroke presents numerous challenges, as both physical and psychological barriers can hinder an individual's ability to engage in previously enjoyed activities. Individuals with stroke and their families often worry about care transitions and losing the

social, emotional, and practical support offered by an inpatient stroke service. Physical limitations, such as reduced mobility, weakness, communication or sensory challenges, coordination difficulties, or fatigue, often prevent individuals with stroke from participating in sports, hobbies, or social activities they once found fulfilling. Additionally, cognitive impairments can make it difficult to follow through with complex activities, such as playing musical instruments, reading, or participating in group activities.

Despite potential challenges, individuals with stroke expressed the importance of access to community programs that support leisure and social participation throughout the recovery journey. Community programs can offer an opportunity to connect and learn from others, receive encouragement and motivation, build confidence, and support independence. These activities can also provide a chance to socialize and reduce isolation, providing the individual with a sense of community which can have a positive impact on mental and emotional health. Ensuring that individuals with stroke and their family are aware of available programs and resources, and that barriers to participation (e.g., transportation, cost) are addressed are important as individuals transition to the community. Follow-up visits with the healthcare team after discharge are valuable for supporting and connecting individuals with appropriate community programs and services, and for helping address ongoing or changing leisure and social participation goals and challenges.

Recognizing that stroke can have an impact on resuming activities and on interpersonal relationships (e.g., spouse or partner, children, friends and other family members), ensuring focused education on these topics is important for individuals with stroke, their family and caregivers. Following stroke, changes to roles, responsibilities and relationship dynamics can occur, and support for navigating these changes can be beneficial. Information about local support services and disability benefits was highly valued by individuals with stroke, their family and caregivers. Documents and forms to access services and funding can often be difficult and confusing to complete, and individuals with stroke, their families and caregivers greatly appreciated support to complete documentation accurately and in a timely manner.

Personal relationships, including intimacy, can be profoundly impacted by a stroke. Individuals with stroke report experiencing significant challenges with interpersonal relationships and sexuality. Beyond physical changes, the emotional and psychological impacts of a stroke can also affect relationships. For many individuals with stroke, physical impairments such as reduced mobility, fatigue, or difficulties with coordination can interfere with the ability to engage in sexual activity.

Individuals with stroke expressed the value of addressing factors such as mental health, spasticity, and other changes to help in managing relationships and expectations. They emphasized the importance of healthcare providers establishing a therapeutic relationship to support conversations on relationships, intimacy and sexuality. Additionally, clarity on which healthcare team members can provide information and support on these topics would be valuable. Conversations on relationships and sexuality should occur across the continuum of care, however individuals with stroke especially noted the importance of support on this topic once they return to community.

System Implications

Following stroke, successful transitions and community participation that specifically address leisure activities, relationships and sexuality requires:

1. Access to appropriate (public) transportation that supports people with disabilities.
2. Programs that support timely and affordable access to mobility and other assistive devices for people with stroke.
3. Strategies to assist individuals with stroke to maintain, enhance, and develop appropriate social support, and to re-engage in desired vocational, social, and recreational activities.
4. Education for individual with stroke, family and caregiver about potential changes in relationship dynamics and sexuality.

5. Information regarding community resources and processes to access these resources provided to all people with stroke and their family members and caregivers.
6. Ongoing support in the form of community programs, respite care, and educational opportunities available to support caregivers who are balancing personal needs with caregiving responsibilities.

Performance Measures

System indicators:

1. Availability of inpatient and community-based assessment services and resources for individuals with stroke discharges from acute care and/or inpatient stroke rehabilitation.
2. Proportion of individuals with stroke with documentation that information was given to them or their family on formal and informal educational programs, care after stroke, available services, process to access available services, and services.
3. Access to resources in the community on sexual health and relationships following stroke.

Process indicators:

4. Documentation of shared and collaborative decision-making between healthcare professionals and individuals with stroke regarding individualized transition plans.
5. Proportion of individuals with stroke who return home following stroke rehabilitation who require community health services (e.g., home care or respite care).
6. Proportion of individuals with stroke who are discharged home from stroke rehabilitation who receive a referral for home care or community supportive services.
7. Proportion of individuals with stroke who return to the emergency department or hospital setting for stroke-related or non-physical issues following stroke (e.g., failure to cope).
8. Median length of time from hospital discharge (whether from acute care or inpatient rehabilitation) to initiation of community health services.
9. Frequency and duration of community health services, stratified by the type of service provided.
10. Proportion of individuals with stroke who return to the community from acute hospital stay or following an inpatient rehabilitation stay who require admission to long-term care or a nursing home within six months or one year.
11. Median wait time from referral to admission to nursing home, complex continuing care or long-term care facility.
12. Documentation to indicate that assessment of fitness to drive and related counseling was performed.
13. Number of individuals with stroke referred for driving assessment by occupational therapist in the community.

Patient-Oriented Indicators:

14. Measure of burden of care for family and caregivers living in the community.
15. Measure of participation in social and leisure activities following return home.
16. Changes in quality of life measured at regular intervals during recovery and participation, and reassessed when changes in health status or other life events occur (e.g., at 60, 90- and 180-days following stroke).

Implementation Resources and Knowledge Transfer Tools

Resources and tools listed below that are external to Heart & Stroke and the Canadian Stroke Best Practice Recommendations may be useful resources for stroke care. However, their inclusion is not an actual or implied endorsement by the Canadian Stroke Best Practices team or Heart & Stroke. The reader is encouraged to review these resources and tools critically and implement them into practice at their discretion.

Health Care Provider Information

- Canadian Stroke Best Practice Recommendations: Rehabilitation, Recovery and Community Participation following Stroke, Part One: Stroke Rehabilitation Planning for Optimal Care Delivery module; and Part Two: Delivery of Stroke Rehabilitation to Optimize Functional Recovery, Update 2025
- Heart & Stroke: Taking Action for Optimal Community and Long-Term Stroke Care: A resource for healthcare providers: https://www.strokebestpractices.ca/resources/professional-resources/tacls
- Stroke Engine: The Functional Independence Measure (FIM®): https://strokengine.ca/en/assessments/functional-independence-measure-fim/
- Stroke Engine: https://strokengine.ca/en/
- CRAIG: The Craig Handicap Assessment and Reporting Technique (CHART): https://craighospital.org/programs/research/research-instruments

Resources for Individuals with Stroke, Families and Caregivers

- Heart & Stroke: Signs of Stroke: http://www.heartandstroke.ca/stroke/signs-of-stroke
- Heart & Stroke: FAST Signs of Stroke…what are the other signs?: https://www.heartandstroke.ca/stroke/signs-of-stroke/fast-signs-of-stroke-are-there-other-signs
- Heart & Stroke: Your Stroke Journey: https://www.heartandstroke.ca/-/media/pdf-files/canada/your-stroke-journey/en-your-stroke-journey-v20.pdf
- Heart & Stroke: Post-Stroke Checklist: https://www.heartandstroke.ca/-/media/1-stroke-best-practices/resources/patient-resources/002-17_csbp_post_stroke_checklist_85x11_en_v1
- Heart & Stroke: Rehabilitation and Recovery Infographic: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/rehabilitation-nov2019/csbp-infographic-rehabilitation.pdf?rev=a2cff1fb27424c84bbd44b568d58d1b4
- Heart & Stroke: Transitions and Community Participation Infographic: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/transition-of-care-nov2019/csbp-infographic-transitions-and-participation.pdf?rev=595e990a17e14232aa3b1c731d983ce3
- Heart & Stroke: Enabling Self-Management Following Stroke Checklist: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/resources/patient-resources/csbpr-enabling-self-management-following-stroke-checklist-jan2021-final.pdf?rev=03b045c41df04abfb7f4cb652869f031
- Heart & Stroke: Virtual Healthcare Checklist: https://www.strokebestpractices.ca/-/media/1-stroke-best-practices/resources/patient-resources/csbp-infographic-virtual-healthcare-checklist.pdf?rev=bf2f5b0e9e4a49cfbfc251208b6a15e2
- Heart & Stroke: Recovery and Support: https://www.heartandstroke.ca/stroke/recovery-and-support

- Heart & Stroke: Online and Peer Support: https://www.heartandstroke.ca/heart-disease/recovery-and-support/the-power-of-community
- Heart & Stroke: Services and Resources Directory: https://www.heartandstroke.ca/services-and-resources
- CanStroke Recovery Trials: Tools and Resources: https://canadianstroke.ca/tools/
- Stroke Engine: https://strokengine.ca/en
- Communication Disabilities Access Canada – Accessibility Includes Communication: https://www.cdacanada.com/
- Toronto Rehab's online resources for patients and clinicians re: sexual health post-stroke: https://www.uhn.ca/TorontoRehab/Clinics/Outpatient_Stroke_Services

Summary of the Evidence

Leisure Activity

Many individuals recovering from stroke are unable to resume their previous leisure activities. Factors including physical limitations, attributable to residual disability, decreased motivation, environmental barriers, including transportation and affordability, have been cited as reasons for decreased participation.

A variety of programs and interventions have been evaluated to help improve participation following stroke, although few have used an assessment of leisure as the primary outcome. Lee et al. [109] conducted a systematic review including 17 studies evaluating interventions addressing community participation, of which leisure activities were assessed in 8 studies. Interventions included individually tailored occupational therapy sessions, home leisure program, community-based group leisure education program, group yoga, exercise and leisure program and an aerobic training program. In 6 of the trials in which participation was assessed, there was a significant improvement in only one study.

A systematic review by Dorstyn et al [110] including the results from 8 RCTs that examined the benefit of a community-based intervention focusing on leisure therapy, leisure therapy + physical activity or leisure education, which provided an average of 17 sessions over 23 weeks. The majority of participants had experienced a mild or moderately disabling stroke within the previous year. While no pooled analyses were conducted, within individual trials significant improvement was noted at the end of treatment on measures of quality of life, mood and satisfaction with leisure activity. An 8-week peer-volunteer facilitated exercise and education program was associated with significantly greater improvement in median perceived Subjective Index of Physical and Social Outcome (physical component) scores at both at the end of treatment and at one year, compared with participants who received standard care. [111] Desrosiers et al. [112] included 62 participants residing in the community with a history of stroke within the previous 5 years and who were experiencing some limitations in leisure participation or satisfaction. The intervention involved 8-12, 60-minute, weekly education sessions, while participants in the control groups received home visits from a recreational therapist following the same schedule as the intervention group. At the completion of the study, participants in the intervention group reported significantly more time spent in active leisure activities (MD=14.0 minutes, 95% CI 3.2-24.9, p=0.01) and involvement in a greater number of different activities (MD= 2.9, 95% CI 1.1-4.8, p=0.002). Participants in the intervention group had also gained significantly more points on the Leisure Satisfaction Scale (MD= 11.9, 95% CI 4.2-19.5, p=0.003) and in the satisfaction of leisure needs and expectations (MD=6.9, 95% CI 1.3-12.6, p=0.02).

Sexuality

Reports of sexual dysfunction following stroke are common. Among several surveys including small samples, declines in sexual activity have been reported. Stein et al. [113] surveyed 35 individuals who agreed to participate, out of 268 who were included in a stroke rehabilitation research registry. Of those, 100% of men and 58% of women met the criteria for sexual dysfunction, 42% indicated their sexual functioning was worse following stroke, 94% reported that physical limitations impacted their

sexual activity and 58.8% reported feeling less sexually desirable following stroke. Buzzelli et al. [114] also reported that among 60 patients (83.3%) reported a decline in sexual activity during the first year following stroke. Variables associated with disruption of sexual activity included fear of relapse, belief that one must be healthy to have a sex life and partner who is "turned off" at the prospect of sexual activity with a "sick person".

Only a few small trials examining interventions designed to address issues relating to sexuality post stroke have been published. Sansom et al. [115] reported no significant differences between groups on median Sexual Function Questionnaire Short-Form (CSFQ-14) scores following a single 30-minute structured sexual rehabilitation session, conducted by a rehabilitation physician, compared with individuals who received a fact sheet. Guo et al. [116] reported that the percentage of stroke rehabilitation inpatients given the opportunity to talk about sexual issues increased from 0% at months 1-3 to 80% at month 10 following an intervention designed to ensure patients had opportunity to discuss sexual health with one of their healthcare providers. A study assessing a sexual education intervention found that patients who received a short (40-50 minute) education session that outlined the changes that they can expect in their sexuality post-stroke, addressed frequently asked questions and provided tips to avoid sexual dysfunction were more sexually active and experienced greater sexual satisfaction than patients who did not. [117] A Cochrane review [118] aimed to evaluate the effectiveness of interventions designed to reduce sexual dysfunction following stroke, which include 3 RCTs (212 individuals). Interventions included 50 mg oral sertraline to prevent premature ejaculation compared with placebo for 8 weeks; pelvic floor muscle training (1-2x/day x 12 weeks) compared with standard rehabilitation for erectile dysfunction after stroke; and a single, 30-minute individualised sexual rehabilitation session compared with written educational materials. The pharmacological intervention was associated with a significant improvement in sexual function at 4, 8 and 12 weeks and in a significant increase in partner satisfaction. The sexual rehabilitation program was not associated with significant improvement in median total CSFQ-14 scores at 6 weeks or 6 months. Finally, pelvic floor muscle training was not associated with significantly greater improvement median International Index of Erectile Function Questionnaire at 3 or 6 months.

Sex & Gender Considerations

There is limited evidence examining sex or gender differences in participation outcomes post stroke. Women were reported to have had greater handicap (i.e. participation restriction) in the long term after stroke, in a review that included the results from five studies, [119] although the difference was blunted after adjustment for age, functional outcome, and depression More recently, Chen et al. [120] used data from the US National Health and Aging Trends Study to examine sex differences in participation restriction among 471 stroke survivors, which assessed four social activities including two formal activities (attending religious services and participating in clubs, classes, or other organized activities) and two informal activities (visiting with friends/family and going out for enjoyment such as dinner, a movie, or gambling). Compared with men, the odds of any participation restriction across all 4 social activities were not increased significantly in women after adjustment (OR=1.36, 95% CI 0.70- 2.65), nor were the odds of restriction in either formal or informal social activities increased.

Evidence Table and Reference List 5a
Evidence Table and Reference List 5b

APPENDIX ONE: REHABILITATION, RECOVERY AND COMMUNITY PARTICIPATION FOLLOWING STROKE SCIENTIFIC WRITING GROUP AND AUTHORS 2025

PART THREE: OPTIMIZING ACTIVITY AND COMMUNITY PARTICIPATION FOLLOWING STROKE

NAME	PROFESSIONAL ROLE	LOCATION	DECLARED CONFLICTS OF INTEREST
Jennifer K. Yao, MD, FRCPC **Module Co-Chair**	Medical Manager Acquired Brain Injury Program, G.F. Strong Rehab Centre, Vancouver Coastal Health Clinical Associate Professor, University of British Columbia, Division Head, Division of Physical Medicine and Rehabilitation Writing Group Co-Chair	Vancouver, BC	Support for attending meetings and/or travel from Heart and Stroke Foundation of Canada - reimbursement to self for conference travel Leadership or fiduciary role with Canadian Stroke Best Practice Review Advisory Committee member
Nancy M. Salbach, PT, PhD **Module Co-Chair**	Professor University of Toronto, Department of Physical Therapy The KITE Research Institute, Toronto Rehabilitation Institute-University Health Network Writing Group Co-Chair	Toronto, ON	All support for the present manuscript - Toronto Rehabilitation Institute Chair at the University of Toronto, payment to institution Grant or contracts with Canadian Institutes of Health Research, payment to institution Honorarium for a lecture with Canadian Institutes for Health Research, honorarium paid to self from research team
Michelle LA Nelson, PhD **Section One Co-Lead**	Principal Investigator, Science of Care Institute, Lunenfeld-Tanenbaum Research Institute, Sinai Health Associate Professor, University of Toronto, Institute of Health Policy, Management and Evaluation Section One Co-Lead	Toronto, ON	All support for the present manuscript - March of Dimes Canada, World Stroke Organization, American Stroke Association, International Foundation of Integrated Care, small honoraria provided for talk at IFIC conference Grant funding paid from CIHR, Walton's Trust, AMS, paid to Sinai Health

			Payment or honoraria for speaking at IFIC (International Foundation of Integrated Care) educational event Participation on the International Journal of Integrated Care Editorial Board Leadership or fiduciary role at World Stroke Organization, American Stroke Association, International Foundation for Integrated Care
Jing Shi, MD, FRCPC **Section One Co-Lead**	Director Stroke Rehabilitation, Saskatoon City Hospital Assistant Professor, University of Saskatchewan, Department of Physical Medicine and Rehabilitation Section One Co- Lead	Saskatoon, SK	Grants or contracts from the Saskatchewan Health Research Foundation, all funds directed to research activity costs Leadership or fiduciary role with the Saskatchewan Stroke Expert Panel Advisory Board and as medical director of stroke rehabilitation at Saskatoon City Hospital, as part of the academic clinical alternative payment (ACFP) physician contract
Patrice Lindsay RN, PhD	Previous Lead PWLE Engagement Strategy and Stroke, Heart and Stroke Foundation of Canada; Principal, MarcLind Health Systems and Engagement Consulting.	Toronto, ON	Consulting fees from Canadian Neurological Sciences Federation, payment to self Payment or honoraria from CHEP PLUS, honorarium payment to self Leadership or fiduciary role in other board, society, committee or advocacy group with Canadian Institutes of Health Research – ICRH IAB, unpaid
Ruth Barclay, PhD, MHSc, BMR(PT)	Professor, Department of Physical Therapy, University of Manitoba, Riverview Health Centre	Winnipeg, MB	Grant or contracts from CIHR, not related to manuscript Support for attending meetings and/or travel from CIHR – CIHR reviewer, not related to manuscript

			Leadership or fiduciary role on editorial board of the Journal of Aging and Physical Activity until January 2025, unpaid
Diana Bastasi, B.Sc. (PT), MBA	Coordinator of Physiotherapy In-patient Services, The McGill University Health Centre, Montreal General Hospital Faculty (part-time) Lecturer, McGill University, School of Physical and Occupational Therapy	Montreal, QC	None to declare
Dylan Blacquiere, MD MSc	Medical Director, Champlain Regional Stroke Network Assistant Professor, University of Ottawa, Department of Medicine, Division of Neurology	Ottawa, ON	Payment or honoraria from Healthing (honorarium), Heart and Stroke Foundation of New Brunswick (Lecture honorarium), payment to self Payment for expert testimony from Burchells LLP, payment to self Participation on a Data Safety Monitoring Board or Advisory board with Abbevie – advisory board payment to self Leadership or fiduciary role with Heart and Stroke Foundation of Canada Stroke Best Practice Guidelines; Canadian Stroke Consortium – unpaid advisory/executive board
Mark I. Boulos, MD FRCPC, CSCN(EEG), MSc	Hurvitz Brain Sciences Research Program, Sunnybrook Research Institute, Sunnybrook Health Sciences Centre Department of Medicine, Division of Neurology, University of Toronto	Toronto, ON	Grants or contracts from Canadian Institutes of Health Research; Alternative Funding Plan from the Academic Health Sciences Centres of Ontario; Heart & Stroke Foundation of Canada; Division of Neurology at the University of Toronto; Sunnybrook Education Advisory Council and Education Research Unit; Ontario Genomics; Toronto Dementia Research Alliance, paid to my institution Consulting fees from Precision AQ, paid to self

			Payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Paladin Labs; Jazz Pharmaceuticals; Eisai, paid to self Receipt of equipment, materials, drugs, medical writing, gifts or other services from Braebon Medical Corporation, In-kind support to Dr. Boulos' research program
Joy Boyce, OT Reg. (NS), BScOT and BA Hons	Occupational Therapist, Early Supported Stroke Discharge Coordinator, Nova Scotia Health Authority	Halifax, NS	Leadership or fiduciary role with the Atlantic Canada Stroke conference committee, co chair and member
Geneviève Claveau, MD, FRCPC	Staff Physiatrist, Stroke and Non-Traumatic Brain Injury Program, Institut de réadaptation Gingras-Lindsay de Montréal Clinical Associate Professor, Division of Physical Medicine and Rehabilitation, Department of Medicine and Medical Specialties, Université de Montréal	Montreal, QC	Receipt of equipment, materials, drugs, medical writing, gifts or other services From Abbvie, Merz, Ipsen that included free lunches, educational material (handbooks) and participation in local conferences/educational sessions organized by them
Norine Foley, MSc	Partner, workHORSE Consulting Group	London, ON	None to declare
Heather L. Flowers, PhD, SLP (C), Reg. CASLPO, CCC-SLP	Associate Professor, University of Ottawa, School of Rehabilitation Sciences, Faculty of Health Sciences,	Ottawa, ON	None to declare
Urvashy Gopaul, MSc, PhD, PT	Toronto Rehabilitation Institute-KITE Research	Toronto, ON	None to declare
Esther S. Kim, PhD, R.SLP, CCC-SLP	Professor, Chair, University of Alberta, Department of Communication Sciences and Disorders	Edmonton, AB	Grants or contracts from SSHRC, CIHR - Unrelated to this manuscript, payment to institution Support for attending meetings and/or travel with University of Alberta and Canadian Stroke Congress, conference travel support (reimbursements)

			Leadership or fiduciary role as chair of the Council of Chairs of Canadian University Programs in Speech-Language Pathology and Audiology (CCUP), unpaid Other financial or non-financial disclosures, salary from University of Alberta
Alto Lo, MD	Stroke Physiatrist, Glenrose Rehabilitation Hospital Associate Professor, University of Alberta, Department of Medicine in the Faculty of Medicine & Dentistry	Edmonton, AB	Payment for expert testimony from Lambert Law; Brownlee LLP, payments to self Support for attending meetings and/or travel from Abbvie Canada, Ipsen Canada, Merz Canada, Air Travel and Accommodations arranged directly by entities above
Rebecca Lund MSc (OT), OT Reg. (Ont.)	Manager, Stroke, Heart and Stroke Foundation of Canada	Toronto, ON	None to declare
Chelsy Martin PT, MScPT	Project Lead, Stroke Best Practices, Heart and Stroke Foundation of Canada	Ottawa, ON	None to declare
Alison M. McDonald, BScPT	Physiotherapist, Acquired Brain Injury Program, Nova Scotia Rehabilitation and Arthritis Centre Adjunct Professor (Clinical) Dalhousie University, School of Physiotherapy	Halifax, NS	None to declare
Amanda McIntyre, PhD, RN	Registered Nurse, Emergency Medicine, London Health Sciences Centre Assistant Professor, Arthur Labatt Family School of Nursing, Western University	London, ON	None to declare
Sarvenaz Mehrabi MD, MSc	Lawson Research Institute, St. Joseph's Health care London, Department of Physical Medicine and Rehabilitation	London, ON	All support for the present manuscript - helped in providing data through 1) Database systematic searches & review, 2) updating evidence-based tables - paid by my employer, funded by St. Joseph healthcare London and Heart & Stroke foundation of Canada.

Anita Mountain, MD, FRCPC	Medical Lead, Acquired Brain Injury Program, Queen Elizabeth II Health Sciences Centre Assistant Professor Division of Physical Medicine & Rehabilitation, Department of Medicine, Dalhousie University	Halifax, N.S	All support for the present manuscript, Heart and Stroke Foundation of Canada, no payments Grants or contracts from any entity - Qualified site investigator for research supported by Brain Canada, Heart and Stroke Foundation of Canada, Canadian Partnership for Stroke Recovery/CIHR/Governors of the University of Calgary. No payments to self. Support for research coordinator and research activities related to research grants from primary organization Leadership or fiduciary role as Rehabilitation co-chair for Canadian Stroke Best Practice Recommendations Advisory Committee, no payments.
Colleen O'Connell, MD, FRCPC	Medical and Research Director, Stan Cassidy Centre for Rehabilitation, Horizon Health Network Professor, Dalhousie University Faculty of Medicine, Dalhousie Medicine New Brunswick Clinical Research Director, Institute for Biomedical Engineering University of New Brunswick	Fredericton, N.B	Payments for lectures provided from MT Pharma Leadership or fiduciary role as Chair of Canadian Physiatry Research and Development Foundation, volunteer role
Colleen O'Connor, PhD, RD	Associate Professor and Undergraduate Program Chair, Brescia School of Food and Nutritional Sciences, Western University	London, ON	None to declare
Kara K. Patterson, PT, PhD	Senior Scientist, The KITE Research Institute, University Health Network Associate Professor University of Toronto, Department of Physical Therapy	Toronto, ON	Grants or contracts from Canadian Institutes of Health Research project grant; Heart and Stroke Grant in Aid; Rehabilitation Science Research Network for COVID catalyst grant, payments made to KITE Research Institute Support for attending meetings and/or travel, Heart and Stroke - Grant in Aid

			reviews, Stroke Cog Canadian Stroke Congress, travel expense reimbursement Leadership or fiduciary role as board member of the International Society for Posture and Gait Research
Tricia Shoniker, OT Reg. (Ont.), BSc OT, MOT	Occupational Therapist, Stroke, Neurological Program Parkwood Institute Professor, Fanshawe College, School of Health Sciences	London, ON	None to declare
Debbie Timpson, BSc(PT), MD, FRCPC	Physiatrist, Chief of Rehabilitation, Pembroke Regional Hospital	Pembroke, ON	Participation on a Data Safety Monitoring Board or Advisory board with Canadian Stroke Best Practice Recommendations Advisory Committee
Theodore Wein, MD, FRCPC, FAHA	Assistant Professor of Neurology and Neurosurgery, McGill University	Montreal, QC	Research grant, consulting fees, honoraria, honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events, support for attending meetings and/or travel, plane ticket provided from Abbvie, Ipsen Participation on a Data Safety Monitoring Board or Advisory Board, Pharmazzz, Syneos, Artivion, payment to self
Janice Wright, MS, ACNP(c), RN-EC	Nurse Practitioner, Rehabilitation and Restorative Medicine, Hotel Dieu Shaver	St. Catharines, ON	None to declare
Brenda Yeates, MSW, RSW	Social Worker, Stroke Early Supported Discharge Team, Queen Elizabeth II Health Centre Ambulatory Care Centre	Grand Prairie, AB	Support for attending meetings and/or travel from Alberta Health Services, paid my wage to attend Writing Group Zoom Meetings as they took place during work tine
Jeanne Yiu, OTR, BSc (OT), MSc (Rehab Sciences)	Regional Clinical Resource Educator, Occupational Therapy, Vancouver Coastal Health.	Vancouver, BC	Support for attending meetings and/or travel from Vancouver Coastal Health, attended meetings during work hours

	Clinical Associate Professor, Department of Occupational Science & Occupational Therapy, Faculty of Medicine, University of British Columbia		

PART ONE: STROKE REHABILITATION PLANNING FOR OPTIMAL CARE DELIVERY

NAME	PROFESSIONAL ROLE	LOCATION	DECLARED CONFLICTS OF INTEREST
Michelle LA Nelson, PhD **Section Co-Lead**	Principal Investigator, Science of Care Institute, Lunenfeld-Tanenbaum Research Institute, Sinai Health Associate Professor, University of Toronto, Institute of Health Policy, Management and Evaluation Section Lead	Toronto, ON	All support for the present manuscript - March of Dimes Canada, World Stroke Organization, American Stroke Association, International Foundation of Integrated Care, small honoraria provided for talk at IFIC conference Grant funding paid from CIHR, Walton's Trust, AMS, paid to Sinai Health Payment or honoraria for speaking at IFIC (International Foundation of Integrated Care) educational event Participation on the International Journal of Integrated Care Editorial Board Leadership or fiduciary role at World Stroke Organization, American Stroke Association, International Foundation for Integrated Care
Jing Shi, MD, FRCPC **Section Co-Lead**	Director Stroke Rehabilitation, Saskatoon City Hospital Assistant Professor, University of Saskatchewan, Department of Physical Medicine and Rehabilitation Section Lead	Saskatoon, SK	Grants or contracts from the Saskatchewan Health Research Foundation, all funds directed to research activity costs Leadership or fiduciary role with the Saskatchewan Stroke Expert Panel Advisory Board and as medical director of stroke

			rehabilitation at Saskatoon City Hospital, as part of the academic clinical alternative payment (ACFP) physician contract
Nancy M. Salbach, PT, PhD **Module Co-Chair**	Professor, University of Toronto, Department of Physical Therapy The KITE Research Institute, Toronto Rehabilitation Institute-University Health Network Writing Group Co-Chair	Toronto, ON	All support for the present manuscript - Toronto Rehabilitation Institute Chair at the University of Toronto, payment to institution Grant or contracts with Canadian Institutes of Health Research, payment to institution Honorarium for a lecture with Canadian Institutes for Health Research, honorarium paid to self from research team
Jennifer K. Yao, MD, FRCPC **Module Co-Chair**	Medical Manager Acquired Brain Injury Program, G.F. Strong Rehab Centre, Vancouver Coastal Health Clinical Associate Professor, University of British Columbia Division Head, Division of Physical Medicine and Rehabilitation Writing Group Co-Chair	Vancouver, BC	Support for attending meetings and/or travel from Heart and Stroke Foundation of Canada - reimbursement to self for conference travel Leadership or fiduciary role with Canadian Stroke Best Practice Review Advisory Committee member
Louis-Pierre Auger, OT, PhD	Postdoctoral Fellow, Institute of Health Sciences Education, Faculty of Medicine and Health Sciences, McGill University School of Physical and Occupational Therapy, Faculty of Medicine and Health Sciences, McGill University Center for Interdisciplinary Research in Rehabilitation of the Greater Montreal	Montreal, QC	All support for the present manuscript - Fonds de recherche du Québec, Santé, Doctoral scholarship and postdoctoral fellowship Grants or contracts from Fonds de recherche du Québec - Santé for postdoctoral fellowship
Jenna Beaumont, RSLP, MRSc.	Lead, Clinical Initiatives, Stroke Services BC, PHSA	Nelson, BC	Support for attending meetings and/or travel, by workplace to attend meetings - Stroke Services BC (Provincial Government)

Dylan Blacquiere, MD MSc	Medical Director, Champlain Regional Stroke Network Assistant Professor, University of Ottawa, Department of Medicine, Division of Neurology	Ottawa, ON	Payment or honoraria from Healthing (honorarium), Heart and Stroke Foundation of New Brunswick (Lecture honorarium), payment to self Payment for expert testimony from Burchells LLP, payment to self Participation on a Data Safety Monitoring Board or Advisory board with Abbevie – advisory board payment to self Leadership or fiduciary role with Heart and Stroke Foundation of Canada Stroke Best Practice Guidelines; Canadian Stroke Consortium – unpaid advisory/executive board
Rebecca Bowes, HBA	Stroke Navigator, West GTA Stroke Network, Trillium Health Partners	Toronto, ON	Support for attending meetings and/or travel from Trillium Health Partners, West GTA Stroke Network, paid by employer; participation paid as part of work role/duties Other financial or non-financial interests - Trillium Health Partners, West GTA Stroke Network, I was supported to participate as part of my regular salaried duties
Imane Samah Chibane, MD	Neurologist, Hôpital du Sacré-Cœur de Montréal, CIUSSS du Nord de l'Ile de Montréal and Institut de réadaptation Gingras-Lindsay de Montréal (IRGLM) Assistant Professor Université de Montréal, Department of Neurosciences	Montréal, QC	Consulting fees from Merz, consultant as a moderator for an educational program
Sarah J. Courtice MD, FRCPC	Medical Manager ABI/Stroke and Transitional Rehabilitation Programs, GF Strong Rehabilitation Centre, Vancouver Coastal Health	Vancouver, BC	Leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid - Medical manager for the ABI

	Clinical Instructor, University of British Columbia, Division of Physical Medicine and Rehabilitation		and TRU programs at GF Strong Rehabilitation Centre - Physician leadership within health authority
Rhina Delgado, BSc.OT	Stroke Service Coordinator, Stroke Program Edmonton Zone, Alberta Health Services	Edmonton, AB	None to declare
Melanie Dunlop, NP, BScN, MN, BA	Acquired Brain Injury Nurse Practitioner, Nova Scotia Rehabilitation & Arthritis Center	Halifax, NS	Support for attending meetings and/or travel - funding from NS Health to attend and present at ICN APN conference; not related to stroke practice
Norine Foley, MSc	Partner, workHORSE Consulting Group	London, ON	None to declare
Kimia Ghavami, MD FRCPC FCSCE	Neurologist, Vancouver Stroke Program, Vancouver General Hospital Clinical Assistant Professor, University of British Columbia, Division of Neurology	Vancouver, BC	Payment or honoraria for lectures provided to students and residents as part of teaching commitment with the University of British Columbia Leadership or fiduciary role with Stroke Services BC, Acute Medical Chair
Teresa Guolla, OT Reg.(Ont.), MHA., BSc.OT	National Lead, Program Development and Clinical Integration, Vision Loss Rehabilitation Canada, Inc.	Ottawa, ON	Consulting fees from the Canadian National Institute for the blind for consulting on visual accessibility of the environment, payments directly to self. Payment or honoraria from the Ontario stroke network (SE, NW, SW), Montfort Hospital, Ontario Society for Occupational Therapists, The Ottawa Hospital, Sunnybrook Hospital, Ottawa Home and Community Support, Queen's University Occupational Therapy Program, Ontario Regional Rehabilitation Coordinators, Sudbury General Hospital, small honoraria were paid either to my institution

			(Vision Loss Rehabilitation Canada) or to self. Leadership or fiduciary role in other board, society, committee or advocacy group, with the Academy for Certification of Vision Rehabilitation Specialists (ACVREP) committee on certification standards for occupational therapists - unpaid
Deborah Kean OT(R)NL	Clinical Occupational Therapist II, Primary Health Care, NL Health Services	St. John's NL	None to declare
Patrice Lindsay RN, PhD	Previous Lead PWLE Engagement Strategy and Stroke, Heart and Stroke Foundation of Canada; Principal, MarcLind Health Systems and Engagement Consulting	Toronto, ON	Consulting fees from Canadian Neurological Sciences Federation, payment to self Payment or honoraria from CHEP PLUS, honorarium payment to self Leadership or fiduciary role in other board, society, committee or advocacy group with Canadian Institutes of Health Research – ICRH IAB, unpaid
Rebecca Lund MSc (OT), OT Reg. (Ont.)	Manager, Stroke, Heart and Stroke Foundation of Canada	Toronto, ON	None to declare
Sandra MacFayden, P.T.	PT, Provincial Ambulatory Stroke Clinic, Queen Elizabeth Hospital	Charlottetown, PE	None to declare
Chelsy Martin PT, MScPT	Project Lead, Stroke Best Practices, Heart and Stroke Foundation of Canada	Ottawa, ON	None to declare
Jasmine Masse, BSW, RSW	Social Worker, Community Stroke Care Service	Winnipeg, MB	Support for attending meetings and/or travel from Winnipeg Regional Health Authority, have been supported by my workplace but only through payment of regular wage during scheduled work hours when attending meetings for SBPR

Anita Mountain, MD, FRCPC	Medical Lead, Acquired Brain Injury Program, Queen Elizabeth II Health Sciences Centre Assistant Professor Division of Physical Medicine & Rehabilitation, Department of Medicine, Dalhousie University;	Hallifax, NS	All support for the present manuscript, Heart and Stroke Foundation of Canada, no payments Grants or contracts from any entity - Qualified site investigator for research supported by Brain Canada, Heart and Stroke Foundation of Canada, Canadian Partnership for Stroke Recovery/CIHR/Governors of the University of Calgary. No payments to self. Support for research coordinator and research activities related to research grants from primary organization Leadership or fiduciary role as Rehabilitation co-chair for Canadian Stroke Best Practice Recommendations Advisory Committee, no payments.
Colleen O'Connell, MD, FRCPC	Medical and Research Director, Stan Cassidy Centre for Rehabilitation, Horizon Health Network Professor, Dalhousie University Faculty of Medicine, Dalhousie Medicine New Brunswick Clinical Research Director, Institute for Biomedical Engineering University of New Brunswick	Fredericton, N.B	Payments for lectures provided from MT Pharma Leadership or fiduciary role as Chair of Canadian Physiatry Research and Development Foundation, volunteer role
Phyllis G. Paterson, PhD	Professor Emerita, University of Saskatchewan, College of Pharmacy and Nutrition	Saskatoon, SK	Grant or contracts from CIHR; Saskatchewan Flax Development Commission – payments made to institution
Benjamin R. Ritsma, MD, FRCPC	Clinical Director – Rehabilitation, Providence Care Hospital Assistant Professor	Kingston, ON	Grants or contracts from SEAMO (Southeastern Ontario Academic Medical Organization) Endowed Scholarship and Education Fund; University Hospitals Kingston Foundation

	Queen's University, Department of Physical Medicine and Rehabilitation		(UHKF);Brain Canada - Platform Support Grants (PSG); Heart & Stroke – Grant-in-Aid (GIA) Program Grant; Canada Research Coordinating Committee (CRCC) – New Frontiers in Research Fund (NFRF) - Exploration Grants. All funds directly to research activity costs. Leadership or fiduciary role with Stroke Rehabilitation Advisory Committee (Co-Chair) –Ontario Health - CorHealth; Stroke Network of Southeastern Ontario (Member) – Regional Stroke Steering Committee (RSSC); Community Stroke Rehabilitation (CSR) Initiative - Expert Panel – Ontario Health - CorHealth Ontario; Community Stroke Rehabilitation (CSR) Initiative - Executive Committee –Ontario Health - CorHealth Ontario; Stroke Leadership Council – Ontario Health - CorHealth Ontario. All unpaid.
Elyse Shumway, SLP, M.A.	Director, Clinical and Education Services, Aphasia Institute Adjunct Lecturer (Status Only), University of Toronto, Department of Rehabilitation Science	Toronto, ON	None to declare
Ada Tang, PT PhD	Professor and Assistant Dean (Rehabilitation Science) McMaster University, School of Rehabilitation Science	Hamilton, ON	Grants or contracts from Canadian Institutes of Health Research, Heart & Stroke, Physiotherapy Foundation of Canada. Paid to institution. Payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Canadian Society for Exercise Physiology, Canadian Physiotherapy Association Neurosciences Division. Paid to self.

			Support for attending meetings and/or travel for Work Congress for Neurorehabilitation, paid to self. Participation on a Data Safety Monitoring or Advisory board with CanStim
Alda Tee, MHS., BSC.PT reg. PT	Regional Rehabilitation Coordinator, Central East Stroke Network Royal Victoria Regional Health Centre	Barrie, ON	None to declare
Debbie Timpson, BSc(PT), MD, FRCPC	Physiatrist, Chief of Rehabilitation, Pembroke Regional Hospital	Pembroke, ON	Participation on a Data Safety Monitoring Board or Advisory board with Canadian Stroke Best Practice Recommendations Advisory Committee
Clinton Yin Hang Tsang, MPH, MSc, RSLP	Regional Practice Initiatives Lead, Professional Practice Allied Health, Vancouver Coastal Health Clinical Assistant Professor, School of Audiology and Speech Sciences, University of British Columbia	Vancouver, BC	None to declare
Stacey Turnbull, RN CRN	Nurse Coordinator, Provincial Ambulatory Stroke Rehabilitation Services PEI	Charlottetown, PEI	None to declare
Katie White, B.Sc.PT, M.Sc	Director, Health Systems, Heart and Stroke Foundation of Canada Previous: Lead, Provincial Clinical Initiatives and Innovation, Stroke Services BC, Provincial Health Services Authority	Vancouver, BC	None to declare

COGNITIVE REHABILITATION EXPERT WRITING SUBGROUP

NAME	PROFESSIONAL ROLE	LOCATION	DECLARED CONFLICTS OF INTEREST
Richard H. Swartz, MD Ph.D. FRCPC	Stroke Neurologist; Medical Director Northeast GTA Regional Stroke Program;	Toronto, ON	Grants or contracts from OBI, CIHR, NIH, payments made to institutions

	Director, Institute of Health Sciences, University of Toronto Associate Professor, University of Toronto		Participation on a Data Safety Monitoring Board or Advisory Board with Roche Advisory Board 2023, payments made to self Stock with Follow MD Inc.
Eric E. Smith, MD, MPH	Professor of Neurology, University of Calgary Department of Clinical Neurosciences	Calgary, AB	No conflicts to declare
Gail A. Eskes, Ph.D., R. Psych.	Professor, Dalhousie University, Departments of Psychiatry and Psychology & Neuroscience	Halifax, NS	Grant from Nova Scotia Health (NSH), CIHR, Innovacorp - NSH, Innovacorp operating grants paid to university; CIHR - training grant Honoraria for lectures and thesis review from LaTrobe University, Parkinson Canada, Mt. Allison University Support for attending meetings and/or travel from CanStim, Canadian Platform for Research in Non-Invasive Brain Stimulation, reimbursement for travel and attending meeting Patens planned, issued or pending - UK Patent application with the University of Birmingham/Dalhousie for cognitive enhancement technology
Aravind Ganesh, MD, DPhil, FRCPC	Vascular and Cognitive Neurologist, Department of Clinical Neurosciences Faculty of Medicine, University of Calgary Assistant Professor, University of Calgary, Cumming School of Medicine, Department of Clinical Neurosciences	Calgary, AB	Grants or contracts from Canadian Institutes of Health Research, Alberta Innovates, Campus Alberta Neuroscience, Government of Canada – INOVAIT Program, Government of Canada –New Frontiers in Research Fund, Microvention, Alzheimer Society of Canada, Alzheimer Society of Alberta and Northwest Territories, Heart and Stroke Foundation of Canada,

			Panmure House, Brain Canada, MSI Foundation, France-Canada Research Fund, payments made to institution Consulting fees from Servier Canada, paid to self Payment for lectures, presentations, speakers bureaus, manuscript writing or educational events from Alexion, Biogen, payments to self Patents planned, issued or pending for US17/317,771, System for patient monitoring and cuff-based therapies Participation on a Data Safety Monitoring Board or Advisory Board with Eisai, payment made to self Stock options with SnapDx Inc, Collavidence Inc (Let's Get Proof)
R Stewart Longman, PhD	Neuropsychologist, Alberta Health Services, Foothills Medical Centre	Calgary, AB	None to declare

MOOD AND DEPRESSION EXPERT WRITING SUBGROUP

NAME	PROFESSIONAL ROLE	LOCATION	DECLARED CONFLICTS OF INTEREST
Treena Blake, Ph.D., RPsych	Psychologist, GF Strong Rehabilitation Centre	Vancouver, BC	None to declare
Sabrina Celarie, MN, RN	Nurse Clinician, Carewest Dr. Vernon Fanning Neuro Rehabilitation	Calgary, AB	None to declare
Geneviève Claveau, MD, FRCPC	Staff Physiatrist, Stroke and Non-Traumatic Brain Injury Program, Institut de réadaptation Gingras-Lindsay de Montréal Associate Clinical Professor	Montreal, QC	Receipt of equipment, materials, drugs, medical writing, gifts or other services From Abbvie, Merz, Ipsen that included free lunches, educational material (handbooks) and participation in local

	Université de Montréal, Department of Physical Medicine and Rehabilitation,		conferences/educational sessions organized by them
Lee-Anne Greer, Ph.D, C. Psych.	Psychologist, Queen Elizabeth Hospital and PEI Organized Stroke Care Program	Charlottetown, PE	None to declare
Jasmine Masse, BSW, RSW	Social Worker, Community Stroke Care Service	Winnipeg, MB	Support for attending meetings and/or travel from Winnipeg Regional Health Authority, have been supported by my workplace but only through payment of regular wage during scheduled work hours when attending meetings for SBPR
Ronak Patel, PhD, C. Psych., ABPP-CN	Clinical Neuropsychologist and Assistant Professor, University of Manitoba, Max Rady College of Medicine, Rady Faculty of Health Sciences,	Winnipeg, MB	None to declare
Gayla Tennen, MD, FRCPC	Staff Psychiatrist, Post-Stroke Psychiatry Clinic, Sunnybrook Health Sciences Centre. Assistant Professor, University of Toronto, Faculty of Medicine, Department of Psychiatry	Toronto, ON	Grant or contracts from Alzheimer's Drug Discovery Foundation, Weston Foundation, supportive investigator for agitation in dementia trials
Manav Vyas, MBBS MSc PhD	Neurologist, Clinician Scientist, St. Michael's Hospital-Unity Health Toronto. Assistant Professor, University of Toronto, Faculty of Medicine, Division of Neurology	Toronto, ON	Grant from Heart and Stroke Foundation of Canada and Canadian Institutes of Health Research

APPENDIX TWO: OPTIMIZING ACTIVITY AND COMMUNITY PARTICIPATION FOLLOWING STROKE, EXTERNAL REVIEWERS 2025

NAME	PROFESSIONAL ROLE	LOCATION	DECLARED CONFLICTS OF INTEREST
Zainab Al Lawati MD, MedEd, FRCPC, FAAPMR	Spasticity Director, Assistant Professor, University of Miami, Department of PM&R	USA	None to declare
Paula Barker MD, FRCPC	Clinical Assistant Professor, Memorial University	Corner Brook, NL	None to declare
Joyce L Chen BSc PT, PhD	Associate Professor, University of Toronto, Faculty of Kinesiology and Physical Education	Toronto, ON	None to declare
Jill Congram, RN, BN	Nurse Clinician, Tertiary Neuro Rehabilitation	Calgary, AB	None to declare
Kenneth Curtis OT(R)NL	OT Clinical Lead, NLHS-LG Zone	Lab City, NL	None to declare
Célina Ducroux MD, MSc	Stroke Physician Assistant Professor, University of Ottawa, Department of Medicine	Ottawa, ON	Currently participating, or have participated within the past two years, in a clinical trial as Co-investigator on Clinical Trial for Escape Mevo, EASI toc
Hillel M. Finestone MDCM, FRCPC	Physiatrist, Director of Stroke Rehabilitation Research, Bruyere Continuing Care, Elisabeth Bruyere Hospital Professor, University of Ottawa, Department of Medicine, Division of Physical Medicine and Rehabilitation	Ottawa, ON	None to declare

NAME	PROFESSIONAL ROLE	LOCATION	DECLARED CONFLICTS OF INTEREST
Margaret Grant MScOT(c), BScOT	Senior Consultant, Alberta Health Services	Calgary, AB	All support for the work reported in the manuscript – Alberta Health Services, employee Support for attending meetings and/or travel, congress fee for Canadian Stroke Congress in Calgary was covered through Canadian Stroke Congress, Congress EyeSee After Stroke Pre-Conference Workshop Planning Committee
Mary E. Halpine MD, FRCPC	Head of Neurorehabilitation program, Moncton City Hospital Associate Professor, Dalhousie University, Faculty of Medicine	Halifax, NS	None to declare
Anne Harris, MScPT	Physiotherapist, Acquired Brain Injury Unit, GF Strong Rehab Centre Vancouver Coastal Health	Vancouver, BC	Received/will be receiving a grant or honorarium CIHR Project Grant (2020-2024), co-applicant Currently participating, or have participated within the past two years in a clinical trial - University of British Columbia, clinical therapist
Sylvie Houde, MD, FRCP	Physiatre, neurologue, gestionnaire médical du programme AVC et autres lésions neurologiques acquises non-traumatiques Professeur adjointe de Clinique, Université de Montréal, département de médecine de réadaptation	Montréal QC	None to declare
Dorothy Kessler PhD,	Associate Professor, Queen's University, School of Rehabilitation Therapy	Kingston, ON	Received/will be receiving a grant or honorarium from Queen's University and

NAME	PROFESSIONAL ROLE	LOCATION	DECLARED CONFLICTS OF INTEREST
O.T. Reg. (Ont.)			Providence Care for Scientist in Rehabilitation fellowship
Jaylyn Leighton, PhD	Postdoctoral Fellow, Lunendeld-Tanenbaum Research Institute, Sinai Health	Toronto, ON	None to declare
Swati Mehta, PhD	Assistant Professor, Scientist, Western University, Schulich School of Medicine and Dentistry, Lawson Research Institute	London, ON	None to declare
Stuart Miller BScPT	Physiotherapist, Community Accessible Rehabilitation, Alberta Health Services	Calgary, AB	All support for the work reported in the manuscript – AHS, employee of Alberta Health Services Involved in other investment(s) or relationship(s) that could be seen by a reasonable, well-informed participant as having the potential to influence the content of the educational activity - participated in developing National FES Toolkit however I declined any honorarium or funding for this
Jennifer Milliken RD, HBSc	Clinical Neurological Sciences, Registered Dietitian, London Health Sciences Centre	London, ON	None to declare
Luciana de Oliveira Neves, MD, MSc	Former Head of Neurology and Head of Palliative Care, Hospital São Carlos University of Fortaleza, Department of Public Health	Brazil	All support for the work reported in the manuscript – UNIFOR, I am doing a postgraduate degree (doctorate)

NAME	PROFESSIONAL ROLE	LOCATION	DECLARED CONFLICTS OF INTEREST
Asha Shelton, Speech-Language Pathologist Reg. CASLPO	S-LP, North & East GTA Stroke Network, Regional Stroke Best Practice Team, Sunnybrook Health Science Centre Adjunct Lecturer, University of Toronto, Department of Speech-Language Pathology	Toronto, ON	None to declare
Shamala Thilarajah, PhD	Allied Health Research & Innovation Lead (Implementation Science), Snr Principal Physiotherapist Associate Professor, Singapore Institute of Technology	Singapore	None to declare
Ankur Wadhwa, MD, DM, FRCPC, Fellowship Canadian Stroke Consortium - scholar	Assistant Professor, University of Manitoba	Winnipeg, MB	None to declare
Marika Demers OT, PhD	Assistant Professor, Universite of Montreal, School of Rehabilitation	Montreal, QC	Currenting participating, or have participated within the past two years, in a clinical trial. Received funding for a research project I was a collaborator to from the National Institute of Health
Sarah J Donkers PT, PhD	Associate Professor, University of Saskatchewan, College of Medicine	Saskatoon, SK	None to declare
Ismalia De Sousa RN, PhD(c), MSc	PhD Candidate, University of British Columbia, School of Nursing	Vancouver, BC	Received a grant from Heart and Stroke Foundation of Canada/CIHR/Brain Canada
Kate Hayward PT, PhD, FACP	Associate Professor -Stroke Recovery and Rehabilitation, University of Melbourne, Departments of Physiotherapy and Medicine	Australia	Received/will be receiving a grant or an honorarium from National Health and Medical Research Council of Australia, Medical Research Future Fund of

NAME	PROFESSIONAL ROLE	LOCATION	DECLARED CONFLICTS OF INTEREST
			Australia, Heart Foundation of Australia – researching funding Support for attending meeting and/or travel for World Congress of NeuroRehabilitation 2022 & 2024,World Stroke Congress 2023, European Stroke Congress2024, International Stroke Conference 2025 – conference registration supported
Alyson Kwok BScPT, MSc	Physical Therapist and Healthcare Improvement Specialist, Glenrose Rehabilitation Hospital, Alberta Health Services Adjunct Professor, University of Alberta, Department of Physical Therapy	Edmonton, AB	None to declare
Alexander Lo MD, MSc, FRCPC	Medical Lead, Stroke Rehabilitation Program, Toronto Rehabilitation Institute, University Health Network Associate Professor, University of Toronto, Department of Medicine	Toronto, ON	None to declare
Lauren M. Mai MD	Neurologist, Assistant Professor of Neurology, Western University	London, ON	All support for the work reported in the manuscript - Western University, Dept Clinical Neurological Sciences, Assistant Professor Received/will receiving grant support from Academic Medical Organization of Southwestern Ontario (AMOSO) Currently participating or have participated within the past two years in a clinical trial with AMOSO (Sponsor/Principal Investigator); Bayer (Site Principal Investigator OCEANIC-Stroke; Population Health Research Institute (Site Principal Investigator CoVasc-ICH Clinical Trials)
Susan Marzolini PhD, RKin	Scientist, Clinician at KITE Research Institute, Toronto Rehabilitation Institute, University Health Network	Toronto, ON	All support for the work reported in the manuscript - KITE-University Health Network, employee

NAME	PROFESSIONAL ROLE	LOCATION	DECLARED CONFLICTS OF INTEREST
	Assistant Professor, University of Toronto, Faculty of Kinesiology and Physical Education		
Erin McHattie R.Kin, BSc.Kin	Stroke Distinction Lead, Accreditation Canada	Ottawa, ON	None to declare
Catherine Sackley MCSP, MSc, PhD, FCOT, FCSP	Professor, University of Nottingham, Faculty of Medicine & Health	UK	Have/had an affiliation or relationship (financial or otherwise) with a for-profit or not-for-profit organization – paid employment All support for the work reported in the manuscript – University of Nottingham; National institute for health services research uk, grantholder Received/will be receiving a grant from The Stroke Association UK, grantholder; National Institute for Health Research UK, grant holder Received payment from an organization (including gifts, other consideration, or in-kind compensation) from European Union, expert Reviewer
Lisa Sheehy PT, PhD	Investigator, Bruyère Health Research Institute	Ottawa, ON	None to declare
Hardeep Singh MScOT, PhD	Assistant Professor, University of Toronto	Toronto, ON	Have/had an affiliation or relationship (financial or otherwise) with a for-profit or not-for-profit organization with Brain injury association of Peel and halton (biaph) and Heart and Stroke Foundation of Canada All support for the work reported in the manuscript - March of dimes, heart and stroke, biaph. Holds the March of Dimes early career professorship at the University of Toronto. Holds a grant in aid and new investigator award (deferred) from Heart & Stroke Received/will be receiving a grant or an honorarium from March of

NAME	PROFESSIONAL ROLE	LOCATION	DECLARED CONFLICTS OF INTEREST
			Dimes, current position at UofT is funded by March of Dimes Received in kind support for recruitment assistance for research studies from March of Dimes Currently participating, or have participated within the past two years, in a clinical trial with Sinai health as a coinvestigator on the DASH trial
Ricardo Viana MD, FRCPC	Medical Director, Stroke Rehabilitation, Parkwood Institute, St. Joseph's Healthcare Associate Professor, Western University, Schulich School of Medicine & Dentistry, Department of Physical Medicine & Rehabilitation	London, ON	Currently participating or have participated within the past two years as a Trial Physician of the Direction Trial comparing the efficacy of Dysport and Botox. Identify patients who may meet criteria, provide study injections and outcome measure assessments. I am not aware of the results, nor do I have a preference for any of the agents.

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