

Philippine Academy of Rehabilitation Medicine (PARM):



**Clinical Practice Guideline
on Stroke Rehabilitation
(Updated: 2017)**

Foreword

The best clinician is armed with scientific knowledge coupled with excellent clinical judgement, compassion and understanding. Developing the skill to practice the science and the art of medicine, to provide good patient care, is a lifelong process.

Philippine Academy of Rehabilitation Medicine (PARM) aims to help our PARM members as well as the local and international medical community achieve the highest level of professional excellence. We believe that becoming the best rehabilitation medicine physician must be founded on having sufficient scientific knowledge, and the clinical skill to apply this knowledge rationally and appropriately.

Philippine Academy of Rehabilitation Medicine (PARM) Clinical Practice guideline (CPG) is one of the cornerstones of our Rehabilitation Medicine practice.

Institute of Medicine (IOM) described CPGs as statements that include recommendations intended to optimize patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options (Institute of Medicine. Clinical Practice Guidelines We Can Trust In: Graham R et al).

In addition to helping us become better clinicians, high quality, evidence-based clinical practice guidelines also bridge the gap between policy, best practice, local contexts and patient choice.

We just concluded the last step in our PARM PhilHealth Rehabilitation Medicine Health Services Package for Adults in the Philippines. Our PARM Clinical Practice Guidelines were very helpful in making this possible.

On behalf of PARM, we would like to convey our deepest gratitude and appreciation to the PARM Stroke CPG team for all their hard work and utmost dedication to this significant project for the past eight years. Kudos to PARM Stroke CPG Project Leader Dr. Marcelle Theresa Zamora-Pregonero, Stroke CPG Advisers Dr. Consuelo Suarez, Dr. Karen Grimmer-Somers, Dr. Carolina M. Valdecanas and Dr. Ephraim DV Gambito, and Stroke CPG members Dr. Mary Monica N. Bernardo-Bueno, Dr. Lorraine Buenavente, Dr. Jan Tyrone Cabrera, Dr. Myrna S. Estrada, Dr. Daniel Dennison Feliciano, Dr. Lauren Anne Liao, Dr. Jan Michael Lleva, Dr. Andrea Kristina G. Malvar, Dr. Jeffrey B. Montes, Dr. Maria Teresa I. Oquinena and Ma. Victoria Tangco.

Comparing the 2011 edition of our PARM Stroke CPG with 2019 edition, the volume of evidence has significantly increased. We need to keep abreast with the latest medical evidence and our CPG simplifies this process for us. We hope that you find this comprehensive reference useful in your everyday practice.

It is with great pleasure and honor that we present to you the PARM Clinical Practice Guidelines on Stroke Rehabilitation.

Mabuhay Ang PARM! Mabuhay tayong lahat! Sa Dios maging kaluwalhatian!

FILIPINAS G. GANCHOON, MD, FPARM
President, 2019-2020 Philippine Academy of Rehabilitation Medicine

Message from PARM Past President

Research is a never-ending process. In our pursuit to provide quality healthcare to our patients, the Philippine Academy of Rehabilitation Medicine (PARM) through our Clinical Practice Guidelines (CPG) Committee headed by Dr. Ephraim Gambito, strives to continuously update our CPGs in order to cope with the changing trends in Physical and Rehabilitation Medicine (PRM) treatment armamentarium. I was privileged to have worked with a team whose commitment and dedication to see this through to the end is unsurpassed. Your passion is contagious.

I am both honored, and humbled that during my Presidency, the CPG on Stroke was extensively peer-reviewed by not only PARM members, but our colleagues in other specialties in the medical, and paramedical fields as well. This proves that collaboration and a free exchange of information are keys to a holistic approach for better patient management. I sincerely believe that this second edition will help health professional practitioners in providing quality of life to all Filipinos.

Congratulations to Dr. Marcelle Theresa Zamora-Pregonero and the rest of the PARM Stroke Rehabilitation Guideline Development Team for all your hardwork. This would not be possible without your sacrifices. We are all proud of you. Daghang salamat ug unta magpadayun ang inyung mga buhat ngadtu sa kaayuhan sa atung mga Pilipino nga pasyente. Mabuhay ang PARM! Mabuhay ang Pilipinong Physiatrists!

RHOEL JAMES TIMOTHY O. DEJANO, MD, FPARM
President, 2017-2018 Philippine Academy of Rehabilitation Medicine

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Glossary

Action observation - form of therapy whereby a motor task is performed by an individual while watching a mirror image of another individual performing the same task. The therapy is designed to increase cortical excitability in the primary motor cortex by activating central representations of actions through the mirror neuron system.

Acupressure – therapy that involves stimulation of defined anatomic locations on the skin using finger pressure applied to meridian points on the body.

Acupuncture - A therapy that involves stimulation of defined anatomic locations on the skin by a variety of techniques, the most common being stimulation with metallic needles that are manipulated either manually or that serve as electrodes conducting electrical currents. Acupuncture may stimulate the release of neurotransmitters and have an effect on the deep structure of the brain.

Activation strategies – refers to techniques that are intended to increase orientation and attention to the neglected hemi-space. A stimulus, either a motor stimulus or externally applied sensory stimulus, to the affected side is thought to “activate” the right hemisphere. These include limb activation as well as the application of a sensory stimulus or sensory stimulation.

Activities of Daily Living (ADL) - basic self-care activities, such as dressing, grooming, personal hygiene, feeding, functional mobility and communication.

Amphetamine – an adrenergic agent that increases the release of norepinephrine and dopamine in the brain and acts as a potent stimulant. It has been shown to accelerate motor recovery following motor cortex lesions in the rat model, especially when combined with task-specific training. Amphetamines have also been shown to enhance plastic changes in motor learning in both animals and humans.

Ankle Foot Orthosis (AFO) – refers to a brace worn on the lower leg and foot to support the ankle, hold the foot and ankle in the correct position, and correct foot-drop. It is often used to compensate for excessive ankle plantar flexion and lack of knee flexion in order to facilitate the swing phase of gait.

Aphasia - an impairment of language, which involves the loss of production and/or comprehension of language.

Apraxia of speech - a disorder of motor planning or programming resulting in difficulty with volitional production of the correct sounds of speech.

Attention training strategies – refers to interventions that rely on drill and practice, with exercises designed to address specific aspects of attention (e.g., processing speed, focused attention, divided attention) and often used stimulus-response paradigms, which require subjects to identify and select among relevant auditory or visual stimuli.

Behavioral treatment (for patients with speech and language impairments) – method for improving the physiological support for speech and target impairments in respiration, phonation, articulation, and resonance.

Bilateral Arm Training (BAT) / Bilateral practice – a form of therapy in which cyclic movement patterns or motor activities are actively performed by both arms simultaneously but independently. It may also involve alternating movements.

Botulinum toxin (BTx) – a neurotoxin used in the management of spasticity which weakens muscles by blocking the release of acetylcholine at the neuromuscular junction.

Brain stimulation techniques – methods used to modulate cortical excitability during post-stroke language recovery; includes epidural cortical stimulation, repetitive transcranial magnetic stimulation (rTMS), and transcranial direct current stimulation (tDCS).

Caregiver mediated program – Program that allows primary caregivers to assume responsibility for home-based exercise programs following patient discharge.

Central Post-Stroke Pain (CPSP) - a neuropathic pain syndrome that develops post stroke characterized by pain and sensory abnormalities in the body parts that correspond to the brain territory that has been injured by the cerebrovascular lesion. It is thought to be due to injury to pathways or brain centers involved in pain processing.

Chemical neurolysis – refers to a method of destroying a portion of the nerve using either alcohol or phenol, which impairs nerve conduction with effects lasting for several months. This is often used in the management spasticity.

Cognitive Behavioral Therapy (CBT) - a short-term, goal-oriented psychotherapy treatment that takes a hands-on, practical approach to problem-solving. Its goal is to change patterns of thinking or behavior that are behind people's difficulties, and so change the way they feel.

Cognitive rehabilitation -refers to the traditional non-pharmacological method to treat cognitive impairment and has been defined as a systematic, functionally-oriented service of therapeutic cognitive activities, based on an assessment and understanding of the person's brain-behavior deficits. These treatments are directed at the restoration or reestablishment of cognitive activity, the acquisition of strategies to compensate for impaired cognitive function, and the use of adaptive techniques or equipment for increasing independence.

Communication partners - refers to family members and caregivers, healthcare professionals, and/or other individuals from the community or organization who are instructed in a technique known as training conversation to promote opportunities for restored access to conversation.

Compensatory strategy training – refers to teaching strategies to address impairments and is often directed at specific functional limitations in activities of daily living to promote independence. This can include learning to use external devices (e.g., memory notebooks, alarms, paging systems, computers or other prompting devices), adapting the external environment (e.g., additional social supports or reorganization of living space), and/or learning to use internal mental operations or processes (e.g., problem-solving techniques, visual imagery, semantic organization, spaced practice) that enhance the impaired cognitive domain.

Computer-Brain-Interface Technology (CBIT) / Brain-Machine Interfaces (BMI) – a relatively low-band width communication system that depends on the interaction of two adaptive controllers: the user's brain, which produces the activity measured by the computer-brain-interface system, and the system itself, which translates that activity into specific commands.

Constraint-Induced (CI) Aphasia Therapy – refers to a technique to address aphasia that is based on intensive practice for short intervals to force the patient to perform actions that are being avoided and relevant to everyday life.

Constraint Induced Movement Therapy (CIMT) – a resource-intensive intervention approach for select patients, with two key features being restraint on the affected hand/arm and increased practice / use of the affected hand / arm. The unaffected limb is restrained by a hand mitten or arm slings for periods in the day. It is designed to overcome learned non-use by promoting neuroplasticity and use-dependent reorganization.

- Traditional CIMT: Involves restraint of the unaffected arm for at least ninety (90) percent of waking hours, and at least six (6) hours a day of intense upper extremity (UE) training of the affected arm every day for two (2) weeks.
- Modified CIMT: Usually done for ten (10) weeks, it is employed when resources are limited. Different variations include restraining the unaffected arm for five (5) hours a day, and with half-hour blocks of 1:1 therapy; or at one (1) hour per day for three (3) days per week.

Direct remediation/Cognitive skill training – refers to a technique that focuses on providing intensive specific training to directly improve the impaired cognitive domain.

Dopamine – a neurotransmitter that increases or reduces the activity of neurons. It plays a role in regulating attention, cognition, movement, pleasure, and hormonal processes. It has been suggested that dopamine is essential for motor learning and may therefore play a role in recovery following stroke.

Dynavision training – refers to the use of a specialized technological equipment designed to train visual scanning, peripheral visual awareness, visual attention, and visual-motor reaction time across a broad, active visual field. It also includes features that require trainees to execute complex visual-motor response sequences, to use basic cognitive skills (e. g., short-term memory), and to show physical and mental endurance.

Dysarthria - refers to defective articulation with normal speech content.

Electrical stimulation – The application of an electrical current to the skin to stimulate lower motor nerves and muscle fibers resulting in improved contractility. It has been used as a method to improve spasticity, muscle tone, sensory deficits and pain reduction, which may lead to improvements in functional recovery. Electrical stimulation is typically administered via two methods, functional electrical stimulation (FES) and transcutaneous electrical nerve stimulation (TENS).

Electroconvulsive Therapy (ECT) - a procedure which involves the administration of a brief electrical stimulation to the brain by trained medical professionals while the patient is under anesthesia.

Electromechanical / Robot-assisted therapy / Mechanical-assisted therapy – the use of different types of robots / machines to improve motor function and strength. It can consist primarily of workstation devices used in a rehabilitation facility or some wearable exoskeletal device that can be used in a home environment.

Electromechanical-assisted training devices – devices that can be used with or without body weight support in gait training, and are classified as either an end effector device (i.e., have patient's feet placed on foot plates and trajectories stimulate the stance and swing phases during gait training) or an exoskeleton device (i.e., patients are outfitted with programmable drives or passive elements, which move the hips and knees during gait phases). The Gait Trainer is the most studied end-effector device; the Lokomat and AutoAmbulator are the two most popular exoskeleton devices.

EMG biofeedback – refers to the use of surface and computerized electromyographic (EMG) biofeedback as an adjunct to conventional therapies. Enhanced contractions provide the proprioceptive feedback to the brain to enhance the recovery of motor skills. It can be provided passively, actively, or in an EMG-triggered manner. Electrodes can be surface applied or indwelling, the latter requiring the assistance of a professional who is able to surgically implant the electrodes.

Enriched environment approach – refers to a stroke rehabilitation environment with provisions of a computer with Internet, books, games, virtual reality gaming technology and encouragement from staff to promote motor and cognitive recovery.

Errorless learning techniques -refers to compensatory strategies that prevent participants from making errors during treatment by repeatedly providing a target response for an appropriate stimulus, thereby increasing their association. This prevents attempts at retrieving target responses from long-term memory.

Executive function – refers to self-regulating and control functions that direct and organize a person's behavior. This includes abstract reasoning, initiation and inhibition of behavior, planning, problem-solving and self-monitoring.

Extracorporeal shockwave therapy / Shockwave therapy – a non-invasive treatment modality that uses non-electrical high energy sound wave, which causes transient pressure disturbance to maximum pressure that propagates rapid increase in blood circulation in three-dimensional space (through the body via handheld probe). Cavitation and break down of fibrous scar tissue are some of the expected outcomes.

Extrinsic feedback therapy – refers to feedback provided from the environment. It can be both verbal and non-verbal.

Eye patching – refers to a technique in neglect rehabilitation wherein the eye ipsilateral to the lesion is covered, causing patients to look toward the contralateral space by either moving their eye or by movement of the head. This aims to encourage the development of voluntary, deliberate control of attention in the short term and the development of automatic shifts of attention over the longer term.

Feedback-based training – refers to a method to help improve balance and mobility-related activities. This provides individuals with additional sensory information through the use of visual cues or auditory means to improve motor performance. The type of feedback provided includes but is not limited to auditory stimulation, action observation, and biofeedback methods.

Feedback strategies -refers to techniques used to address neglect by improving awareness of and attention to the neglected space. Typical methods of feedback include auditory and visual techniques to make the patient aware of his/her neglect behaviors.

Fitness to drive – refers to conditions which may make the patient deemed fit to drive with regards to vision, cardiovascular status, diabetes, neurological status, age and drug use.

Functional assessment – refers to a standardized or non-standardized method of evaluating a person's ability to perform basic self-care ADLs and IADLs as well as ability to interact socially.

Galvanic Vestibular Stimulation (GVS) – refers to a treatment method that is utilized to treat “pusher behavior”, a phenomenon during which patients push with their non-affected limbs towards their paretic side, even to the point of resisting physical corrections, causing a shift in the centre of gravity and thereby impairing postural balance. GVS provides anodal and cathodal currents behind each ear between the mastoid processes causing patients to sway towards the anodal side.

Gesture training – refers to a technique that involves training of both transitive (involving objects) and intransitive (symbolic and nonsymbolic) gestures to retrain the performance of daily activities or specific tasks.

Horse riding stimulation / Hippotherapy – refers to a rehabilitative method for lower limb stroke recovery based on the rhythmical and repetitive movement of the horse, which is similar to the movement pattern of the pelvis when a person is walking.

Hyperbaric Oxygen Therapy (HBOT) - refers to a procedure wherein the patient is placed inside a pressurized chamber and allowed to breathe in 100% oxygen.

High Voltage Pulsed Galvanic Stimulation (HVPGS) – application of high voltage, low-amperage direct current to affected regions.

Imagery/ Mental practice / Mental imagery – refers to the use of motor imagery, a covert cognitive process of imaging oneself performing the requested tasks, or imagining a movement of one's own body part without actually moving that body part. Imagery should be from the first person perspective rather than mentally watching someone else doing the task.

Instrumental Activities of Daily Living (IADL) – activities including meal preparation, home management, communication activities, financial management, shopping and community living skills.

Interferential Electrical Stimulation (IES) – electrical stimulation to muscle tissue to relieve pain.

Intermittent pneumatic compression – a therapeutic technique used in medical devices that include an air pump and inflatable auxiliary sleeves, gloves or boots in a system designed to improve venous circulation in the limbs of patients who suffer edema or the risk of deep vein thrombosis or pulmonary embolism.

Intrathecal – refers to a pharmacological delivery method wherein drug is administered into the subarachnoid space of the central nervous system through an implantable, programmable pump device.

Intrinsic feedback – the use of a person's own sensory-perceptual information to enhance their performance during a given task. It may take the form of touch, sound, pressure, and/or proprioception.

Leisure activities - time free from obligations, work (paid and unpaid), and tasks required for existing (sleeping, eating). Leisure time is residual time; constructive use of free time.

Levodopa – a dopamine precursor which, once it crosses the blood-brain barrier, is metabolized to dopamine and converted to norepinephrine. Levodopa is used to increase dopamine levels.

Light therapy/Phototherapy - exposure to light that is brighter than indoor light but not as bright as direct sunlight.

Limb activation – refers to a rehabilitation technique based on the idea that any movement of the contralesional side may function as a motor stimulus activating the right hemisphere and improving neglect.

Limb apraxia – impairment of the affected limb in the planning and sequencing of movement that is not due to weakness, incoordination or sensory loss.

Massage therapy – refers to a type of massage that is used for physical or psychological benefits. Massage is the practice of applying structured pressure, tension, motion or vibration, manually or with mechanical aids, to the soft tissues of the body, including muscles, connective tissue, tendons, ligaments, joints and lymphatic vessels.

Meridian acupressure - a form of treatment whereby finger pressure is applied to meridian points on the body. Meridians are either yin or yang, depending on the direction they flow on the body's surface and can theoretically increase blood flow (qi) thus improving function. Yang meridians of the foot flow from the head to the lower limbs whereas yin meridians of the foot flow from the lower limbs to the chest.

Methylphenidate – an adrenergic agent that increases endogenous norepinephrine and dopamine by blocking catecholamine uptake, thereby affecting noradrenergic and dopaminergic modulation.

Mirror therapy – refers to a technique wherein the patient watches the reflection of their non-paretic upper extremity in a mirror. The patient is asked to perform a bilateral task, which is performed well with the non-paretic limb. The mirror provides visual feedback and encourages the patient to match the movement of the non-paretic limb with the paretic limb.

Motivational interviewing - a psychotherapeutic approach that attempts to move an individual away from a state of indecision or uncertainty and towards finding motivation to making positive decisions and accomplishing established goals. It is a directive, client-centered counseling style for eliciting behavior change by helping clients to explore and resolve ambivalence.

Motor cortex stimulation - an emerging treatment option for neuromodulation, which uses electrodes placed on specific surfaces of the brain. This includes transcranial magnetic stimulation (TMS), theta burst stimulation (TBS), transcranial direct current stimulation (TDCS).

Motor Imagery (MI) or Mental Practice (MP) – involves rehearsing a specific task or series of tasks mentally as a means to enhance performance following stroke.

Muscle strengthening – an intervention designed to improve the force-generation capacity of hemiplegic limbs post stroke and enhancing functional abilities.

Music therapy - a rehabilitation technique based on engagement in musical activities, which involves listening to music, singing, playing musical instruments, or composing music.

Neck muscle vibration therapy - a non-invasive technique that applies somatosensory stimulation to the left posterior neck muscles in the form of vibration. This creates a kinesthetic illusion that facilitates or promotes lengthening of the left neck muscles which can translate into improvement of the detection and identification of stimuli in the left visual field in patients with neglect.

Nerve block treatment – injection of alcohol or phenol into a specific nerve.

Neurodevelopmental Technique (NDT) – a neurologic treatment concept aimed to facilitate motor recovery of the paretic upper extremity without promoting compensatory movement. It emphasizes the normal components of the upper extremity movements and provides task-specific practice related to activities of daily living, instrumental activities of daily living and work. It can also be used in the rehabilitation of the lower extremity.

Neuropsychological evaluation - comprehensive assessment of cognitive and behavioral functions using a set of standardized tests and procedures. Various mental functions are systematically tested, which may include but are not limited to: Intelligence, problem solving and conceptualization.

On the road driving test – also known as driving test, road examinations, behind the wheel test. This is conducted by the land transportation office (LTO) and is essential in acquiring a driver's license.

Optokinetic stimulation – refers to the use of a visual stimulus moving linearly from right to left to induce nystagmus. This approach is also theorized to affect position sense or the representation of personal space.

Ozonated autohemotherapy – a nonconventional therapy for ischemic disorders or cerebral low perfusion syndromes, wherein ozone can rapidly combine with hemoglobin in the bloodstream to improve oxygen saturation, activate erythrocyte metabolism, and improve oxygen supply to brain tissue, resulting in improved blood circulation to the brain and improved brain cell activity.

Peripheral Magnetic Stimulation (PMS) / Repetitive Peripheral Magnetic Stimulation (rPMS) – a form of non-invasive therapy that generates painless stimulation of deep muscle structures through repetitive contraction-relaxation cycles said to enhance proprioceptive input from the affected extremity.

Piracetam - a γ -aminobutyrate derivative which has been marketed as a "nootropic" agent (a drug that exerts an effect on metabolic activity in the human brain) and has recently been used in the treatment of ischemic stroke. It is considered to be a neuroprotective drug which has the potential to improve cognition and motor recovery post stroke.

Post-stroke emotional incontinence – refers to a person's increase in tearfulness with episodes of crying that are sudden or unheralded and not under normal social control.

Prism adaptation - a technique for the treatment of neglect that utilizes prisms attached or cemented to modified eyeglass lenses to increase a patient's field of view. This affects spatial representation by causing an optical deviation of the visual field to either the left or the right. When gaze is shifted in the direction of the non-seeing hemi-field, the prismatic effect gives a more peripheral view to the side that would not be possible without a larger magnitude of eye movement.

Repetitive task training – the use of low-cost, non-robotic device to enable repetitive practice in those with severe paresis with the goal of achieving significant improvement in arm function and reduction of trunk compensations after training. It facilitates active motor sequence that should be performed repetitively within a single training session.

Repetitive Transcranial Magnetic Stimulation (rTMS) is a non-invasive procedure that uses a rapidly fluctuating magnetic field to create electrical currents in discrete areas of the brain. Theta burst stimulation, a pattern of transcranial magnetic stimulation delivered in three bursts of pulses, is a relatively new treatment that has also been shown to produce an effect on the affected cortex.

Ropinirole – a non-ergoline dopamine agonist, which mimics the effect of natural dopamine in the body and produces dopamine-like effects. Dopaminergic agonists cross the blood-brain barrier and have central effects of neurological and endocrine types.

Rhythmic auditory stimulation – a form of gait therapy that involves the sensory cuing of motor systems. The rhythmic auditory stimulus provides a time reference for motor gait response. The gait response and the auditory stimulus develop into a stable temporal relationship.

Segmental Neuromyopathy (SNMT) – aims to diagnose the precise segment involved with the use of therapy, injection of local anesthetics, application of heat & electrical stimulation.

Selective Serotonin-Reuptake Inhibitors (SSRI) – medications that selectively block serotonin reuptake rather than block both serotonin and norepinephrine reuptake. These medications are most commonly used to treat depression following stroke, however, a small number of studies examined their potential benefit for improving motor function. Examples include Citalopram and Fluoxetine.

Self-management program – activities involving self-monitoring and modification of one's behavior. Self-management requires individuals to identify and solve problems, do internal motivation, and reflect on past experiences with the direction of others.

Simulator-based driving training – refers to a training technique that combines specific simulator scenarios with actual car driving. May be computer based or with a moving base.

Somatosensory retraining / Sensorimotor training – a treatment approach that emphasizes postural control and proprioception. A set of progressive proprioceptive exercise program, divided into static, dynamic and functional phases, is primed to restore the normal muscle firing patterns and reflexive stabilization of post-stroke patients.

Spasticity – velocity-dependent resistance to stretch of a muscle, with exaggerated tendon jerks; Component of the upper motor neuron syndrome.

Splinting – the use of an orthosis or formed supports for providing protection, rest, range of motion, or alignment for the fingers, wrist and hand.

Surface Neuromuscular Electrical Stimulation (NMES) – electrical stimulation of lower motor neuron to cause muscle contraction

Task oriented training / Task-specific training – involves practicing real-life tasks, with the intention of acquiring or reacquiring a skill. The tasks should be challenging and progressively adapted and should involve active participation.

Tele-health - a collection of means or methods for enhancing health care, public health, and health education delivery and support using telecommunications technologies. Telehealth encompasses a broad variety of technologies and tactics to deliver virtual medical, health, and education services.

Telerehabilitation – refers to an accepted alternative to face-to-face communication assessment for people with communication impairment, which requires adequate technology that can overcome barriers of access to speech and language therapy services.

Transcranial Direct Current Stimulation (tDCS) - an intervention wherein a weak, non-invasive electrical current is administered over a desired area of the scalp/head corresponding to a specific area of the brain to induce changes in cortical excitability. The polarity of the current flow determines whether excitability is increased (anodal tDCS) or decreased (cathodal tDCS). tDCS manipulates the ion balance inside and outside the resting neural membrane through polarizing and depolarizing the brain tissue

Transcranial Magnetic Stimulation (TMS) – a method in which a changing magnetic field is used to cause electric current to flow in a small region of the brain via electromagnetic induction. Stimulation may be in a single pulse, paired pulses or as repetitive trains of stimulation. Repetitive TMS (rTMS) produces effects which last longer than the period of stimulation.

Transcutaneous Electrical Stimulation (TENS) – electrical stimulation of sensory nerves by applying electrodes to the overlying skin.

Theta Burst stimulation (TBS) - a novel form of rTMS that provides a low-intensity output that can incite or reduce cortical excitability. TBS can be used to rebalance hemispheric activity.

Trunk rotation - a technique that turns the trunk of the patient to the left such that both right and left stimuli are projected to the right side of the trunk to compensate for deficits in reaction times to stimuli in the left visual field. This relies on the idea that the orientation of the trunk midline in space functions as the dividing line between personal representation of left versus right space and acts as an anchor for the calculation of body position.

Unilateral spatial neglect or hemi-inattention - failure to attend to sensory or visual stimuli or to make movements toward one side of the environment, typically the left side, due to lesion in the right hemisphere. Unilateral spatial neglect has deleterious effects on all aspects of a person's activities of daily living and is a predictor of functional outcome.

Vascular Cognitive Impairment (VCI) – refers to cognitive and behavioral disorders associated with cerebrovascular disease and risk factors, from mild cognitive deficits to frank dementia. It is a syndrome with cognitive impairment affecting at least one cognitive domain (e.g., attention,

memory, language, perception or executive function) and with evidence of clinical stroke or subclinical vascular brain injury.

Vascular dementia – refers to the loss of cognitive function resulting from ischemic, hypoperfusive, or hemorrhagic brain lesions due to cerebrovascular disease or cardiovascular pathology and includes disorders that are in the original vascular dementia construct, such as post-stroke dementia and multi-infarct dementia.

Vestibular galvanic stimulation – a form of intervention that involves the delivery of a low level electrical current to the part of the scalp that overlies the vestibular nerves. This intervention is theorized to affect position sense or the representation of personal space.

Virtual reality - a computer based, interactive, multi-sensory environment that occurs in real time. It ranges from interaction with a computer screen from outside the environment, such as with simple computer games, to completely immersive environments where the person has a strong sense of being within the virtual environment. Individuals perform different activities within these computer environments that have many characteristics of real world activities.

Virtual reality training - refers to the use of interactive simulations created with computer hardware and software to present patients with opportunities to engage in environments that appear to be and feel similar to real world objects and events.

Visual scanning, visuoperceptual or visuospatial training – refers to techniques that attempt to improve the deficits of visual attention associated with neglect individuals by increasing the patient's exposure to or awareness of the affected field of view. This may include tasks that encourage patients to visually scan their whole environment or repeatedly attempt to look at the affected side.

Voiding dysfunction - refers to bladder and urinary problems or abnormalities in the process of urination as a consequence of underlying nervous system pathology. It is considered as independent predictor of death, disability, and discharge to a long-term care facility.

Watchful waiting – refers to a period of time when the patient who 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 somewhere between 2 to 4 weeks. It is often described as including suggestions to the patient for self-help strategies and participation in exercise.

1. Introduction

1.1 THE NEED FOR A GUIDELINE

According to the Department of Health, vascular disease is the second highest cause of morbidity in the Philippines (Department of Health 2005). The prevalence of stroke in the Philippines has increased in recent years, affecting more people at younger ages, and causing a large burden on the Filipino health care system. Furthermore, due to the low socio-economic status of most Filipinos, it is important that stroke patients be able to return to work to support their families. If stroke patients are unable to continue their occupation, issues of family burden and independence in daily activities need to be addressed.

It was previously thought that the majority of functional recovery after a stroke is a result of spontaneous natural recovery from neurological impairment (Dobkin 1989; Lind 1982). However, studies have since shown that rehabilitation has an independent role in improving function beyond that explained by neurological recovery alone (Roth et al, 1998). Elements of a stroke rehabilitation program shown to contribute to a patient's functional recovery include: patient participation and motivation; early patient mobilization; intensity and timing of physiotherapy; and compliance with stroke rehabilitation guidelines. Functional recovery gained from a stroke rehabilitation program has likewise been shown to have both short-term and long-term effects. Although the cost of a stroke rehabilitation program in a stroke unit may initially seem to pose a significant economic burden, even in developed countries, studies have shown that participation in a rehabilitation program substantially reduces the length of a patient's stay in a stroke unit and is more effective in minimizing disability, thereby proving to be more cost-effective in the long term (Kalva et al, 2005; Van Exel et al, 2003). The application of evidence to guide clinical practice is a global challenge for almost all health professionals (Grol & Grimshaw, 2003) and even more so in developing countries such as the Philippines where scant resources and sometimes even out of date practices are still being delivered (Agarwal et al, 2008). In South East Asia, evidence-based healthcare practices are not well established, particularly in terms of understanding evidence-based practice (EBP), development of guidelines, or application of guidelines in making decisions regarding patient care (McDonald et al, 2010, Short et al, 2010). However, there have been some pioneering initiatives in this area by medical societies in the Philippines in recent years, such as the Philippine Rheumatological Association (Guidelines for gout, osteoarthritis and osteoporosis) and the Stroke society (Guidelines for stroke) (Li-Yu et al, 2011; Philippine Rheumatological Association, 2008a, 2008b; Stroke Society of the Philippines, 2010).

To practice in an evidence-based manner requires a clear understanding of EBP concepts, an ability to apply the concepts in practice, and a commitment to lifelong learning, all of which are still slowly in progress in the Philippines (Dizon et al, 2012). In educational institutions in the Philippines, obstacles to evidence-based learning is being addressed by practical solutions such as: conducting small group, problem-based learning activities; providing critical appraisal workshops for diagnosis and treatment; and increasing role

models of evidence-based medicine practitioners (Dans and Dans, 2005). In terms of adherence to evidence-based practice by clinicians in the country, present observations are inconsistent, especially regarding conformance to current Clinical Practice Guidelines (CPG). An example of this would be improved adherence to the CPG on the management of ischemic stroke in young (Espeleta et al, 2011), in contrast to poor adherence to the CPG on antimicrobial prophylaxis for elective surgical procedures (Matti et al, 2002). Nevertheless, it is refreshing to see the gradually growing attention and importance being given to obtaining relevant systematic reviews, and developing of evidence-based clinical practice guidelines in developing countries including the Philippines (Garner et al, 1998). Unfortunately, there still are currently many health practices in Asia and the Philippines that are not based on current best research evidence, which may be due to limited resources (financial and intellectual), low priority being given to health research initiatives and a lack of evidence-based training and skills for clinicians (Chinnock et al, 2005, Agarwal et al, 2008, Dizon et al, 2012, McDonald et al., 2010). With the increasing prevalence of stroke, it is crucial for patients to be provided with the best preventive and rehabilitative management. Therefore there is a need for locally applicable clinical guidelines to underpin evidence-based practice in the Philippines.

The Philippine Academy of Rehabilitation Medicine has developed clinical practice guidelines on stroke rehabilitation (2012), low back pain (2012, 2017 update), neck pain (2014), shoulder pain (2014) and hip osteoarthritis (2015), using the approach of contextualizing relevant Western guidelines rather than de novo synthesis (Gonzalez-Suarez et al., 2011). These guidelines are freely available on the PARM website (<https://parm.org.ph/clinicalguidelines.php>). The stroke rehabilitation and low back pain CPGs have since been the subject of nation-wide baseline audit and implementation activity (Gonzalez-Suarez et al, 2013; Gonzalez-Suarez et al, 2015), and have been endorsed by the International Society of Physical and Rehabilitation Medicine (ISPRM) which provided the members' recommendations for best practice in the field of rehabilitation medicine. The low back pain guideline has likewise been submitted to the Philippine Health Insurance Corporation (PHIC), and now serves as the basis for reimbursement of fees for the management of low back pain which includes rehabilitation consultation, physical therapy treatments, non-surgical interventions such as acupuncture and epidural steroid injections; and diagnostic procedures such as spine X-ray, magnetic resonance imaging and electromyography.

It is important for clinical practice guidelines to be regularly updated with current literature in order to remain relevant. In 2015, PARM developed a novel standard approach for updating CPGs, dovetailing with its writing guide which underpinned its foundational work in contextualizing its earlier released guidelines (Gambito et al, 2015). This system was developed based on the criteria reported by Johnston et al. (2003) and then modified to incorporate wording from the foundational PARM writing guide. This revised edition of the PARM CPG on stroke rehabilitation was developed using this updating process.

1.2 CLINICAL GUIDELINES SUPPORTING EVIDENCE-BASED PRACTICE

"Clinical practice guidelines are systematically developed statements to assist practitioners and patient decisions about appropriate health care for specific clinical circumstances (Field & Lohr, 1992)". The key components of a high-quality and trustworthy guideline include the following: a diverse and relevant guideline development group composition; a unanimous decision-making process; clearly-stated objectives and scope; explicitly-described methodology; use of high-quality systematic reviews for evidence analysis; statements of clear and evidence-based recommendations; the use of a rating system to link qualities of evidence to the strengths of recommendations; full disclosure of conflicts of interest, financial support and sponsoring organizations; external stakeholder review prior to publication; and declaration of an anticipated review date (Qaseem et al, 2012).

Over the last 20 years, well-credentialed guideline development groups have set international standards for guideline construction (e.g. Scottish Intercollegiate Guidelines Network (SIGN), New Zealand Guidelines Group (NZGG), National Health and Medical Research Council, Australia (NHMRC), UK NHS National Institute for Clinical Excellence (NICE)). These groups provide clinicians, policy-makers and clinicians with ready access to high-quality clinical guidelines on a range of topics. However, despite international investment in guideline development, there remains a lack of detail in how guidelines should be developed, the evidence reported, and recommendations worded (Turner et al, 2008). Moreover, there is inconsistent nomenclature for such documents, with terms such as guidelines, recommendations, care pathways and protocols having different meanings in different health care and cultural settings (Kumar et al, 2010).

The GLIA group (GuideLine Implementability Appraisal) (Shiffman et al, 2005) provides advice on wording guideline recommendations to reflect the strength of the underpinning evidence, and to encourage implementation of best-evidence into practice. The ADAPTE group (from Canada and Europe) provides a guideline adaptation process to layer existing evidence underpinning existing recommendations with new literature (ADAPTE Collaboration 2007). Critical appraisal tools such as AGREE (Appraisal of Guidelines Research and Evaluation) provide criteria to assess the independence of guideline developers, the clarity of guideline purpose, its scope and end-users, the transparency of clinical questions, and how the literature was searched, appraised, extracted and synthesized, how recommendations were worded, and guidelines revised (AGREE 2010).

There is no widely-accepted approach to presenting or reporting the strength of the body of evidence underpinning guideline recommendations. Approaches include providing summaries of the evidence, reporting the evidence hierarchy and/ or methodological quality, providing reference lists, or a considered judgment of the strength of the body of evidence using a ranking (letter or number). The GRADE group (Guyatt et al, 2010) and Australia's National Health and Medical Research Council (NHMRC) FORM approach (Hillier et al, 2011) provide suggestions as to how to assess the strength of the body of evidence for guideline recommendations.

1.2.1 GETTING GUIDELINES INTO PRACTICE

There is increasing research regarding the importance of guideline implementation, separate to the guideline-writing process. This research highlights that no matter how well a guideline is constructed, it will not implement itself. Planned approaches are required to embed recommendations into widespread and sustainable practice, and to evaluate the effectiveness of the guideline, in changing practice and improving health outcomes. There is also a growing body of research on adapting guidelines from Western countries for other Western countries. For instance, the ADAPTE Collaboration provides a framework on how to systematically adapt guidelines to specific cultural and organizational settings using three phases, nine modules and 24 steps (ADAPTE Collaboration 2007). However the ADAPTE framework has not been applied to resource-limited developing countries, with different healthcare systems, healthcare provider relationships and education, and patient need. It is for this reason that we propose our innovative, simple and practical approach to contextualize guidelines from developed countries, for use in the Philippines.

The production of these guidelines was based on the notion that 'contextualization' and 'adaptation' are not synonymous. Guideline writing involves semantics (ADAPTE Collaboration 2007, Kumar et al, 2010, Shiffman et al, 2005, Turner et al, 2008), where the best words are chosen to translate evidence into persuasive and adoptable clinical recommendations. The purpose behind our work was to ensure that existing high-quality recommendations could be readily adopted by Filipino healthcare providers by putting them into local contexts and demonstrating their relevance. Our contextualization process fills the gap between expected (evidence-based) practice and 'usual' Filipino practice, by providing PARM Endorsements and PARM Context Points that should assist Filipino healthcare providers to understand what is currently the best available evidence, and to do the best they can, with local resources in their local environment, to put evidence into practice. Thus there was no intent to adapt existing guideline recommendations by rewording, revising or updating the evidence, as this process would not have achieved our purpose. There was no local expertise or even the will to do this, and we had limited resources and time. There was a far more urgent need to embed existing evidence widely to educate healthcare providers about evidence-based guidelines, improve local practices and make the best of available resources. Thus our intention in contextualizing existing recommendations was to make it simple for Filipino healthcare providers who knew little about evidence-based practice, to provide the best possible healthcare, with minimum training and least impost.

1.3 CLINICAL CARE PATHWAY IN STROKE REHABILITATION

The PARM stroke rehabilitation guideline developers formulated this care pathway (Figure 1) to depict the relevant procedures and processes typically encountered by patients who had a stroke. This flowchart served as a guide in focused selection of pertinent recommendations synthesized and contextualized in this guideline.

1.3.1 INPATIENT

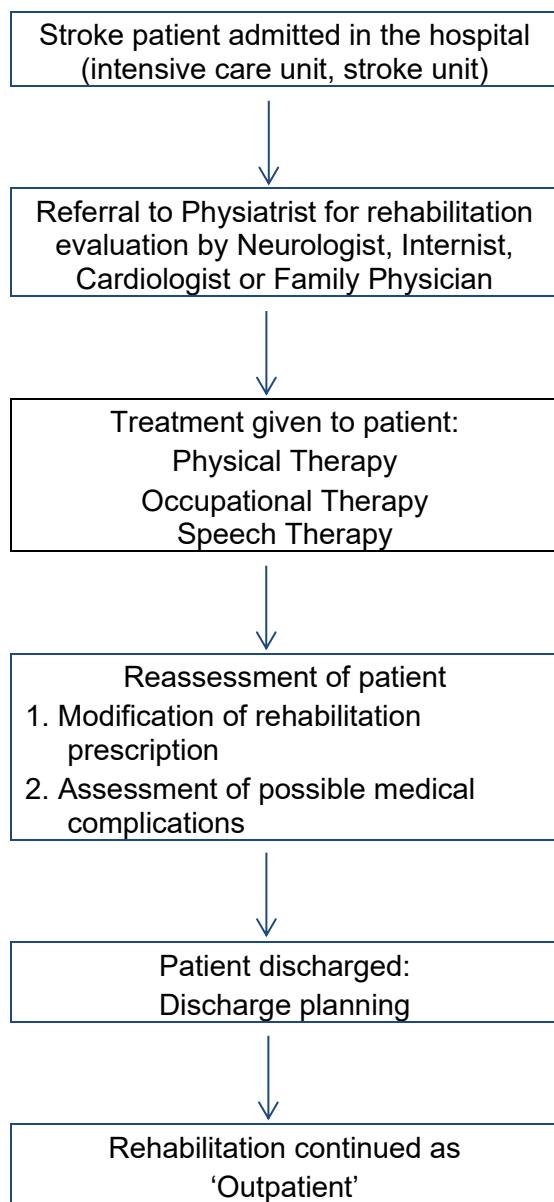


Figure 1. Care pathway of stroke patients after admission to hospital

1.3.2 OUTPATIENT

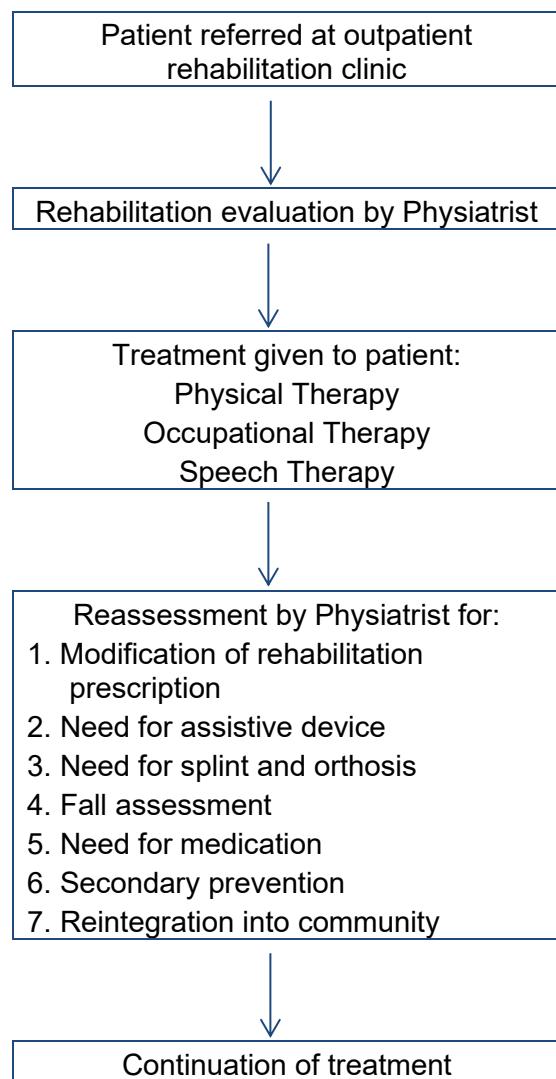


Figure 2. Care pathway of stroke patients discharged from hospital

2. Methodology

2.1 PURPOSE AND SCOPE

The team which prepared this document, comprised of Rehabilitation Medicine Specialists (Physiatrists), aimed to establish evidence-based guidelines to guide medical practitioners in clinical decision making and apprise them of current best standard of care in the rehabilitation of post-stroke patients.

This updated guideline encompasses recommendations for rehabilitation management in the inpatient and outpatient settings, community-based rehabilitation, management of post-stroke complications, and secondary prevention of stroke. The patient population are adults, whether male or female, requiring rehabilitative care after suffering a stroke.

The health questions addressed by this guideline include:

1. What does current best evidence recommend regarding the assessment and management of patients who are neurologically and medically stable to start rehabilitation in the in-patient setting?
2. What does current best evidence recommend in prescribing appropriate rehabilitation programs for post-stroke patients upon discharge?
3. What does current best evidence recommend in the assess of patient's needs for additional management programs or other treatment options in stroke rehabilitation?
4. What does current best evidence recommend in helping post-stroke patients avoid future neurologic events and other medical complications?
5. What does current best evidence recommend in assisting post-stroke patients recover as much as possible and to maximize functional outcome?

End users: Physiatrists handling patients with stroke of varying duration.

2.2 GUIDELINE SEARCH PROCESS

The following electronic databases were searched for existing international clinical practice guidelines (CPGs): PubMed, Google Scholar, National Institute for Health and Clinical Excellence (NICE), Scottish Intercollegiate Guidelines Network (SIGN), National Health and Medical Research Center (NHMRC), New Zealand Guidelines Group (NZGG), National Guidelines Clearinghouse (NGC). The following search words were used: clinical practice guidelines, practice guidelines, stroke rehabilitation, and rehabilitation.

Inclusion criteria for the selected CPGs were:

1. Documents available online and in full text;
2. Published in the English language; and
3. Publication date from 2012-2017;

Exclusion criteria were:

1. CPGs without explicit methodology described;
2. CPGs based on consensus process;
3. CPGs with recommendations not overtly linked to underlying evidence nor references;

2.3 CRITICAL APPRAISAL

Selected CPGs which met the inclusion criteria were methodologically assessed using the International Center for Allied Health Evidence (iCAHE) Guideline Appraisal Checklist. This tool is composed of 6 categories (with a total of 14 items) namely: availability (3 items), dates (3 items), underlying evidence (4 items), guideline developers (2 items), guideline purpose/users (1 item) and ease of use (1 item) (Table 1). CPGs with scores of 10 or higher were eligible for inclusion. Only guidelines which provided a summary of their own recommendations were included in this project.

Table 1. iCAHE critical appraisal tool for clinical guidelines

1. Availability
Is the guideline readily available in full text?
Does the guideline provide a complete reference list?
Does the guideline provide a summary of its recommendations?
2. Date
Is there a date of completion available?
Does the guideline provide an anticipated review date?
Does the guideline provide dates for when literature was included?
3. Underlying Evidence
Does the guideline provide an outline of the strategy they used to find underlying evidence?
Does the guideline use a hierarchy to rank the quality of the underlying evidence?
Does the guideline appraise the quality of the evidence which underpins its recommendations?
Does the guideline link the hierarchy and quality of underlying evidence to each recommendation?
4. Guideline Developers
Are the developers of the guideline clearly stated?
Does the qualifications and expertise of the guideline developer(s) link with the purpose of the guideline and its end users?
5. Guideline purpose and users
Are the purpose and target users of the guideline stated?
6. Ease of use
Is the guideline readable and easy to navigate?
TOTAL SCORE

2.4 EXTRATION OF RELEVANT DATA FOR CARE PATHWAY

The following data or recommendations were extracted from each guideline:

The following topics of stroke rehabilitation were extracted from the guidelines:

- a Inpatient rehabilitation process
- b Outpatient rehabilitation process
- c Dysphagia management
- d Mobility management
- e Management of sensory and motor impairment
 - i Visual field loss
 - ii Hemi-neglect
 - iii Motor strength
 - iv Spasticity
 - v Central post-stroke pain
- f Management of communication disorders
 - i Aphasia
 - ii Dyspraxia
 - iii Dysarthria
 - iv Cognitive/ communication deficits
- g Managing complications of stroke that is pertinent to rehabilitation medicine
 - i Nutrition and hydration
 - ii Contracture
 - iii Reflex sympathetic dystrophy
 - iv Bladder and bowel dysfunction
 - v Decubitus ulcer
 - vi Decrease in cardiovascular and muscular endurance
 - vii Deep venous thrombosis
 - viii Sexual dysfunction
 - ix Depression
- h Return to community and work
- i Prevention of recurrence of stroke
 - i Exercise
 - ii Cessation of smoking
 - iii Food
 - iv Obesity management
 - v Blood pressure management
 - vi Diabetes control
 - vii Lipid control
 - viii Use of anti-platelets and anti-coagulants
 - ix Use of oral contraception, hormone replacement therapy
 - x Management of patent foramen ovale, carotid stenosis, intracranial atherosclerosis and cardiac abnormalities

2.5 CONTEXTUALIZATION

PARM applied the fourth and fifth elements of the NHMRC FORM tool (Hillier et al, 2011) to assess the generalizability and applicability of the included recommendations to Filipino settings. There was no consideration of the first three FORM elements of evidence strength (evidence-base, consistency and clinical impact) for any included guideline, as to do so would have violated the PARM contextualization process. Moreover, the PARM group did not assign an evidence level (A-D) to the generalizability and applicability of any PARM endorsement, although this grading is the basis of the FORM guide for de novo guideline development (Hillier et al, 2011). Rather, PARM focused on discussion of generalizability and applicability of summarized recommendations, to determine whether the PARM Endorsement was sufficient to guide practice decisions, or whether PARM Context Points were also required to contextualize the endorsed recommendation(s) within the patient journey. Where there was confusion in interpreting recommendations to the Filipino patient journey, or where the included guideline recommendations were contradictory, the group went back to the original references for clarification. If required, the level of the PARM endorsement was debated and consensus achieved, with a final decision from the working group chair in the absence of consensus.

To assist in standardizing the guideline contextualization process, a PARM writing guide was established (see Box 1). This guide establishes a uniform framework for summarizing differently-worded recommendations and differently-reported strengths of the body of evidence for recommendations extracted from the included guidelines that were relevant to a particular situation in the Filipino patient journey. The guide is to be used in the event that there are:

- more than one relevant recommendation extracted from the relevant guidelines, which addresses a particular aspect of the Filipino patient journey, and/or
- different methods of reporting the underpinning strength of the body of evidence of the relevant recommendations from the included guidelines.

Box 1. PARM standard writing guide**Key:**

High quality evidence can be variously described in the included guidelines, as Levels I or II, A or B.

Moderate quality evidence can be variously described in the included guidelines as Levels II or III, B or C.

Low quality evidence can be variously described in the included guidelines as Levels III or IV, C or D.

Key:

The volume of literature underpinning the recommendations was classified as low volume (3 references or less), moderate volume (4-7 references) or high volume (8+ references). Where a recommendation in the included guidelines was supported only by Good Practice Points (expert opinion in the absence of evidence, or inconsistent evidence), these were noted in the summary table as GPPs, and not given a level of evidence

Each relevant recommendation from each included guideline was assessed using the following parameters: level of evidence, uniformity of thought, and volume, consistency and age of references. The level of evidence was rated as consistent or inconsistent based on the homogeneity of the evidence level assigned by the different clinical practice guidelines. Uniformity of thought was graded as uniform or variable based on similarity of the findings of the different clinical practice guidelines as to the effectiveness or ineffectiveness of a treatment modality and reliability of diagnostic procedure or physical examination. The volume of references was graded as low if the number of references was less than or equal to three, moderate if the number was between four and seven, and high if the volume was greater than eight. The age of the references was assessed as current if 50% of the papers cited were published later than 2012 and non-current if the majority of the papers were published prior to 2012.

All recommendations relevant to the patient journey were collated in a table for each element of the journey, along with the underpinning levels of evidence, and the guideline reference from which the recommendation had been extracted. Each included recommendation set was rated according to the Philippine Academy of Rehabilitation Medicine (PARM) guide for evidence rating, outlined in Table 2.

Table 2. PARM guide for summarizing the underpinning strength of the body of evidence of included recommendations

Recommendation	Strength of the body of evidence
1. There is strong evidence	Consistent grades of high quality evidence with uniform thought, and at least a moderate volume of references to support the recommendation(s)
2. There is evidence	A mix of moderate- and high quality evidence with uniform thought and at least a low volume of references, OR A mix of high and low quality evidence with uniform thought, and high volume of references, OR High level evidence coupled with GPPs, and at least moderate volume of references, OR One Level I paper with at least moderate volume references
3. There is some evidence	Single level II (A) paper OR Inconsistent grades of high and low evidence with uniform thought and moderate volume references, OR Consistent grades of low level evidence with uniform thought and at least a moderate volume of references
4. There is conflicting evidence	A mix of levels of evidence with non-uniform thought, irrespective of the volume of references with or without GPPs
5. There is insufficient evidence	Low or inconsistent levels of evidence with low volume references with or without GPPs, OR Single paper with low level evidence
6. There is no evidence	Absence of evidence for any aspect of the patient journey

2.6 PARM ENDORSEMENTS

PARM determined uniform wording with which to endorse recommendations based on the level of evidence (outlined in Table 3). These descriptions ranged from clear statements about efficacy for those with strong evidence (PARM strongly endorses) to those with conflicting evidence of efficacy (PARM suggests).

Table 3. PARM guide for writing recommendations

Recommendation statement	Description
1. PARM strongly endorses	When there is strong evidence as determined by the criteria in the table above
2. PARM endorses	When there is evidence as determined by the criteria in the table above
3. PARM recommends	When there is some evidence as determined by the criteria in the table above
4. PARM suggests	When there is insufficient or conflicting evidence as determined by the criteria in the table above
5. PARM does not endorse	There is no evidence as determined by the criteria in the table above

2.7 UPDATING PROCESS

The basis for PARM updating used the four levels proposed by Johnston and his colleagues (Johnston et al, 2003). The specifications of the PARM writing guide for strength of evidence base, uniformity of thought and volume of references were amalgamated with the Johnston et al guideline updating approach (Table 4 and Figure 3).

Table 4. PARM guide for updating recommendations

LEVEL	DESCRIPTION
Level 1	The new evidence is consistent with the data used to inform the original practice guideline report. The recommendations in the original report remain unchanged
Level 2	The new evidence is consistent with the data used to inform the original practice guideline report. The strength of the recommendations in the original report has been modified to reflect this additional evidence
Level 3	The new evidence is inconsistent with the data used to inform the original practice guideline report. However, the strength of the new evidence does not alter the conclusions of the original document. Recommendations in the original report remain unchanged
Level 4	The new evidence is inconsistent with the data used to inform the original practice guideline report. The strength of the new evidence will alter the conclusions of the original document. Recommendations in the original report will change

Figure 3. PARM writing guide in revising recommendations

		CONSISTENT THOUGHT	CHANGED THOUGHT	
LEVEL OF EVIDENCE OF HIGHEST HIERARCHY	SAME LEVEL OF EVIDENCE	LEVEL 1	Consistent thought + Same level of new evidence ACTION: No change to PARM Recommendation statement	Changed thought + Same level of new evidence ACTION: PARM recommendation remains the same but NEW thought is important and should be introduced LEVEL 3
	CHANGED LEVEL OF EVIDENCE	LEVEL 1	Consistent thought + Lower level of new evidence ACTION: No change to PARM Recommendation statement	Changed thought + Lower level of evidence ACTION: PARM recommendation remains the same but NEW thought is important and should be introduced LEVEL 3
		LEVEL 2	Consistent thought + Higher level of evidence ACTION: Upgrade PARM Recommendation wordings regarding strength but not the thought	Changed thought + Higher level of evidence Change PARM recommendation statement LEVEL 4

2.8 PARM CONTEXT POINTS

As was done in the previously-released guidelines, each set of recommendations along the patient journey, for which PARM wrote an endorsement statement, was then considered in terms of generalizability and applicability to the Filipino healthcare setting. Generalizability and applicability were addressed using the standard framework developed in writing the PARM Context Points. This framework outlined the elements that needed to be in place for minimum best-practice care to be provided equitably across the Philippines. Elements which addressed more advanced standard care were also considered. This aimed to provide guidance to clinicians wherever they may practice in the Philippines, regarding essential equipment, standards and resources, training and workforce, in order to provide evidence-based care.

The PARM Context Points considered aspects of the Donabedian (1988) quality framework (Structure, Process) in order to define the important elements of service delivery underpinning evidence-based care. This assisted PARM to take into account issues such as training of healthcare providers to comply with recommendations, availability of, and access to, trained

healthcare providers across the Philippines, access to appropriate diagnostic and assessment processes, availability of resources and what to do when resources are unavailable, and alternative diagnostic or management approaches which could be adopted in the absence of capacity to provide guideline-recommended healthcare. This process of contextualizing recommendations to local conditions addressed the fourth pillar of evidence-based practice as discussed by Hoffmann et al (2010, Figure 1.1, p.4) (the other pillars being the research evidence, clinician reasoning and patient choice).

2.9 GUIDELINES

A total of ten guidelines were identified in the internet search which met the inclusion criteria. These were fitted to the patient journey, and were considered as potentially useful.

After critical appraisal, the ten CPGs were initially deemed fit for inclusion in this project. These guidelines are the following:

1. Winstein CJ, et al.; on behalf of the American Heart Association Stroke Council, Council on Cardiovascular and Stroke Nursing, Council on Clinical Cardiology, and Council on Quality of Care and Outcomes Research. Guidelines for adult stroke rehabilitation and recovery: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2016;47 [AHA-ASA 2016]
2. Dawson AS, Knox J, McClure A, Foley N, and Teasell R, on behalf of the Stroke Rehabilitation Writing Group. *Chapter 5: Stroke Rehabilitation*. In Lindsay MP, Gubitz G, Bayley M, and Phillips S (Editors) on behalf of the Canadian Stroke Best Practices and Standards Advisory Committee. *Canadian Best Practice Recommendations for Stroke Care*: 2013; Ottawa, Ontario Canada: Heart and Stroke Foundation and the Canadian Stroke Network. [CANADIAN 2013]. With links and reference to Evidence-based Review of Stroke Rehabilitation (EBSR), www.ebsr.com.
3. National Clinical Guideline Centre Stroke Rehabilitation: Long Term Rehabilitation after Stroke. Clinical Guideline 162. Methods, Evidence and Recommendations. May 2013. Commissioned by the National Institute for Health and Care Excellence. [NCGC NICE 2013] (excluded due to difficulty navigating the guideline)
4. Intercollegiate Stroke Working Party. *National clinical guideline for stroke*, 4th edition. London: Royal College of Physicians, 2012. (excluded due to absence of hierarchy of recommendations)
5. Intercollegiate Stroke Working Party. National clinical guideline for stroke, 5th edition. 2015. Royal College of Physicians. (excluded due to absence of hierarchy of recommendations)
6. Jauch EC, et al.; on behalf of the American Heart Association Stroke Council, Council on Cardiovascular Nursing, Council on Peripheral Vascular Disease, and Council on Clinical Cardiology. Guidelines for the early management of patients with acute

ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2013;44:870–947. [AHA-ASA Ischemic 2013]

7. Best Practice Guidelines for the Management and Rehabilitation of Stroke in the Northwest Region of Cameroon. Bamenda Coordinating Centre for Studies in Disability and Rehabilitation, North West Region, Cameroon and International Centre for Disability and Rehabilitation, University of Toronto, Canada. April 2013. [CAMEROON 2013]
8. Post Stroke Community Based Exercise Guidelines (2015). Ontario Stroke Network Post Stroke Community Based Exercise Guidelines Working Group. (low ICAHE appraisal score)
9. New Zealand West Coast District Health Board Stroke Guidelines. 2015. (low ICAHE appraisal score)
10. Kernan WN, et al.; on behalf of the American Heart Association Stroke Council, Council on Cardiovascular and Stroke Nursing, Council on Clinical Cardiology, and Council on Peripheral Vascular Disease. Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2014 [AHA-ASA Stroke and TIA 2014]

2.9.1 GUIDELINE RESULTS

The ten included clinical practice guidelines were critically appraised using the iCAHE tool. The iCAHE scores of the guidelines, shown in Table 5, qualified them for use as reference guidelines in our project. Appendix 1 shows the full methodology of scores for each included CPG.

Table 5. iCAHE scores of the included clinical practice guidelines and the assigned tags used in the PARM stroke rehabilitation guideline

CPG	YEAR	ICAHE SCORE	TAG
Guidelines for adult stroke rehabilitation and recovery: a guideline for healthcare professionals from the American Heart Association/American Stroke Association	2016	12	AHA-ASA 2016
<i>Canadian Best Practice Recommendations for Stroke Care: 2013</i>	2013	14	CANADIAN 2013
National Clinical Guideline Centre Stroke Rehabilitation: Long Term Rehabilitation after Stroke. Clinical Guideline 162. Methods, Evidence and Recommendations. Commissioned by the National Institute for Health and Care Excellence.	2013	13	NCGC NICE 2013

Intercollegiate Stroke Working Party. <i>National clinical guideline for stroke</i> , 4th edition. London: Royal College of Physicians, 2012. (excluded due to absence of hierarchy of recommendations)	2012	13	*excluded due to absence of hierarchy of recommendation
Intercollegiate Stroke Working Party. National clinical guideline for stroke, 5 th edition. 2015. Royal College of Physicians. (excluded due to absence of hierarchy of recommendations)	2015	13	*excluded due to absence of hierarchy of recommendation
Guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association	2013	12	AHA-ASA 2013
Best Practice Guidelines for the Management and Rehabilitation of Stroke in the Northwest Region of Cameroon	2013	12	CAMEROON 2013
Post Stroke Community Based Exercise Guidelines (2015). Ontario Stroke Network Post Stroke Community Based Exercise Guidelines Working Group. (low ICAHE appraisal score)	2015	9	*excluded due to low ICAHE appraisal score
New Zealand West Coast District Health Board Stroke Guidelines. 2015. (low ICAHE appraisal score)	2015	9	*excluded due to low ICAHE appraisal score
Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association	2014	14	AHA-ASA 2014

2.9.2 GUIDELINE CLASSIFICATION OF EVIDENCE STRENGTH

The tables below (Tables 6 to 10 inclusive) provide an outline of the levels of evidence and recommendation grades used by each of the clinical practice guidelines included.

Table 6. Definition of classes and levels of evidence used in AHA/ASA recommendations

Class of Evidence	
Class I	Conditions for which there is evidence for and/or general agreement that the procedure or treatment is useful and effective
Class II	Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment
Class IIa	The weight of evidence or opinion is in favor of the procedure or treatment
Class IIb	Usefulness/efficacy is less well established by evidence or opinion
Class III	Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases may be harmful
Therapeutic Recommendations	
Level A	Data derived from multiple randomized clinical trials or meta-analyses
Level B	Data derived from a single randomized trial or nonrandomized studies
Level C	Consensus opinion of experts, case studies, or standard of care

Diagnostic Recommendations	
Level A	Data derived from multiple prospective cohort studies using a reference standard applied by a masked evaluator
Level B	Data derived from a single grade A study or 1 or more case-control studies, or studies using a reference standard applied by an unmasked evaluator
Level C	Consensus opinion of experts

Table 7. CANADIAN 2013 summary of criteria for levels of evidence reported in the Canadian Best Practice Recommendations for Stroke Care (adapted from Guyatt et al, 2008)

Level of Evidence	Criteria
A	Evidence from a meta-analysis of randomized controlled trials or consistent findings from two or more randomized controlled trials. Desirable effects clearly outweigh undesirable effects or vice versa.
B	Evidence from a single randomized controlled trial or consistent findings from two or more well-designed non-randomized and/or non-controlled trials, and large observational studies. Meta-analysis of non-randomized and/or observational studies. Desirable effects outweigh or are closely balanced with undesirable effects or vice versa.
C	Writing group consensus on topics supported by limited research evidence. Desirable effects outweigh or are closely balanced with undesirable effects or vice versa, as determined by writing group consensus.
Clinical Consideration	Reasonable practical advice provided by consensus of the writing group on specific clinical issues that are common and/or controversial and lack research evidence to guide practice.

Table 8. EBRSSR guideline classification of evidence strength (Modified Sackett Scale Version 4.0)

Level	Research Design	Description
1a	Randomized Controlled Trial (RCT)	More than 1 Higher RCT: Randomized Controlled Trial, PEDro score ≥ 6 . Includes within subjects comparison with randomized conditions and cross-over designs.
1b	RCT	1 Higher Randomized Controlled Trial, PEDro score ≥ 6 .
2	RCT	Lower RCT, PEDro score ≤ 6
	Prospective Controlled Trial (PCT)	Prospective Controlled Trial (not randomized)
	Cohort	Prospective Longitudinal study using at least 2 similar groups with one exposed to a particular condition.
3	Case Control	A retrospective study comparing conditions, including historical cohorts.
4	Pre-Post	A prospective trial with a baseline measure, intervention, and a post-test using a single group of subjects.
	Post-test	A prospective post-test with two or more groups (intervention followed by post-test and

		no re-test or baseline measurement) using a single group of subjects.
	Case Series	A retrospective study usually collecting variables from a chart review.
5	Observational	Study using cross-sectional analysis to interpret relations.
	Clinical Consensus	Expert opinion without explicit critical appraisal, or based on physiology, biomechanics or “first principles.”
	Case Report	Pre-post or case series involving one subject.

Table 9. CAMEROON guideline classification of evidence strength

Level of Evidence	Type of Evidence
A	Strong recommendation. Evidence from randomized controlled trials or meta-analyses of randomized controlled trials. Desirable effects clearly outweigh undesirable effects, or vice versa.
B	Single randomized controlled trial or well-designed observational study with strong evidence; or well-designed cohort or case control analytic study; or multiple time series or dramatic results of uncontrolled experiment.
C	At least one well-designed, non-experimental descriptive study (e.g., comparative studies, correlation studies, case studies) or expert committee reports, opinions and/or experience of respected authorities, including consensus from development and/or reviewer groups.
D	Expert opinion, formal consensus

Table 10. Summary of low and high evidence ratings for each of the included clinical guideline practices

Guideline	Low evidence	High evidence
AHA-ASA 2013, 2014, 2016	Class III; Level C	Class I, II; Level A, B
CANADIAN 2013	C, Clinical Considerations	A,B
EBRSR 2016	3,4,5	1a, 1b, 2
CAMEROON 2013	C,D	A,B

2.10 FILLING THE GAPS

During the discussions among the developers, several deficiencies were observed, which may be obstacles in the proper implementation of the guidelines. In the stroke CPG, one of the recommendations is that rehabilitation using proper exercises is sufficient for the treatment of stroke patients. The health care delivery system in the Philippines is usually centered in the major cities. Rehabilitation centers in the cities generally have more facilities and personnel in secondary and tertiary hospitals than centers in many of the provinces in the Philippines, where there is a shortage of occupational and speech therapists. One way to overcome this deficiency is to initiate a training program, to teach nurses and physical therapists in the provinces the basic skills to cope with upper extremity rehabilitation.

Likewise, one of the treatment armamentarium in PARM should strongly advocate involvement in physical activity as a secondary prevention in stroke. The developers strongly suggest that one of the advocacies of PARM should be increased involvement of Filipinos, children and adults alike, in daily physical activity. Among PARM members, the knowledge on evidence based practice (EBP) is nominal. PARM members must be better equipped with the principles of EBP for successful implementation of the CPGs. It is suggested that PARM members should be given full training on the concepts and application of EBP.

2.11 PUBLIC CONSULTATION

Public consultation of the draft document was undertaken from July to November 2019.

The manuscript was disseminated electronically to members of the Philippine Academy of Rehabilitation Medicine for evaluation and review. Different training institutions of rehabilitation medicine, namely Philippine General Hospital (PGH), Philippine Orthopedic Center (POC), University of Santo Tomas Hospital (USTH), and Veterans Memorial Medical Center (VMMC), St. Luke's Medical Center (SLMC), were made aware of the said document, in order to facilitate ease of internal consultation. Feedback was made through an online survey platform (SurveyMonkey). Responses were collated and recorded.

Copies of the manuscript and a feedback form were likewise circulated to different professional organizations such as the Philippine Medical Association (PMA), Philippine College of Physicians (PCP), Philippine Neurological Association (PNA), Philippine Academy of Family Physicians (PAFP), Philippine Physical Therapy Association (PPTA), Philippine Academy of Occupational Therapists (PAOT), and Philippine Association of Speech Pathologists (PASP). The above organizations were given the opportunity to comment on the PARM CPG, and issues to do with uptake and application. Among these organizations, only PASP replied with its comments and suggestions. Its inputs were incorporated in some recommendations featured on chapters 9 and 10 (Sections on Aphasia and Dysphagia, respectively)

While this guideline has undergone extensive internal and external peer review, it was not able to incorporate the views and preferences of post-stroke patients, as their direct involvement was not facilitated in this CPG development. Patient involvement will therefore be highly considered in future revisions and editions of this guideline.

2.12 IMPLEMENTATION PLANS

Following public consultation, modification and finalization of the clinical practice guidelines, the guidelines will be disseminated to personnel who are involved in the rehabilitation of patients with stroke. Strategies were identified by PARM CPG developers in order for the guidelines to be implemented effectively at the local level.

Strategies for the dissemination of the revised stroke rehabilitation guideline in the Philippine medical system are the following:

1. Endorsement by:

- The Department of Health (DOH), Philippine Council for Health Research and Development (PCHRD), and Philippine Health Insurance Corporation (PHIC)
- Relevant professional associations: Philippine Medical Association (PMA), Philippine College of Physicians (PCP), Philippine Neurological Association (PNA), Philippine Academy of Family Physicians (PAFP), Philippine Physical Therapy Association (PPTA), Philippine Academy of Occupational Therapists (PAOT), and Philippine Association of Speech Pathologists (PASP)
- Key training institutions: UP - Philippine General Hospital, Philippine Orthopedic Center, University of Santo Tomas Hospital, Veterans Memorial Medical Center, St. Luke's Medical Center, and Ospital ng Makati.
- Drug companies (if relevant)

2. A clear outlined description of the process undertaken by PARM should be provided, using posters, webpages and short interviews

3. Public awareness: Media release prepared by PARM and newspaper articles

4. Professional awareness

- Conference presentations: PARM Midyear Convention in August 2019 and a future Philippine Medical Association (PMA) Convention
- Short articles in professional newsletters and magazines
- Freely-accessible website providing details on the CPG and on Evidence-Based Practice (EBP) in general, which can be accessed by health professionals and target end-users.
- Short forms of the guideline developed, for dissemination to all physiatrists and relevant allied health professionals (laminated form for desktop use, or as wall charts, etc.) and consumer guides

5. Professional champions: Key professional people from PARM to promote the guidelines widely

6. Education: Education sessions provided widely in PARM and for other health provider groups on Evidence Based Practice (EBP), guideline development (in general), measurement of health outcomes and the future of EBP in the Philippines, not only to support this guideline, but other future guideline developments.

Guideline implementation and adherence will be assessed periodically (every 2 years) using an assessment checklist (Appendix 2) disseminated to end-users. Responses will be collated and recorded, and will be considered in future revisions of this CPG.

Specific plans (facilitators) for implementation of PARM CPG recommendations are also outlined in Gonzalez-Suarez et al, 2013 (“Implementation of Recommendations from the PARM stroke In-patient Rehabilitation Guideline: A Plan of Action”):

- **Physiatrists:**

Handouts or pamphlets on the key recommendations of the guidelines should be provided to every member of PARM and all the training institutions.

Regular education sessions on evidence based practice (EBP) and outcome measures and updates on guidelines.

Progress reports on guideline roll out.

- Coordination with other Medical Specialists and Patient care units (e.g. stroke units)

Promotion of rehabilitation medicine services:

- Education on rehabilitation should be provided at training institutions;
- Agreement with administrative heads of clinical departments (internal medicine, cardiology, neurology) should be obtained regarding the importance of guideline-driven acute stroke care, and rehabilitation;
- Education on early intervention rehabilitation.

Emphasizing indications and contraindications for stroke rehabilitation interventions, comorbidities management such as dysphagia, pressure sore, bladder incontinence, deep venous thrombosis through the use of integrated process flowchart (Appendix 6), pressure sore assessment, dysphagia assessment tool (Appendix 8-9), and others.

- Physical, occupational and speech therapists

Small-group discussions regarding the guidelines ensuring that therapists were actively involved

Educational training, Mini case presentations, Involvement in actual protocols or demonstrations

Quick guides (posters, forms, summaries)

Identifying senior staff who may be resistant to innovative changes and engaging them in local activities, and assigning opinion leaders

- Nurses

Training provided on proper bed mobility techniques and transfers

Provision of educational training guides

- Patients

Targeted patient education (importance of rehabilitation, adherence to exercises)

Quick guides (posters, forms, summaries)

Demonstration of exercises/activities with return demonstration from the patient and relative

Visual aids or handouts on exercises

Lectures focusing on the benefits of post-stroke rehabilitation

Potential barriers to implementation include time constraints, availability of trained personnel and workforce, financial limitations, availability of rehabilitation units and relevant stroke-care units.

2.13 GUIDELINE DEVELOPMENT TIMELINE:

March 2017 to June 2019 (Guideline Development Phase)

July to September 2019 (Guideline Internal Consultation Phase)

September to November 2019 (Guideline External Consultation Phase)

December 2019 (Official Release of Guideline)

2.14 EXPECTED DATE OF REVISION:

A revised edition of this CPG is expected to be composed on 2022 (five years from the development phase of this current guideline), using the PARM novel approach for updating CPGs developed and published in 2015 (Gambito et al, 2015), which was also the methodological tool used in this present CPG revision.

2.15 GUIDELINE DEVELOPERS

The PARM working committee on this guideline is composed of the following members:

	Member	Affiliation	Location
Project Leader	Marcelle Theresa G. Zamora-Pregonero, MD	Capitol Medical Center	Quezon City
Members	Mary Monica N. Bernardo-Bueno, MD	East Avenue Medical Center	Quezon City
	Ma. Lorraine Buenavente, MD	University of Santo Tomas Hospital	Manila
	Jan Tyrone Cabrera, MD	University of Santo Tomas Faculty of Medicine and Surgery	Manila
	Myrna S. Estrada, MD	De La Salle Medical and Health Sciences Institute College of Medicine and University Medical Center	Dasmariñas City, Cavite

	Daniel Dennison SL. Feliciano, MD	University of Santo Tomas Hospital	Manila
	Lauren Anne Liao, MD	San Juan De Dios Hospital	Pasay City
	Jan Michael C. Lleva, MD	University of Santo Tomas Hospital	Manila
	Andrea Kristina G. Malvar, MD	University of Santo Tomas Hospital	Manila
	Jeffrey B. Montes, MD	JBM Physical Medicine and Rehabilitation Centre	Malolos City, Bulacan
	Maria Teresa I. Oquiñena, MD	Capitol Medical Center	Quezon City
	Ma. Victoria Tangco, MD	Ateneo School of Medicine and Public Health	Quezon City
Advisers	Consuelo G. Suarez, MD ¹	University of Santo Tomas Hospital	Manila
	Karen Grimmer, PhD ²	International Center for Allied Health Evidence (ICAHE), University of South Australia	Adelaide, South Australia
	Carolina M. Valdecañas, MD ³	St. Luke's Medical Center	Quezon City
	Ephraim DV. Gambito, MD ⁴	St. Luke's Medical Center	Quezon City

The panel leader, assistant leader, members, and advisers (1, 2, 4) are specialists in Physical Medicine and Rehabilitation (PM&R), board-certified by the Philippine Board of Rehabilitation Medicine (PBRM).

Advisers 1 and 2 are methodology experts, both with a PhD degree in Health Sciences, and are also affiliated with the International Center for Allied Health Evidence (ICAHE).

External Reviewers:

Name	Society/Affiliation	Location
Howell Henrian G. Bayona (Speech pathologist)	Philippine Association of Speech Pathologists	Metro Manila

Copies of the manuscript and a feedback form were circulated to different professional organizations such as the Philippine Medical Association (PMA), Philippine College of Physicians (PCP), Philippine Neurological Association (PNA), Philippine Academy of Family Physicians (PAFP), Philippine Physical Therapy Association (PPTA), and Philippine Academy of Occupational Therapists (PAOT), however no responses were received.

Acknowledgements: The Stroke CPG Working Committee would like to acknowledge the valuable assistance of Editha C. Dizon, MD and Vivien Francesca A. Mercado-Ner, MD in streamlining the formulation of the recommendation statements.

The working committee disclose no potential conflicts of interest including all relevant financial gains in any company, institution or organization (including the Philippine Academy of Rehabilitation Executive Board) that might benefit from the release of this guideline.

3. Inpatient and Outpatient Stroke Rehabilitation

Early and intensive rehabilitation for patients in both the acute and subacute stages of stroke helps to improve motor recovery, communication capacity and mobility. This further improves the patient's independence in self-care, return to work and community and participation in leisure activities. Adequate intensity of therapy, task-oriented training, team coordination and timely discharge planning are considered vital elements for the success of inpatient stroke rehabilitation. Discharge planning further facilitates efficient transition back to the community and provides the patient and their families/caregivers access to options for continuation of therapy on an outpatient basis. Home assessment, caregiver training and provision of support and education are required, when possible, to identify and remove potential barriers to better recovery as well as prevent injuries and complications. Outpatient therapies should be tailored to the patient's needs and tasks that need to be retrained and developed to enable them to return effectively to their social roles (CANADIAN 2013).

3.1 TIMING, INTENSITY, FREQUENCY AND DURATION OF REHABILITATION

Table 11. The timing, intensity, frequency and duration of rehabilitation of stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is strong evidence that patients should be mobilized as early, and as frequently as possible once medical stability is reached, preferably within 24 hours of stroke symptom onset unless contraindicated.	NSF SIGN 2010 USVA/Dod CSS	B B, 1+ A, I B	Bernhardt et al, 2008 Langhorne et al, 2007 Cifu & Stewart, 1999 Gagnon et al, 2006 Ottenbacher & Jannell, 1993 Maulden et al, 2005 Musicco et al, 2003 Paolucci et al, 2000 Wade et al, 1992 Sorbello et al, 2009
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that patients should be referred for early rehabilitation as early as possible once medical stability is reached preferably within 24 hours of stroke symptom onset unless contraindicated.	AHA-ASA 2016 CANADIAN 2013 CAMEROON 2013 EBRSR 2016	IA A Level A Ia	Bernhardt et al, 2009 Bernhardt et al, 2008 Craig et al, 2010 Wang et al, 2011 Horn et al, 2005 Adams HP et al, 2007 Bernhardt et al, 2015

		Bernhardt et al, 2016 Bernhardt et al, 2008b Sorbello et al, 2009 Cumming et al, 2011 Langhorne et al, 2010b Chippala & Sharma, 2016 Diserens et al, 2012 Sundseth et al, 2012 Sundseth et al, 2014 Poletto et al, 2015 Morreale et al, 2016 Bai et al, 2014 Bai et al, 2012
Consistent level of evidence – High volume – Current - Uniform thought		
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.		
PARM strongly endorses that a stroke patient should be referred for early rehabilitation as early as possible once medical stability is reached preferably within 24 hours of onset of stroke symptoms unless medically contraindicated.		

2011 Recommendation Statement			
There is evidence that the patient should receive as much therapy as “needed” and tolerated, to adapt, recover and/or re-establish the pre-morbid or optimal level of functional independence.	USVA/DoD	B	Kwakkel et al, 1999 Langhorne et al, 1996
	CSS	B	Sorbello et al, 2009
Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that stroke patients should receive amount of physical therapy and occupational therapy of appropriate intensity and duration individually designed to meet needs for optimal recovery.	AHA-ASA 2016	IB	Chan L. 2012 Wang H. et al, 2013
	CANADIAN 2013	A	Kwakkel et al, 1997 Wang et al, 2013 Horn et al, 2005 Foley et al, 2012 Cifu and Stewart 1999 Legg et al, 2007
	CAMEROON 2013	A	HSFO 2007 Lindsay MP et al, 2010
	EBRSR 2016	IA	Langhammer et al, 2007 Langhammer et al, 2008 Langhammer et al, 2009 Boyne et al, 2016 Askim et al, 2010 Pohl et al, 2007 Partridge et al, 2000 Kwakkel et al, 1999 Kwakkel et al, 2002

			Di Lauro et al, 2003 English et al, 2015 Xiang et al, 2004 Parry et al, 1999 Slade et al, 2002 Winstein et al, 2016 Sunderland et al, 1992 Sunderland et al, 1994 Richards et al, 1993 Werner & Kessler, 1996 Feys et al, 1998 Pohl et al, 2002 Park et al, 2011 Cauraugh et al, 2011 Wu et al, 2016 Lang et al, 2016 Severinsen et al, 2014 Sullivan et al, 2002 Smith et al, 1981 Sivenius et al, 1985 Ruff et al, 1999
Consistent level of evidence – High volume - non-current - Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM strongly endorses that stroke patients should receive physical therapy and occupational therapy of appropriate intensity and duration, individually designed to meet the patient's needs for optimal recovery.			

2011 Recommendation Statement			
There is strong evidence that increasing the intensity of rehabilitation has beneficial effects on functional outcomes, including gait.	SIGN 2010	1+	Van Peppen et al, 2004 Kwakkel et al, 1997 Kwakkel et al, 2004
	USVA/DoD	I, B	Kwakkel et al, 1999 Langhorne et al, 1996 Lincoln et al, 1999 Parry et al, 1999 Rapoport & Judd-Van Eerd, 1989 Richards et al, 1993 Sivenius et al, 1985 Smith et al, 1981 Sunderland et al, 1992 Van der Lee et al, 2001
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017: No new evidence			
PARM strongly endorses that the intensity of rehabilitation should be increased according to the tolerance of patient and it has beneficial effects on functional outcome, including gait.			

2011 Recommendation Statement			
There is insufficient evidence that patients undergoing active rehabilitation should be provided with as much as possible; a minimum of 1 hour active practice per day, at least five days a week for both physical and occupational therapy.	NSF	GPP	Intercollegiate Stroke Working Party 2008
Low volume – Current			
2017: No new evidence			
PARM suggests that rehabilitation should be given for a minimum of one hour of active practice per day, five days a week, for both physical therapy and occupational therapy.			

2011 Recommendation Statement			
There is some evidence that rehabilitation should be structured to provide with as much practice as possible within the first six months after stroke.	NSF	A	Kwakkel et al, 1999
Low volume – Non-current			
2017: No new evidence			
PARM recommends that there should be a structured rehabilitation program that will provide as much practice as possible within the first six months after stroke onset.			

2017 Recommendation Statement			
There is some evidence that therapy should include repetitive and intense use of novel tasks that challenge the patient to acquire necessary motor skills to use the involved limb during functional tasks and activities.	CAMEROON 2013	Level A	SCORE 2007
Low volume - Non-current			
PARM recommends the repetitive and intense use of novel tasks that challenge the patient to acquire the necessary motor skills to use the involved limb during functional tasks and activities.			

2017 Recommendation Statement			
There is evidence that the amount of therapy needed to result in a significant improvement in motor outcomes is 17 hours of physiotherapy and occupational therapy over a 10 week period of time.	EBRSR 2016	IA	Langhammer et al, 2007 Langhammer et al, 2008 Langhammer et al, 2009 Boyne et al, 2016 Askim et al, 2010 Pohl et al, 2007 Partridge et al, 2000 Kwakkel et al, 1999 Kwakkel et al, 2002

			Di Lauro et al, 2003 English et al, 2015 Xiang et al, 2004 Parry et al, 1999 Slade et al, 2002 Winstein et al, 2016 Sunderland et al, 1992 Sunderland et al, 1994 Richards et al, 1993 Werner & Kessler, 1996 Feys et al, 1998 Pohl et al, 2002 Park et al, 2011 Cauraugh et al, 2011 Wu et al, 2016 Lang et al, 2016 Severinsen et al, 2014 Sullivan et al, 2002 Smith et al, 1981 Sivenius et al, 1985 Ruff et al, 1999
High volume – Non-current			
PARM endorses that the amount of therapy needed to result in a significant improvement in motor outcomes is 17 hours of physiotherapy and occupational therapy over a 10 week period of time.			

3.2 OUTPATIENT REHABILITATION

Table 12. Outpatient stroke rehabilitation

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is strong evidence that stroke patients with moderate or severe symptoms should be referred to a facility with an organized rehabilitation team, or referred to a rehabilitation specialist with some experience in stroke aids	USVA/DoD	I	Evans et al, 2001 Langhorne & Duncan, 2001
	NSF	A	Early Supported Discharge Trialist 2005 Larsen et al, 2006
	SIGN 2010	1++	Outpatient Service Trialists 2003
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
2017: No new evidence			
PARM strongly endorses outpatient stroke rehabilitation after discharge of stroke survivors to an organized rehabilitation team (physiatrist, physical therapist, occupational therapist, and speech and language pathologist).			
2011 Recommendation Statement			
There is strong evidence that rehabilitation delivered in the	NSF	B	Britton & Andersson, 2000

home setting should be offered to all stroke survivors as needed. Where home rehabilitation is unavailable, patients requiring rehabilitation should receive center-based care.	SIGN 2010	1+	Hiller & Gakeemah, 2010 Baskett et al, 1999 Bjorkdahl et al, 2006 Britton & Andersson, 2000 Gladman et al, 1993 Lord et al, 2008 Winkel et al, 2008 Young & Forster, 1992
	Consistent level of evidence – High volume – Non-current – Uniform thought		
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that rehabilitation delivered in the home setting should be offered to all stroke survivors as needed as it is beneficial for the patient.	CANADIAN 2013		Bjorkdahl et al, 2006 Hillier & Inglis-Jassiem, 2010 Lincoln et al, 2004 Lord et al, 2009 Young & Forester, 1992
	CAMEROON 2013	A	Lindsay, MP et al, 2010
	EBRSR 2016	Ia	Balci et al, 2013 Baskett et al, 1999 Bjorkdahl et al, 2006 Gersten et al, 1968 Gladman et al, 1993 Lincoln et al, 2004 Lord et al, 2008 Malagoni et al, 2016 Olaleye et al, 2014 Rasmussen et al, 2016 Redzuan et al, 2012 Roderick et al, 2001 Wall and Turnball, 1987 Young and Forster, 1992
Consistent Level of Evidence - High Volume - Non – Current Uniform thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM strongly endorses the two types of outpatient stroke rehabilitation: hospital or center-based rehabilitation and community-based rehabilitation.			

2011 Recommendation Statement			
There is insufficient evidence that the medical team, including the patient and family, must analyze the patient's medical/ functional status, as well as expected prognosis in order to establish the most appropriate setting.	USVA/ DoD	III	USVA/DoD (2010)
None			
2017: No new evidence			

PARM suggests that the rehabilitation team, including the patient and family/caregiver, analyze the medical and functional status, as well as the expected prognosis in order to establish the most appropriate rehabilitation setting.

2011 Recommendation Statement

There is insufficient evidence that the severity of the patient's impairment, the rehabilitation needs, the availability of family/social support and resources, the patient/family goals and preferences and the availability of community resources will determine the optimal environment of care.	USVA/ DoD	III	USVA/DoD (2010)
None			

2017: No new evidence

PARM suggests that the rehabilitation team determine the optimal environment of care based on the severity of the patient's impairment, the rehabilitation needs, the availability of family/social support and resources, the patient/family goals and preferences and the availability of community resources.

2011 Recommendation Statement

There is evidence that patients should receive as much therapy as they are able to tolerate in order to adapt, recover and/or re-establish their premorbid or optimal level of functional independence.	USVA/ DoD	I	Kwakkel et al, 1999 Langhorne et al, 1996 Lincoln et al, 1999 Parry et al, 1999 Rapoport et al, 1989 Richards et al, 1993 Sivenius et al, 1985 Smith et al, 1981 Sunderland et al, 1992 Van der Lee et al, 2001
High volume – Non-current			

2017: No new evidence

PARM endorses that stroke survivors should receive as much therapy as they are able to tolerate in order to adapt, recover, and/or re-establish their premorbid or optimal level of functional independence.

2017 Recommendation Statement

Recommendation	Guideline	Body of Evidence	References
There is evidence that stroke survivors with mild to moderate disability with ongoing rehabilitation should be considered for organized community or home-based interprofessional rehabilitation	AHA ASA 2016	I C	Buntin et al, 2005 Buntin et al, 2007 Buntin et al, 2009 Deutsch et al, 2006 Gage et al, 2009 Kane et al, 1996 Kane et al, 1998 Kane et al, 2002

care and facility-based outpatient services.			Keith et al, 1995 Kramer et al, 1997 Liu et al, 1998 MedPAC 2003 Segal et al, 2008 Wang et al, 2011
	CANADIAN 2013	A	Bjorkdahl et al, 2006 Gilbertson & Langhorne, 2000 Gilbertson et al, 2000 Hillier & Ingles-Jasseim, 2010 Lincoln et al, 2004 Lord et al, 2009 Outpatient Service Trialists 2002 Sackley et al, 2006 Young & Forester, 1992
	CAMEROON 2013	C	HSFO 2007 Lindsay 2010
	EBRSR 2016	Ia	Balci et al, 2013 Baskett et al, 1999 Bjorkdahl et al, 2006 Gersten et al, 1968 Gladman et al, 1993 Lincoln et al, 2004 Lord et al, 2008 Malagoni et al, 2016 Olaleye et al, 2014 Rasmussen et al, 2016 Redzuan et al, 2012 Roderick et al, 2001 Wall and Turnball, 1987 Young and Forester 1992
Inconsistent level of evidence - high volume – non-current - uniform thought			
PARM endorses consideration for organized community or home-based interprofessional rehabilitation care and facility-based outpatient services for stroke survivors with mild to moderate disability undergoing rehabilitation.			

2017 Recommendation Statement

There is strong evidence that providing a formal comprehensive assessment of ADL, IADL, and mobility assessments, including evaluation of the discharge living setting, should be considered in candidates for community or home-based rehabilitation when feasible.	AHA-ASA 2016	IA	Aziz NA et al, 2008 Bakas et al, 2014 Barker LN et al, 2010 Graven C. et al, 2011 Hartley S. 2009 Hillier S. et al, 2010 Langhorne P. et al, 2005 Legg LA et al, 2011 Miller EL et al, 2010 Reed MC et al, 2012
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			Ryan T. et al, 2006 Thorsten et al, 2005
	CANADIAN 2013	A	Sackley et al, 2006 Gilbertson et al, 2000 Gilbertson & Langhorne, 2000
Consistent level of evidence – high volume – Non-current – Uniform thought			
PARM strongly endorses that candidates for community or home-based rehabilitation should be provided with a formal comprehensive assessment of ADL, IADL, and mobility assessments, including evaluation of the discharge living setting.			

2017 Recommendation Statement			
There is strong evidence that organized community-based and coordinated interprofessional rehabilitation care is recommended in the outpatient or home-based settings based on severity of disability.	AHA-ASA 2016	IA	Berg K. et al, 1999 Bluest et al, 1995-1996 Brady BK et al, 2005 Bronskill et al, 2002 Buntin MB et al, 2007 Buntin MB. et al, 2005 Buntin MB. et al, 2009 Deutch et al, 2006 Ellis C. et al, 2008 Finlayson M. et al, 2002 Fisher RJ et al, 2011 Gage B. et al, 2009 Kane RL et al, 2002 Kane RL. et al, 1998 Kane RL. et al, 1996 Keith RA. et al, 1995 Kramer A. et al, 2006 Kramer et al, 1997 Langhorne P. et al, 2005 Liu K BC et al, 2001 Liu K. et al, 1998 MedPAC 2003 MedPAC.2008 Miller EL et al, 2010 Olson DM et al, 2011 Petri H. et al, 1991 PrvuBettger et al, 2015 Roussseaux et al, 2009 Segal M. et al, 2008 Shatto 2002 Wang H. et al, 2011
CANADIAN 2013			
A			
Fearon et al, 2012 Langhorne et al, 2005			
Consistent level of evidence – high volume – Non-current – Uniform thought			
PARM strongly endorses that organized community-based and coordinated interprofessional rehabilitation care should be available in the outpatient or home-based settings.			

2017 Recommendation Statement			
There is evidence that therapy should be provided for a minimum of 45 minutes per day up to 3 hours per day 3-5 days per week based on individual patient needs and goals.	CANADIAN 2013	B	Gilbertson & Langhorne, 2000 Gilbertson et al, 2000 Outpatient Service Trialists 2002 Sackley et al, 2006
	CAMEROON 2013	A	Canadian Best Practice Recommendations for stroke care Lindsay MP et al, 2010
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
PARM endorses that therapy should be provided for 45 minutes to 3 hours per day 3-5 days per week, but should be modified according to individual patient needs and goals.			

2017 Recommendation Statement			
There is strong evidence that home-based and hospital-based outpatient stroke rehabilitation programs are equally effective in achieving modest gains in ADL following inpatient rehabilitation.	EBRSR 2016	Ia 2	Aziz et al, 2008 Fearon and Langhorne 2012 Fletcher-Smith et al, 2013 Legg et al, 2007 Outpatient Service Trialists 2003
Moderate volume – Non-current			
PARM strongly endorses that home-based and hospital-based outpatient stroke rehabilitation programs are equally effective in achieving modest gains in activities of daily living following inpatient rehabilitation.			

3.3 PARM CONTEXT POINTS

3.3.1 INPATIENT REHABILITATION

Table 13. Context points for minimal and additional standard care of practice for early inpatient rehabilitation

	Minimum standard care of practice	Additional standard care of practice
Practice method	<ul style="list-style-type: none"> - Medical history - Physical examination - Neurologic examination - Functional Capacity Evaluation - Psychosocial risk assessment - Diagnostic triage 	No diagnostic imaging tests are needed, i.e. LS spine x-rays, CT scans, MRI
Equipment	Parallel bars, walking frame	Biodex machine frame

Workforce	Trained personnel (physical therapist, occupational therapist, nurse)	Trained personnel (physical therapist, occupational therapist, speech therapist, nurse)
Training	Within competency	Within competency
When is it done	Within 24 after onset of symptoms or when medically stable	Within 24 after onset of symptoms or when medically stable
Reassessment using at least one standard outcome measure	Everyday * Discharge planning should be documented in a discharge document	Everyday * Discharge planning should be documented in a discharge document

3.3.2 OUTPATIENT REHABILITATION

Table 14. Context points for minimal and additional standard care of practice for ongoing outpatient rehabilitation

	Minimum standard care of practice	Additional standard care of practice
Practice method	- Medical history - Physical examination - Neurologic examination - Functional Capacity Evaluation - Psychosocial risk assessment - Diagnostic triage	No diagnostic imaging tests are needed, i.e. LS spine x-rays, CT scans, MRI
Equipment	Gym equipment: Therapeutic exercises Electrical stimulation	Biodek machine frame Robotics Virtual reality
Workforce	Trained personnel (physical therapist, occupational therapist)	Trained personnel (physical therapist, occupational therapist, speech therapist)
Training	Within competency	Within competency
When is it done	After discharge up to optimum functional independence	After discharge up to a minimum of six months, progressing program to improve cardiovascular and muscular endurance
Reassessment using at least one standard outcome measure	Monthly	Monthly

3.4 SUMMARY OF PARM RECOMMENDATION STATEMENTS

TIMING, INTENSITY, FREQUENCY AND DURATION OF REHABILITATION

PARM strongly endorses that a stroke patient should be referred for early rehabilitation as early as possible once medical stability is reached preferably within 24 hours of onset of stroke symptoms unless medically contraindicated.

PARM strongly endorses that stroke patients should receive physical therapy and occupational therapy of appropriate intensity and duration, individually designed to meet the patient's needs for optimal recovery.

PARM strongly endorses that the intensity of rehabilitation should be increased according to the tolerance of patient and it has beneficial effects on functional outcome, including gait.

PARM suggests that rehabilitation should be given for a minimum of one hour of active practice per day, five days a week, for both physical therapy and occupational therapy.

PARM recommends that there should be a structured rehabilitation program that will provide as much practice as possible within the first six months after stroke onset.

PARM recommends the repetitive and intense use of novel tasks that challenge the patient to acquire the necessary motor skills to use the involved limb during functional tasks and activities.

PARM endorses that the amount of therapy needed to result in a significant improvement in motor outcomes is 17 hours of physiotherapy and occupational therapy over a 10 week period of time.

OUTPATIENT REHABILITATION

PARM strongly endorses outpatient stroke rehabilitation referral after discharge of stroke survivors to an organized rehabilitation team (physiatrist, physical therapist, occupational therapist, and speech and language pathologist).

PARM strongly endorses the two types of outpatient stroke rehabilitation: hospital or center-based rehabilitation and community-based rehabilitation, taking into consideration the needs and resources of the stroke patient as well as the availability of stroke rehabilitation facilities and allied medical personnel (i.e. Physical Therapists, Occupational Therapists, Speech Therapists).

PARM suggests that the rehabilitation team, including the patient and family/caregiver, analyze the medical and functional status, as well as the expected prognosis in order to establish the most appropriate rehabilitation setting.

PARM suggests that the rehabilitation team determine the optimal environment of care based on the severity of the patient's impairment, the rehabilitation needs, the availability of family/social support and resources, the patient/family goals and preferences and the availability of community resources.

PARM endorses that stroke survivors should receive as much therapy as they are able to tolerate in order to adapt, recover, and/or re-establish their premorbid or optimal level of functional independence.

PARM endorses that organized community or home-based interprofessional rehabilitation care and facility-based outpatient services be considered for stroke survivors with mild to moderate disability undergoing rehabilitation.

PARM strongly endorses that candidates for community or home-based rehabilitation should be provided with a formal comprehensive assessment of ADL, IADL, and mobility assessments, including evaluation of the discharge living setting.

PARM strongly endorses that organized community-based and coordinated interprofessional rehabilitation care should be available in the outpatient or home-based settings.

PARM endorses that outpatient therapy should be provided for 45 minutes to 3 hours per day, 3-5 days per week, but should be modified according to individual patient needs and goals.

PARM strongly endorses that home-based and hospital-based outpatient stroke rehabilitation programs are equally effective in achieving modest gains in activities of daily living following inpatient rehabilitation.

4. Secondary Prevention of Stroke

Secondary prevention is an individually based clinical approach aimed at reducing the risk of recurrent vascular events in individuals who have already experienced a stroke or transient ischemic attack and in those who have one or more of the medical conditions or risk factors that place them at high risk of stroke (CANADIAN 2013/2017 update). This is essential in the management and rehabilitation of stroke patients to prevent worsening of functional capacity or loss of recovery gains during therapies. Adequate education and awareness of the patients and their families/caregivers regarding the stroke risk factors and available management strategies can further translate into better participation in recovery and rehabilitation.

4.1 RECOMMENDATIONS FOR IDENTIFICATION OF RISK FACTORS

Table 15. Identification and interventions for stroke risk factors

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is strong evidence that every stroke patient should be assessed and informed of their risk factors for a further stroke and possible strategies to modify identified risk factors.	NSF	A	Rubak et al, 2005 Sinclair et al, 2004 Stead & Lancaster, 2005
	CSS	B	Gillman et al, 1995 He et al, 2006 Joshiipura et al, 1999 Liu et al, 2000
Consistent Level of Evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that persons at risk of stroke and patients who have had a stroke should be assessed for vascular disease risk factors, lifestyle management issues (diet, sodium intake, exercise, weight, alcohol intake, smoking), as well as use of oral contraceptives or hormone replacement therapy.	CANADIAN 2013	B	Murray et al, 2013 O'Donnell et al, 2016
Low volume - Current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM strongly endorses that persons at risk of stroke and patients who have had a stroke should be assessed and informed for vascular disease risk factors, lifestyle management issues and possible strategies to modify identified risk factors. It should be performed within one week of onset. At a minimum this includes checking for: raised blood pressure (sustained over 130/90 mmHg), hyperlipidemia and diabetes mellitus.			

2011 Recommendation Statement			
There is strong evidence that interventions should be individualized and delivered using behavioral techniques, such as educational or motivational counseling.	NSF	A	Rubak et al, 2005 Sinclair et al, 2004 Stead & Lancaster, 2005
	CSS	B	Gillman et al, 1995 He et al, 2006 Joshiipura et al, 1999 Liu et al, 2000
Consistent Level of Evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that persons at risk of stroke should receive individualized information and counseling about possible strategies to modify their lifestyle and risk factors.	CANADIAN 2013	B	Murray et al, 2013 O'Donnell et al, 2016
Low volume - Current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM strongly endorses that interventions should be individualized and delivered using behavioral techniques, such as educational or motivational counseling.			

2011 Recommendation Statement			
There is insufficient evidence that patients should be encouraged to take responsibility for their own health and be supported to identify, prioritize, and manage their risk factors.	SIGN 2010	GPP	Hackam & Spence, 2007
Low volume – Current			
2017: No new evidence			
PARM suggests that patients should be encouraged to take responsibility for their own health and be supported to identify, prioritize, and manage their risk factors.			

2017 Recommendation Statement			
There is evidence that urgent assessment and initiation of treatment following transient ischemic attack is associated with reduced hospital costs, length of stay and risk for early stroke. However, the effect of these accelerated programs on stroke risk is unclear. Further research with higher methodological quality is required.	EBRSPR 2016	2, 4	The National Stroke Association (2006) Canadian Stroke Best Practice Recommendations: Stroke Recognition and Response, 2015 Gladstone et al, 2004 Selvarajah et al, 2008 Fallon et al, 2006 Birns et al, 2006

			Wu et al, 2009 Ross et al, 2007 Nahab et al, 2012 Kim et al, 2007 Rothwell et al, 2007 Luengo-Fernandez et al, 2009 Kehdi et al, 2008 Wasserman et al, 2010
High volume – Non-current			
PARM endorses that urgent assessment and initiation of treatment following ischemic attack be performed, not only for the patient's effective medical management, but also in order to reduce hospital costs, length of stay and risk for early stroke.			

2017 Recommendation Statement			
There is evidence that a pharmacist-led educational intervention, a stroke prevention group workshop or post-discharge management of risk factors conducted using a model of shared care may improve long-term benefits in terms of blood pressure reduction, reduced lipid levels, reduced body mass and increased physical activity.	EBRSR 2016	1b, 2	McAlister et al, 2014b McAlister et al, 2014a Ellis et al, 2005 Chiu et al, 2008
Moderate volume – Non-current			
PARM endorses that an educational program that includes stroke prevention and post-discharge management of risk factors be provided to patients in order to improve long-term benefits in the management of blood pressure, lipid levels, body mass, and physical activity.			

2017 Recommendation Statement			
There is evidence that referrals to appropriate specialists should be made where required. The specialists may provide more comprehensive assessments and structured programs to manage specific risk factors.	CANADIAN 2013	B	MacLaughlin et al, 2012 Travis, 1997 Jurkiewicz et al, 2011 Bushnell et al, 2014
Moderate volume – Current			
PARM endorses that referrals to appropriate specialists should be made where required, in order to provide patients with more comprehensive assessments and more appropriate programs to manage specific risk factors.			

2017 Recommendation Statement			
There is insufficient evidence that at each stroke prevention visit with healthcare team members, patients should be assessed for adherence to individualized	CANADIAN 2013	C	MacLaughlin et al, 2012 Bushnell et al, 2014 Travis, 1997 Hedegaard et al, 2015

secondary prevention plans (pharmacotherapy and lifestyle changes). Adherence topics include medication compliance, diet management, rehabilitation therapy and/or exercise participation, and other areas specific to each patient.			
Moderate volume - Current	PARM suggests that at every check-up with a healthcare professional, patients should be assessed for adherence to individualized secondary prevention plans, including adherence to medications, diet management, rehabilitation therapy, exercise participation, and other lifestyle topics specific to the patient.		

4.2 LIFESTYLE MEASURES

4.2.1 RECOMMENDATIONS FOR SMOKING

Table 16. Smoking as a stroke risk factor and options to facilitate smoking cessation

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that tobacco smoking is strongly and dose dependently associated with all cardiovascular events, including coronary heart disease (CHD), stroke, peripheral arterial disease (PAD) and cardiovascular death.	SIGN 2010	2++	Doll et al, 2004 Law et al, 1997
Low Volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is evidence that smoking and exposure to tobacco smoke has consistently been associated with an increased risk of stroke (ischemic and hemorrhagic) while smoking cessation reduces this risk.	EBRSR 2016	1a	Goldstein et al, 2001 O'Donnell et al, 2010b Flemming & Brown, 2004 Kawachi et al, 1993 Robbins et al, 1994 Wolf et al, 1988 Kumagai et al, 2013 Bonita et al, 1999 Hankey 1999 Kurth et al, 2003a Lu et al, 2008 Cardiovascular Study in the Elderly (CASTEL), Mazza et al, 2001
High volume – Non-current			

ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.

PARM endorses that smoking cessation substantially reduces the risks of recurring stroke and other cardiovascular diseases.

2011 Recommendation Statement

There is conflicting evidence that smoking cessation reduces these risks substantially, although the decrease is dependent on the duration of cessation.	SIGN 2010	4	Ockene & Miller, 1997 Wannamethee et al, 1995
	SIGN 2010	4, 2++	Wannamethee et al, 1995

Inconsistent level of evidence – Low volume – Non-current – Uniform thought

2017: No new evidence

PARM suggests that smoking cessation substantially reduces the risks of recurring stroke and other cardiovascular diseases, although the decrease is dependent on the duration of cessation.

2011 Recommendation Statement

There is evidence that all ischemic stroke or TIA patients who have smoked in the past year should be strongly encouraged not to smoke.	USVA/ DoD	Class I, Level C	Kawachi et al, 1993 Wannamethee et al, 1995 Wolf et al, 1988
	CSS	A	Fiore et al, 2008
	SIGN 2010	B	Ockene & Miller, 1997
	AHA 2011	Class I Level C	Goldstein et al, 2006 Kawachi et al, 1993 Mast et al, 1998 Robbins et al, 1994 Shinton & Beevers, 1989

Inconsistent level of evidence – High volume – Non-current – Uniform thought

2017 Updated Recommendations and Evidence Sources

There is strong evidence that healthcare providers should strongly advise every patient with stroke or TIA who has smoked in the past year to quit. Others who reside with the patient should also be advised regarding the importance of smoking cessation.	AHA-ASA 2014	Class I Level C	Bonita et al, 1986 Putala et al, 2009 Goldstein et al, 2011 Kaplan et al, 2005 Taylor et al, 2002
	CANADIAN 2013	B	Robbins et al, 1994 Peters et al, 2013 O'Donnell et al, 2010 O'Donnell et al, 2016 Kaplan et al, 2005

Consistent level of evidence – High volume – Non-current – Uniform thought

ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.

PARM strongly endorses that all ischemic stroke or TIA patients who have smoked in the past year should be strongly encouraged to stop smoking. Those who live with the patient should also be advised on the importance of smoking cessation.

2011 Recommendation Statement

There is strong evidence that tobacco dependence is a chronic condition for which there are now effective behavioral and pharmacotherapy treatments.	USVA/ DoD	Class IIa, Level B	Bak et al, 2002 Fiore et al, 1996 Fiore et al, 2000 Hughes et al, 2003 Silagy et al, 2004
	SSP	Class IIa, Level B	Bak et al, 2002 Fiore et al, 2000 Hughes et al, 2003 Silagy et al, 2004

Consistent level of evidence – Moderate volume – Non-current – Uniform thought

2017 Updated Recommendations and Evidence Sources

There is evidence that a combination of pharmacological therapy and behavioural therapy should be considered in all smoking cessation programs and interventions.	CANADIAN 2013	A	Cahill et al, 2013 Stead & Lancaster, 2012a Mullen et al, 2016 Lai et al, 2010
Moderate volume - Current			
ADAPTE I: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM strongly endorses the use of pharmacologic treatment and behavioral therapy to address tobacco dependence.			

2011 Recommendation Statement

There is some evidence that exposure to environmental tobacco smoke (through passive inhalation) increases the risk of cardiovascular disease, including stroke.	USVA/ DoD	Class IIa, Level B	Bonita et al, 1999 He et al, 1999 You et al, 1999
	AHA(2011)	Class IIa Level C	Bontia et al, 1999 He et al, 1999 Heuschmann et al, 2007 Kiechl et al, 2002 US Dep't of Health and Human Services, 2004 You et al, 1999

Inconsistent level of evidence – High volume – Non-current – Uniform thought

2017: No new evidence

PARM recommends promoting a smoke-free environment for every healthcare encounter for every active smoker.

2011 Recommendation Statement

There is strong evidence to stop smoking through several treatment methods, including nicotine replacement therapy,	USVA/ DoD	Class IIa, Level B	Bonita et al, 1999 He et al, 1999 US Dept of Health and Human Services, 2004
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bupropion or nortriptyline therapy, nicotine receptor partial agonist therapy and/or behavioural therapy and/or skills training.			You et al, 1999
The three classes of pharmacological agents that should be considered as first line therapy for smoking cessation are nicotine replacement therapy, bupropion, and varenicline.	NSF	A	Cahill et al, 2007 Hughes et al, 2007 Lancaster & Stead, 2005 Rice & Stead, 2004 Sinclair et al, 2004 Stead & Lancaster, 2005
There is strong evidence that providing unambiguous, non-judgmental and personally relevant advice regarding the importance of cessation to all smokers, and offering assistance with the initiation of smoking cessation attempts, either directly or through referral to appropriate resources can be effective.	CSS	A	Fiore et al, 2008
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that counseling, nicotine products, and oral smoking cessation medications are effective in helping smokers to quit.	AHA-ASA 2014	Class I Level A	Ovbiagele et al, 2004 Bak et al, 2002 Papadakis et al, 2011 Sauerbeck et al, 2005 Rigotti et al, 2012 Stead et al, 2012 Fiore et al, 2008
Moderate volume – Non-current			
There is some evidence that the three classes of pharmacological agents that should be considered as first-line therapy for smoking cessation are nicotine replacement therapy, varenicline and bupropion. The choice of appropriate pharmacotherapy should take into account the patient's medical stability, clinical needs, other medical factors, and patient preferences.	CANADIAN 2013	A	Cahill et al, 2013 Stead & Lancaster, 2012a
Low volume - Current			

<p>There is evidence that an intensive smoking cessation program providing a period of counseling and support may be as effective as a minimal intervention providing a single 30-minute session of counseling only.</p> <p>Information regarding the importance of quitting should be provided to all smokers, including pharmacological (nicotine replacement therapy, bupropion, varenicline) and behavioral therapy. Further research is required to investigate and develop effective smoking cessation interventions.</p>	EBRSR 2016	1b	Jorenby et al, 1999 Ambriz et al, 2004 Edjoc et al, 2012 Frandsen et al, 2012 Ives et al, 2008 Brunner Frandsen et al, 2012
	CANADIAN 2013	A	Stead & Lancaster, 2012a Lai et al, 2010
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
<p>PARM strongly endorses a combination of nicotine replacement therapy, bupropion or nortriptyline therapy, nicotine receptor partial agonist therapy and/or behavior therapy and skills training</p> <p>PARM strongly endorses that physicians provide unambiguous, non-judgmental and personally relevant advice regarding the importance to stop smoking for all smokers and offer assistance with a smoking cessation attempt—either directly or through referral to appropriate resources.</p>			

2017 Recommendation Statement

<p>There is strong evidence that patients should be advised to avoid environmental (passive) tobacco smoke after TIA or ischemic stroke. Family members and caregivers should also be counseled about the harmful effects of exposure to environmental (second-hand) smoke.</p>	AHA-ASA 2014	Class IIa Level B	Oono et al, 2011 Iribarren et al, 2004 He Y et al, 2008 Glymour et al, 2008 Lee et al, 2006 Zhang et al, 2005 Qureshi et al, 2005 Bonita et al, 1999 Heuschmann et al, 2007 Kiechl et al, 2002 You et al, 1999
	CANADIAN 2013	B	Stead & Lancaster, 2012a Mullen et al, 2016
	EBRSR 2016	1a	Bonita et al, 1999 Iribarren et al, 2004 Zhang et al, 2005

		Lee and Forey, 2006
Consistent level of evidence – High volume – Non-current – Uniform thought		
PARM strongly endorses that patients should be advised to avoid second-hand tobacco smoke after TIA or ischemic stroke. Family members and/or caregivers should also be counseled about the harmful effects of exposure to second-hand smoke.		

2017 Recommendation Statement			
There is some evidence that in all healthcare settings along the stroke continuum (inpatient, ambulatory, and community), patient smoking status should be identified, assessed and documented.	CANADIAN 2013	A	Mullen et al, 2016 Lai et al, 2010
Low volume - Current			
PARM recommends that patient smoking status should be identified, assessed and documented in all healthcare settings involved in the management of stroke (inpatient, outpatient, community-based).			

2017 Recommendation Statement			
There is some evidence that people who are not ready to quit should be offered a motivational intervention to help enhance their readiness to quit.	CANADIAN 2013	B	Lai et al, 2010
Low volume – Non-current			
PARM recommends that people who are not ready to quit smoking should be offered some form of motivation in order to prepare them to quit.			

2017 Recommendation Statement			
There is some evidence that for stroke patients in hospital who are current smokers, protocols should be in place to manage nicotine withdrawal during hospitalization.	CANADIAN 2013	B	Stead & Lancaster, 2012a
Low volume - Current			
PARM recommends that there should be protocols to help stroke patients who are current smokers to manage nicotine withdrawal in the inpatient setting.			

4.2.2 RECOMMENDATIONS FOR DIET / NUTRITION

Table 17. Dietary recommendations for stroke risk reduction (primary/secondary prevention)

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is strong evidence that diets low in total and saturated fats should be recommended to	SIGN 2010	1++	Hooper et al, 2004
	CSS	B	Blood Pressure Canada, 2007
	NSF	A	Appel et al, 1997

all for the reduction of cardiovascular risk.			Barzi et al, 2003 Dauchet et al, 2005 de Lorgeril et al, 1999 He & MacGregor, 2004 He et al, 2006 Sacks et al, 2001
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017: No new evidence			
PARM strongly endorses patients to have a diet low in saturated fat and salt but high in fruits and vegetables to reduce cardiovascular risk.			

2011 Recommendation Statement			
There is some evidence on the benefits associated with increased consumption of omega-3 fatty acids for the prevention of cardiovascular or stroke disease.	SIGN 2010	1++	Hooper et al, 2004 Wang et al, 2006
Low volume – non-current			
2017: No new evidence			
PARM recommends educating patients on the benefits associated with increased consumption of omega-3 fatty acids for the prevention of cardiovascular or stroke disease.			

2011 Recommendation Statement			
There is no evidence identified to advise people to stop taking supplemental omega-3 fatty acids.	SIGN 2010	1++	Hankey et al, 2007 Toole et al, 2004
Low volume – Current			
2017: No new evidence			
PARM does not endorse to advise people to stop taking supplemental omega-3 fats.			

2011 Recommendation Statement			
There is some evidence that all individuals should eat at least two portions of fish (140 grams) per week, one of which should be a fatty fish.	SIGN 2010	4	Food Standards Agency, 2011
Low volume – Current			
2017: No new evidence			
PARM recommends that all individuals should eat at least two portions of fish (140 grams) per week, one of which should be a fatty fish.			

2011 Recommendation Statement			
There is strong evidence that reduction in salt intake lasting at least six months also reported small but significant benefits to blood pressure.	SIGN 2010	1++	Hooper et al, 2004
NSF	A		Appel et al, 1997 Barzi et al, 2003 Dauchet et al, 2005 de Lorgeril et al, 1999 He & MacGregor, 2004 He et al, 2006

		Sacks et al, 2001
CSS	B	Blood Pressure Canada, 2007
SSP	Class I, Level A	Chobanian et al, 2003
Consistent level of evidence – High volume – Non-current – Uniform thought		
2017: No new evidence		
PARM strongly endorses patients to have a diet low in saturated fat and salt but high in fruits and vegetables to reduce cardiovascular risk.		

2011 Recommendation Statement			
There is some evidence that adults should consume no more than 6 g of salt per day (approximately equivalent to one teaspoonful).	SIGN 2010	4	Food Standards Agency, 2008
Low volume – Current			
2017: No new evidence			
PARM recommends that people with hypertension should be advised to reduce their salt intake as much as possible to lower blood pressure (no more than 6 grams per day)			

2011 Recommendation Statement			
There is evidence that patients should follow the recommended daily sodium intake from all sources, known as the 'adequate intake'. For persons 9 to 50 years, the 'adequate intake' is 1500 mg. 'Adequate intake' decreases to 1300 mg for persons 50 to 70 years 'Adequate intake' is 1200 mg for persons over 70 years. A daily upper consumption limit of 2300 mg should not be exceeded by any age group.	CSS	B	Blood Pressure Canada, 2007
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is evidence that individuals with TIA or stroke should be counseled and educated that daily sodium intake from all sources should be no more than 2,000 mg per day.	CANADIAN 2013	A	Mozaffarian et al, 2014 Feigin et al, 2016 He et al, 2013 Abuerto et al, 2013 Graudal et al, 2014 O'Donnell et al, 2014
Moderate volume – Current			
ADAPTE 3: The recommendation changed but the strength of evidence remains unchanged from the 2011 PARM guideline.			

PARM endorses that for daily salt intake, for persons 9 to 50 years, the ‘adequate intake’ is 1500 mg. ‘Adequate intake’ decreases to 1300 mg for persons 50 to 70 years and to 1200 mg for persons over 70 years. A daily upper consumption limit of 2300 mg should not be exceeded by any age group. Current evidence states that daily sodium intake from all sources should be no more than 2,000 mg per day for individuals with TIA or stroke.

2011 Recommendation Statement

There is evidence that increasing fruit and vegetable consumption is recommended to reduce risk of stroke or TIA in a dose-respondent fashion.	SIGN 2010	2+	Dauchet et al, 2005
	NSF	A	Appel et al, 1997 Barzi et al, 2003 Dauchet et al, 2005 de Lorgeril et al, 1999 He & MacGregor, 2004 He et al, 2006 Sacks et al, 2001
	CSS	B	Blood Pressure Canada, 2007

Inconsistent level of evidence – High volume – Non-current – Uniform thought

2017: No new evidence

PARM endorses that increasing fruit and vegetable consumption is recommended to reduce risk of stroke or TIA in a dose –respondent fashion.

2011 Recommendation Statement

There is some evidence that vitamin supplementation does not prevent the recurrence of stroke in patients following ischemic stroke.	SIGN 2010	1++; 1+	Hankey et al, 2007 Toole et al, 2004
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Low volume – Current

2017: No new evidence

PARM does not recommend vitamin supplementation following ischemic stroke as it would not prevent recurrence of stroke.

2017 Recommendation Statement

There is evidence that individuals with TIA or stroke should be counseled and educated to eat a healthy balanced diet that includes lean meats, whole grains and protein from plant sources which are low in saturated and trans fats, low in cholesterol (< 200 mg daily for patients at increased vascular risk) and low in sodium.	CANADIAN 2013	B	Siri-Tarino et al, 2010 De Oliveira Otto et al, 2012 He et al, 2003 Kiage et al, 2014
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Moderate volume - Current

PARM endorses that individuals with TIA or stroke should be educated on the importance of eating a healthy balanced diet that includes lean meat, whole grains and protein from plant sources which are low in saturated and trans fats, low in cholesterol and low in sodium.

2017 Recommendation Statement

There is evidence that individuals with TIA or stroke should be counseled and educated to eat a healthy balanced diet that includes a diet high in vegetables and fruit; encourage patients to choose fresh or frozen unsweetened fruit, or fruit canned in water without added/free sugars or artificial/non-caloric sweeteners; fresh or frozen vegetables without added sauce, or canned vegetables with no added salt.	CANADIAN 2013	B	Du et al, 2016 Feigin et al, 2016 Sharma et al, 2013 O'Donnell et al, 2010 He et al, 2006
Moderate volume – Current			
PARM endorses that individuals with TIA or stroke should be educated on maintaining a healthy balanced diet that is high in fresh vegetables and fruit, and to avoid fruit and vegetable preparations with added sugars, artificial sweeteners, sauces and salt.			

2017 Recommendation Statement

There is evidence that individuals with TIA or stroke should be counseled and educated to eat a healthy balanced diet that includes: a. a variety of natural/whole foods at each meal b. fewer highly processed foods which include highly refined foods, confectionaries, sugary drinks, processed meats, and snack foods c. a diet high in vegetables and fruit; encourage patients to choose fresh or frozen unsweetened fruit, or fruit canned in water without added/free sugars or artificial/non-caloric sweeteners; fresh or frozen vegetables without added sauce, or canned vegetables with no added salt d. fat-free or skim milk and alternatives, and dietary and soluble fibre	CANADIAN 2013	Level B	Siri-Tarino et al, 2010 De Oliveira Otto et al, 2012 He et al, 2003 Kiage et al, 2014 Hu et al, 2014 Qin et al, 2015 Larsson et al, 2012 Soedamah-Muthu et al, 2013
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e. lean meats, whole grains and protein from plant sources which are low in saturated and trans fats, low in cholesterol (< 200 mg daily for patients at increased vascular risk) and low in sodium			
High volume - current			
PARM endorses that individuals with TIA or stroke should be counseled and educated to eat a healthy balanced diet that includes: a. a variety of natural/whole foods at each meal b. fewer highly processed foods c. a diet high in fresh vegetables and fresh fruit; d. fat-free or skim milk and alternatives, and dietary and soluble fibre e. lean meats, whole grains and protein from plant sources which are low in saturated and trans fats, low in cholesterol (< 200 mg daily for patients at increased vascular risk) and low in sodium.			

2017 Recommendation Statement

There is strong evidence that individuals with TIA or stroke should be counseled and educated to follow a Mediterranean-type diet, which is high in vegetables, fruit, whole grains, fish, nuts and olive oil and low in red meat.	CANADIAN 2013	Level B	Agnoli et al, 2011 Psaltopoulou et al, 2013 Estruch et al, 2013 Soedamah-Muthu et al, 2013
	EBRSR 2016	Level 1a	Steffen et al, 2003 Anderson et al, 2009 Huth & Park, 2012 Elwood et al, 2010 Soedamah-Muthu et al, 2011 Samieri et al, 2011 Apostolopoulou et al, 2012 Kaluza et al, 2012 Hu et al, 2000 Fung et al, 2004 Appel et al, 1997 Sacks et al, 2001 Singh et al, 2002 De Lorgeril et al, 1999
Consistent grades of high evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses that individuals with TIA or stroke should be educated to follow a Mediterranean-type diet, which is high in vegetables, fruit, whole grains, fish, nuts and olive oil and low in red meat.			

2017 Recommendation Statement

There is evidence that routine supplementation with a single vitamin or combination of vitamins is not recommended. Further research is required to	AHA-ASA 2014	Class III Level A	Toole et al, 2004 VITATOPS, 2010
	EBRSR 2016	1a	Gorelick, 2002 Asplund, 2002 Voko et al, 2003

understand the mechanism by which these supplements provide benefits against stroke.			Marniemi et al, 2005 Lonn et al for the SECURE investigators, 2001 Salonen et al, 2000 & 2003
Inconsistent grades of high and low evidence – High volume – Non-current – Uniform thought			
PARM endorses against routine supplementation with a single vitamin or combination of vitamins until more studies can show their benefit against stroke.			

2017 Recommendation Statement			
There is evidence that more research is needed to determine the potential benefits of vitamin B supplementation on atherosclerotic progression.	EBRSR 2016	Level 1a	Boushey et al, 1995 Eikelboom et al, 1999 VITATOPS Potter et al, 2008 Till et al, 2005 Fernandez-Miranda et al, 2007 Van Guelpen et al, 2005 Sacco et al, 2004 Bos et al, 2005
High volume – Non-current			
PARM endorses the need for further research in order to determine the potential benefits of vitamin B supplementation on atherosclerotic progression.			

2017 Recommendation Statement			
There is evidence that while treatment with folic acid and/or vitamins B6 & B12 reduces plasma homocysteine levels, subsequent cardiovascular outcomes and stroke risk may not be improved.	EBRSR 2016	Level 1a, 1b	VITATOPS Hankey et al, 2005 NORVIT Trial Bonaa et al, 2006 Grace et al, 2006 SU.FOL.OM3 Galan et al, 2010 VITATOPS Hankey et al, 2010 AIM-HIGH Boden et al, 2011 VITATOPS Hankey et al, 2012a Lonn et al, 2006 WAFACS Trial Albert et al, 2008 VISP Trial Toole et al, 2004 Goes Trial Liem et al, 2003 & 2005 Arshi et al, 2015 Wang et al, 2007 Mei et al, 2010 Miller et al, 2010

			Zhou et al, 2011 Huo et al, 2012
High volume – Non-current			
PARM endorses that caution should be taken in prescribing stroke patients with folic acid and/or vitamins B6 & B12. Although these have shown to reduce plasma homocysteine levels, subsequent cardiovascular outcomes and stroke risk may not be improved.			

2017 Recommendation Statement			
There is some evidence that concurrent antiplatelet use may alter the action of vitamin therapy however, there is conflicting evidence supporting this association. Further research is required.	EBRSP 2016	Level 1b	Hankey et al, 2012a Huo et al, 2012
Low volume - Current			
PARM recommends that further research should be done in order to determine if concurrent antiplatelet use may alter the action of vitamin therapy.			

2017 Recommendation Statement			
There is some evidence that patients with a history of ischemic stroke or TIA and signs of undernutrition should be referred for individualized nutritional counseling.	AHA-ASA 2014	Class I, Level B	Ha et al, 2010
Low volume – Non-current			
PARM recommends that patients with a history of ischemic stroke or TIA and signs of undernutrition should be referred for individualized nutritional counseling.			

4.2.3 RECOMMENDATIONS FOR PHYSICAL ACTIVITY

Table 18. The roles of physical activity in the primary and secondary prevention of stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that physical activity also has clear benefits for reducing hypertension in at-risk people and improving glycemic control for those with type 2 diabetes; and is an important aspect of lifestyle that patients at risk of recurrent stroke can modify.	USVA/ DoD	Class IIb, Level C	Dylewicz et al, 1999 Endres et al, 2003 From the Centers for Disease Control and Prevention, 2001 Hu et al, 2000 Katzmarzyk et al, 2000 Kohrt et al, 1993 Kokkinos et al, 1995 Lee et al, 1999, 2003 Pate et al, 1995 Thompson et al, 2003
	SIGN 2010	2+	Wendel-Vos et al, 2004

	NSF	C	Department of Health and Aged Care, 1999 Lee et al, 2003 Mead et al, 2007 Pang et al, 2006 Scottish Government, 2003 Sims et al, 2006 Thomas et al, 2006 Wendel-Vos et al, 2004 Whelton et al, 2002
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
2017: No new evidence			
PARM recommends physical activity as a significant modifiable factor in lifestyle modification for individuals with hypertension and type 2 diabetes because of its benefits for reducing hypertension and improving glycemic control.			

2011 Recommendation Statement

There is some evidence that cardiorespiratory fitness training is feasible for stroke survivors and can lead to improved aerobic fitness, walking speed and endurance, balance and functional activity	SIGN 2010	3	Eng et al, 2003
	NSF	C	Lee et al, 2003 Mead et al, 2007 Pang et al, 2006 Wendel-Vos et al, 2004
Consistent level of evidence – Moderate volume – Non-current– Uniform thought			
2017: No new evidence			
PARM recommends cardiorespiratory fitness training as a feasible means for stroke survivors to improve aerobic fitness, walking speed and endurance, balance and functional activity.			

2011 Recommendation Statement

There is some evidence that participating in moderate exercise (an accumulation of 30 to 60 minutes) such as walking (ideally brisk walking), jogging, cycling, swimming or other dynamic exercise four to seven days each week in addition to routine activities of daily living reduce risk factors and comorbid conditions that increase the likelihood of recurrence of stroke.	USVA/DoD	Class IIb, Level C	Dylewicz et al, 1999 Endres et al, 2003 From the Centers for Disease Control and Prevention, 2001 Hu et al, 2000 Lee et al, 1999, 2003 Katzmarzyk et al, 2000 Kohrt et al, 1993 Kokkinos et al, 1995 Pate et al, 1995 Thompson et al, 2003
	CSS	A	Lee et al, 2003
A supervised therapeutic exercise regimen is recommended for those with disability after ischemic stroke			
NSF			

			Sims et al, 2006 Scottish Government, 2003 Thomas et al, 2006 Wendel-Vos et al, 2004 Whelton et al, 2002
	AHA (2011)	Class IIb Level C	Duncan et al, 2003 Fletcher et al, 2001 Gordon et al, 2004 MacKay-Lyons & Makrides, 2002
Inconsistent level of evidence – High volume – Non-current – Variable thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that for patients with ischemic stroke or TIA who are capable of engaging in physical activity, at least 3 to 4 sessions per week of moderate-to vigorous-intensity aerobic physical exercise, in addition to routine activities of daily living, are reasonable to reduce stroke risk factors. Sessions should last an average of 40 minutes. Moderate-intensity exercise is typically defined as sufficient to break a sweat or noticeably raise heart rate (e.g., walking briskly, using an exercise bicycle). Vigorous-intensity exercise includes activities such as jogging.	AHA-ASA 2014	Class IIa; Level C	Eckel et al, 2013 Kernan et al, 2013 Haskell et al, 2007 Katsiki et al, 2011 Lee et al, 2003 Li et al, 2012 Oguma et al, 2004 Willey et al, 2011 Wendel-Vos, 2004 Shiroma et al, 2010
	CANADIAN 2013	B	Armstrong et al, 2015 McDonnell et al, 2013 O'Donnell et al, 2010 Sattelmair et al, 2010 Lee et al, 2003
Consistent level of evidence – high volume – non-current – uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM endorses that patients with ischemic stroke or TIA who are capable of engaging in physical activity should have at least 3 to 4 sessions of supervised moderate to vigorous-intensity aerobic physical exercises per week in order to reduce stroke risk factors. Each session should last an average of 40 minutes.			

2011 Recommendation Statement			
There is some evidence that three 40 minute sessions of treadmill training a week for six months with a program of common components of conventional rehabilitation showed that treadmill training was superior at improving cardiovascular fitness.	SIGN 2010	1++	Macko et al, 2005

Low volume – Non-current
2017: No new evidence
PARM recommends three 40 minute sessions of treadmill training a week for six months with a program of common components of conventional rehabilitation.

2011 Recommendation Statement			
There is insufficient evidence that for those individuals with a disability following ischemic stroke, supervision by a healthcare professional, such as a physical therapist or cardiac rehabilitation professional, at least on initiation of an exercise regimen, may be considered	AHA (2011)	Class IIb Level C	
None			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that most people who have had a stroke or TIA should be encouraged to start a regular exercise program. For individuals with disability after ischemic stroke, supervision by a healthcare professional such as a physical therapist or cardiac rehabilitation professional, at least on initiation of an exercise regimen, may be considered.	AHA-ASA 2014	Class IIb, Level C	Gordon et al, 2004
	CANADIAN 2013	C	Armstrong et al, 2015 McDonnell et al, 2013 O'Donnell et al, 2010 Sattelmair et al, 2010 Lee et al, 2003
Inconsistent level of evidence – Moderate volume – non-current – uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends that individuals who have had a stroke or TIA should be encouraged to start a regular exercise program, supervised by a healthcare professional such as a physical therapist or cardiac rehabilitation professional, at least on initiation of an exercise regimen.			

2011 Recommendation Statement			
There is conflicting evidence that a combination of aerobic exercise and strength training could improve cardiovascular fitness after stroke.	USVA/ DoD	Class IIb, Level C	Duncan et al, 2003 Gordon et al, 2004 Fletcher et al, 2001 MacKay-Lyons & Makrides, 2002 Sacco et al, 1998
Moderate Volume – Non-current			
2017: No new evidence			
PARM suggests that a combination of aerobic exercise and strength training could improve cardiovascular fitness after stroke.			

2011 Recommendation Statement			
There is insufficient evidence for the reasons why older people do not participate in physical activities. These include: <ul style="list-style-type: none"> • lack of interest • lack of access to a car • shortness of breath • joint pain • dislike of going out alone • perceived lack of fitness • lack of energy • doubting that exercise can lengthen life. 	SIGN 2010	4	Crombie et al, 2004
Low Volume – Non-current			
2017: No new evidence			
PARM suggests educating patients on the perceived reasons why older people do not participate in physical activities, namely lack of interest, lack of access to a car, shortness of breath, joint pain, dislike of going out alone, perceived lack of fitness, lack of energy and doubting that exercise can lengthen life.			

2017 Recommendation Statement			
There is evidence that for patients who are able and willing to initiate increased physical activity, referral to a comprehensive, behaviorally oriented program is reasonable.	AHA-ASA 2014	Class IIa, Level C	Kernan et al, 2013 Tuomilehto et al, 2001 Harrison et al, 2005 Di Loreto, 2003 Boysen et al, 2009
Moderate volume – Non-current			
PARM endorses that patients who are willing and able to initiate increased physical activity after a stroke should be referred to a comprehensive, behavior-oriented program.			

2017 Recommendation Statement			
There is evidence that exercise is associated with significant reductions in risk for stroke and cardiovascular disease. Modest to high levels of activity performed regularly (once/week for at least 30 minutes) may be optimally beneficial for reducing stroke risk.	EBRSR 2016	1a	INTERSTROKE O'Donnell et al, 2010b Lee et al, 2003 Wendel-Vos et al, 2004 Reimers et al, 2009 Li & Siergrist, 2012 Calling et al, 2006 McDonnell et al, 2013 Fossum et al, 2007 Manson et al, 2002 Wisloff et al, 2006 Willey et al, 2009 Sattelmair et al, 2010 Willey et al, 2011 Li et al, 2013
High volume – Non-current			

PARM endorses that modest to high levels of activity be performed regularly (minimum of once/week for at least 30 minutes) in order to reduce the risk for stroke and cardiovascular disease.

2017 Recommendation Statement

There is evidence that individuals with TIA or stroke should be counseled and educated to reduce sedentary behaviors and to work towards increased activity goals as tolerated throughout their stroke recovery.	CANADIAN 2013	B	Armstrong et al, 2015 McDonnell et al, 2013 O'Donnell et al, 2010 Sattelmair et al, 2010 Lee et al, 2003
Moderate volume – Non-current			
PARM endorses that individuals with TIA or stroke should be educated to consistently reduce sedentary behaviors and to increase physical activity as tolerated.			

4.2.4 RECOMMENDATIONS FOR WEIGHT MAINTENANCE

Table 19. Weight management as part of secondary prevention for stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that weight reduction may be considered for all overweight ischemic stroke or TIA patients to maintain the goal of a BMI of 18.5 to 24.9 kg/m ² and a waist circumference of <35 in for women and <40 in for men.	USVA/ DoD	Class IIb, Level C	Abbott et al, 1994 Anderson & Konz, 2001 Dey et al, 2002 DiPietro et al, 1994 Flegal et al, 2002 Fontaine et al, 2003 Ford et al, 2003 Krauss et al, 2000 Kurth et al, 2002 Lindenstrom et al, 1993 Mann, 1974 Manson et al, 1995 Mokdad et al, 2003 Renaud et al, 1995 Rexrode et al, 1997 Selmer & Tverdal, 1995 Singh et al, 2002 Suk et al, 2003 Turcato et al, 2000 Walker et al, 1996 Weil et al, 2002 Williams et al, 2002
	CSS	B	Genest et al, 2009
	SIGN 2010	2+	Mulrow et al, 2004
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that individuals with TIA or stroke should be	CANADIAN 2013	B	Feigin et al, 2016 Twig et al, 2016

c counseled and educated to achieve a body mass index (BMI) of 18.5 to 24.9 kg/m ² ; or a waist circumference of <88 centimetres for women and <102 centimetres for men.			Saito et al, 2011 Bazzano et al, 2010 O'Donnell et al, 2010, 2016 Hu et al, 2007
Moderate volume – Non-current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM endorses that weight reduction may be considered for all overweight ischemic stroke or TIA patients to maintain the goal of a BMI of 18.5 to 24.9 kg/m ² and a waist circumference of <35 in for women and <40 in for men.			

2011 Recommendation Statement			
There is evidence that clinicians should encourage weight management through an appropriate balance of caloric intake, physical activity and behavioral counseling. There is evidence that dietary interventions to reduce weight were moderately effective at reducing blood pressure.	USVA/ DoD	Class IIb, Level C	Abbott et al, 1994 Anderson & Konz, 2001 Dey et al, 2002 DiPietro et al, 1994 Flegal et al, 2002 Fontaine et al, 2003 Ford et al, 2003 Krauss et al, 2000 Kurth et al, 2002 Lindenstrom et al, 1993 Mann, 1974 Manson et al, 1995 Mokdad et al, 2003 Renaud et al, 1995 Rexrode et al, 1997 Selmer & Tverdal, 1995 Singh et al, 2002 Suk et al, 2003 Turcato et al, 2000 Walker et al, 1996 Weil et al, 2002 Williams et al, 2002
SIGN 2010 1+ Mulrow et al, 2004			
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
2017: No new evidence			
PARM endorses that clinicians should encourage weight management through an appropriate balance of caloric intake, physical activity, and behavioral counseling. PARM endorses that the use of dietary interventions to reduce weight are moderately effective at reducing blood pressure.			

2017 Recommendation Statement			
There is evidence that all patients with TIA or stroke should be screened for obesity with measurement of BMI.	AHA-ASA 2014	Class I, Level C	Kernan et al, 2013 Katsiki et al, 2011 Kuklina et al, 2012 Yatsuya et al, 2010 Ruland et al, 2005

Moderate volume – Non-current
PARM endorses that all patients with TIA or stroke should be screened for obesity through measurement of body mass index.

2017 Recommendation Statement			
There is evidence that individuals with TIA or stroke who are overweight should be counseled and educated to set healthy weight loss goals and develop individualized plans to achieve goals. Referral to a dietitian should be considered.	CANADIAN 2013	B	Feigin et al, 2016 Twig et al, 2016 Saito et al, 2011 Bazzano et al, 2010 O'Donnell et al, 2010, 2016 Hu et al, 2007
Moderate volume - Current			
PARM endorses that individuals with TIA or stroke who are overweight should be educated to set healthy weight loss goals and develop individualized plans to achieve goals. A referral to a dietitian should also be included in the patient's plan.			

4.2.5 RECOMMENDATIONS FOR ALCOHOL CONSUMPTION

Table 20. Alcohol consumption as a risk factor for stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that chronic alcoholism and heavy drinking are risk factors for all stroke subtypes.	USVA/DoD	Class I, Level A	Gill et al, 1986 Hillbom et al, 1999 Klatsky et al, 2001 Mazzaglia et al, 2001 US Preventive Services Task Force, 2004 Wannamethee & Sharper, 1996
	CSS	C	Kiechl et al, 1998 Mazzaglia et al, 2001 Sacco, 1998 Truelson et al, 1998
	NSF	C	NHMRC, 2009 Reynolds et al, 2003
	SSP	Class I, Level A	Berger et al, 1999 Djousse et al, 2002 Gill et al, 1986 Stampfer et al, 1988
Inconsistent level of evidence – High volume – Non-current – Variable thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that heavy alcohol consumption and binge drinking increases the risk of stroke.	EBRSR 2016	1a	Reynolds et al, 2003 Mazzaglia et al, 2001 Patra et al, 2010
Low volume – non-current			

ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.

PARM recommends the avoidance of heavy alcohol consumption and binge drinking as these increase the risk of stroke.

2011 Recommendation Statement			
There is evidence that a primary goal for secondary stroke prevention is to eliminate or reduce alcohol consumption in heavy drinkers through established screening and counseling methods.	USVA/ DoD	Class I, Level A	Gill et al, 1986 Hillbom et al, 1999 Klatsky et al, 2001 Mazzaglia et al, 2001 US Preventive Services Task Force, 2004 Wannamethee & Sharper, 1996
	AHA (2011)	Class I Level C	Djousse et al, 2004 Gorelick et al, 1989 Hillbom et al, 1999 US Preventive Services Task Force, 2004

Inconsistent level of evidence – High volume – Non-current – Uniform thought

2017 Updated Recommendations and Evidence Sources

There is strong evidence that patients with ischemic stroke, TIA, or hemorrhagic stroke who are heavy drinkers should be counseled and educated to avoid, eliminate or reduce their consumption of alcohol.	AHA-ASA 2014	Class I, Level C	O'Donnell et al, 2010 Guiraud et al, 2010 Mostofsky, 2010 Sundell et al, 2008 US Preventive Services Task Force, 2004 Jonas et al, 2012
	CANADIAN 2013	Level B	Zhang et al, 2014 Zheng et al, 2015 Patra et al, 2010 O'Donnell et al, 2010 O'Donnell et al, 2016 Reynolds et al, 2003

Consistent level of evidence – high volume – non-current – uniform thought

ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.

PARM strongly endorses that a primary goal for secondary stroke prevention is to eliminate or reduce alcohol consumption in heavy drinkers through established screening and counseling methods.

2011 Recommendation Statement			
There is evidence that low to moderate levels of alcohol consumption may be considered non-detrimental to health. That is: 1 glass of wine per day, or no more than 2 – 3 units of alcohol	USVA/ DoD	Class IIb, Level C	-
	CSS	C	Kiechl et al, 1998 Mazzaglia et al, 2001 Sacco, 1998 Truelsen et al, 1998

<p>per day for non-pregnant women, and 2 glasses of wine per day or no more than 3 – 4 units of alcohol per day for men.</p> <p>There is some evidence that there should be at least two alcohol-free days per week for both men and women.</p>	SIGN 2010	GPP	Department of Health, 1995 MacGregor, 1991
	AHA (2011)	Class IIb Level B	Denburgh et al, 1993 Ernst & Resch, 1993 McKenzie et al, 1996 Pellegrini et al, 1996 Soyama et al, 2003 Torres Duarte et al, 1995 US Preventive Services Task Force, 2004
Inconsistent level of evidence –High volume – Non-current – Variable thought			
2017 Updated Recommendations and Evidence Sources			
<p>There is strong evidence that individuals with TIA or stroke should be counseled and educated to follow Canada's Low-Risk Alcohol Drinking Guidelines (2011): for women, no more than 10 drinks per week, with no more than 2 drinks per day most days and no more than 3 drinks on any single occasion; for men, no more than 15 drinks per week, with no more than 3 drinks per day most days and no more than 4 drinks on any single occasion.</p> <p>One standard drink is considered to be 13.6 g or 17.2 ml of ethanol, or approximately 44 mL of 80 proof (40%) spirits, 355 mL of 5% beer or 148 mL of 12% wine.</p>	AHA-ASA 2014	Class IIb; Level B	O'Donnell et al, 2010 Ronksley et al, 2011 Patra et al, 2010 Zhang et al, 2011
	CANADIAN 2013	B	Zhang et al, 2014 Zheng et al, 2015 Patra et al, 2010 O'Donnell et al, 2010 O'Donnell et al, 2016 Reynolds et al, 2003
Consistent level of evidence – high volume – non-current – uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM endorses limiting drinking to low to moderate levels. That is: 1 glass of wine per day, or no more than 2 – 3 units of alcohol per day for non-pregnant women, and 2 glasses of wine per day or no more than 3 – 4 units of alcohol per day for men			

2011 Recommendation Statement			
There is some evidence that irregular and binge drinking (more than 5 drinks at one sitting) have also been associated with an increase in risk for hemorrhagic stroke.	NSF	C	NHMRC, 2009 Reynolds et al, 2003
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			

There is some evidence that heavy alcohol consumption and binge drinking increases the risk of stroke.	EBRSP 2016	1a	Sundell et al, 2008
Low volume – non-current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM recommends informing patients that irregular and binge drinking (more than 5 drinks at one sitting) has also been associated with an increased risk for hemorrhagic stroke.			

4.3 RECOMMENDATIONS FOR BLOOD PRESSURE

Table 21. Management of hypertension as a major component of primary and secondary stroke prevention

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is strong evidence that hypertension is the most significant risk factor for stroke and contributes up to 34.6% of the population-attributed risk (PAR), and this rises to 52% when measured blood pressures are greater than 160/90 mm Hg.	CSS	A	O'Donnell et al, 2010
	SIGN 2010	1++	Rashid et al, 2003
Consistent level of evidence – Low volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that hypertension is the single most important modifiable risk factor for stroke. Blood pressure should be assessed and managed in all persons at risk for stroke.	CANADIAN 2013	A	O'Donnell et al, 2010 O'Donnell et al, 2016 Du et al, 2000 Lewington et al, 2002 Bestehorn et al, 2008 Rapsomanki et al, 2014
Moderate volume – Non-current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM strongly endorses the assessment and effective management of blood pressure in all persons at risk for stroke, because hypertension is the single most important modifiable risk factor for stroke.			

2011 Recommendation Statement			
There is strong evidence that antihypertensive treatment is recommended for prevention of recurrent stroke and other vascular events in persons who have had an ischemic stroke and	USVA/ DoD	Class I, Level A	Lawes et al, 2004 Rodgers et al, 1996 Yusuf et al, 2000
	USVA/ DoD	Class IIa, Level B	Chobanian et al, 2003 Goldstein et al, 2001
	NSF	A	Lakhan & Sapko, 2009

are beyond the hyperacute period.	SSP	Class I, Level A	Nazir et al, 2004 Yusuf et al, 2000 Lawes et al, 2004
	AHA (2011)	Class I, Level A Class IIa, Level B	Heart Outcomes Prevention Evaluation Study Investigators, 2000 Hypertension-Stroke Cooperative Study Group, 1974 Lawes et al, 2004 Lewington et al, 2002 PATS Collaborating Group, 1995 PROGRESS Collaborative Group, 2001 Rashid et al, 2003 The Dutch TIA Trial Study Group, 1993 Turnbull, 2003
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017: No new evidence			
PARM strongly endorses that antihypertensive treatment is recommended for prevention of recurrent stroke and other vascular events in persons who have had an ischemic stroke and are beyond the hyperacute period.			

2011 Recommendation Statement			
There is some evidence that regular screening for hypertension (at least every 2 years in most adults and more frequently in minority population and the elderly) and appropriate management including dietary changes, lifestyle modification and pharmacological therapy are needed for primary stroke prevention.	SSP	Class I, Level A	Chobanian et al, 2003
Low volume – Non-current			
2017: No new evidence			
PARM recommends that regular screening for hypertension (at least every 2 years in most adults and more frequently in minority population and the elderly) and appropriate management including dietary changes, lifestyle modification and pharmacological therapy are needed for primary stroke prevention.			

2011 Recommendation Statement			
There is evidence that an absolute target blood pressure	USVA/ DoD	Class IIa, Level B	Chobanian et al, 2003

level or reduction target levels are uncertain and should be individualized, but benefit has been associated with an average reduction of <10/5 mm Hg and normal levels have been defined as <120/80 by Chobanian et al, (2003).	SSP	Class IIa, Level B	Chobanian et al, 2003
	AHA (2011)	Class IIa, Level B	Chobanian et al, 2003
Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that goals for target BP level or reduction from pretreatment baseline are uncertain and should be individualized, but it is reasonable to achieve a systolic pressure <140 mm Hg and a diastolic pressure <90mm Hg.	AHA-ASA 2014	Class IIa, Level B	Chobanian et al, 2003 Mancia et al, 2013 Go et al, 2014 James et al, 2014 Cushman et al, 2010 Cooper-DeHoff et al, 2010 Ovbiagele et al, 2011 Ovbiagele et al, 2013
	CANADIAN 2013	B	Lee et al, 2012 Law et al, 2009 Musini et al, 2009 Benavente et al, 2013 Hanssen et al, 1998
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 4: The recommendation and the strength of evidence changes (increased) from the 2011 PARM guideline.			
PARM strongly endorses that target blood pressure level reduction from pretreatment baseline blood pressure should be individualized, and it is reasonable to achieve a systolic blood pressure <140 mm Hg and a diastolic pressure <90 mm Hg.			

2011 Recommendation Statement			
There is some evidence that current guidelines for management of hypertension from the British Hypertension Society suggest systolic blood pressure should be treated to <140 mm Hg and diastolic blood pressure to <85 mm Hg with a target of 130/80 mm Hg for patients with diabetes.	SIGN 2010 CSS	4 C	Neal et al, 2000 Beckett et al, 2008 Bestehorn et al, 2008 Dahlöf et al, 1997 Du et al, 2000 Girerd & Giral, 2004 Gueyffier et al, 1997 Heart Outcomes Prevention Evaluation Study Investigators, 2000 Khan et al, 2008 Launer et al, 1995 Lewington et al, 2002 Lithell et al, 2003 Musini et al, 2009

		PROGRESS Collaborative Group, 2001 Rodgers et al, 1996 Schrader et al, 2003 Weber, 2005
Consistent level of evidence – High volume – Non-current – Uniform thought		
2017: No new evidence		
PARM recommends the using the current guidelines for management of hypertension from the British Hypertension Society suggest systolic blood pressure should be treated to <140 mm Hg and diastolic blood pressure to <85 mm Hg with a target of 130/80 mm Hg for patients with diabetes.		

2017 Recommendation Statement			
There is some evidence that in patients with diabetes, blood pressure lowering treatment is recommended for the prevention of first or recurrent stroke to attain systolic blood pressure targets consistently lower than 130 mm Hg and diastolic blood pressure targets consistently lower than 80 mm Hg.	CANADIAN 2013	A	Hanssen et al, 1998
Low volume – Non-current			
PARM recommends that blood pressure lowering treatment be prescribed to patients with diabetes for the prevention of first or recurrent stroke, with the goal of achieving a target systolic blood pressure consistently lower than 130 mm Hg and a target diastolic blood pressure consistently lower than 80 mm Hg.			

2017 Recommendation Statement			
There is insufficient evidence that in patients with non-diabetic chronic kidney disease and stroke, blood pressure lowering treatment is recommended for the prevention of first or recurrent stroke to attain a blood pressure consistently lower than 140/90mm Hg.	CANADIAN 2013	C	James PA et al, 2014
Low volume - Current			
PARM suggests that blood pressuring lowering treatment be given to patients with non-diabetic chronic kidney disease and stroke in order to prevent first or recurrent stroke, with the goal of consistently achieving a blood pressure lower than 140/90 mm Hg.			

2011 Recommendation Statement			
There is insufficient evidence that several lifestyle modifications	USVA/ DoD	Class IIb, Level C	Chobanian et al, 2003

<p>have been associated with blood pressure reductions and should be included as part of a comprehensive approach to antihypertensive therapy.</p> <p>These modifications include salt restriction; weight loss; consumption of a diet rich in fruits, vegetables, and low-fat dairy products; regular aerobic physical activity; and limited alcohol consumption.</p>	SSP	Class IIb, Level C	Chobanian et al, 2003
	AHA (2011)	Class IIb, Level C	Chobanian et al, 2003
Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
<p>There is strong evidence that several lifestyle modifications have been associated with BP reductions and are a reasonable part of a comprehensive antihypertensive therapy.</p> <p>These modifications include salt restriction; weight loss; the consumption of a diet rich in fruits, vegetables, and low-fat dairy products; regular aerobic physical activity; and limited alcohol consumption.</p>	AHA-ASA 2014	Class II, Level C	Kernan et al, 2013 Estruch et al, 2006 Sacks et al, 2001 Chobanian et al, 2003
	CANADIAN 2013	B	Irish Heart Foundation: Council for Stroke, 2010 Kernan et al, 2014
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends that several lifestyle modifications should be included as part of a comprehensive approach to antihypertensive therapy. These modifications include salt restriction; weight loss; consumption of a diet rich in fruits, vegetables, and low-fat dairy products; regular aerobic physical activity; and limited alcohol consumption.			

2011 Recommendation Statement			
<p>There is strong evidence that support the use of diuretics; and the combination of diuretics and angiotensin converting enzyme (ACE) inhibitors is effective in hypertension management.</p> <p>There is strong evidence that the choice of specific drugs and targets should be individualized</p>	USVA /DoD	Class 1, Level A	Rashid et al, 2003 Svensson et al, 2001
	SIGN 2010	A	Chapman et al, 2004 Schrader et al, 2005
	SIGN 2010	1+	Chapman et al, 2004 Schrader et al, 2005
	SSP	Class I, Level A Class IIb	Rashid et al, 2003

on the basis of reviewed data and consideration, as well as specific patient characteristics (e.g., extracranial cerebrovascular occlusive disease, renal impairment, cardiac disease and diabetes mellitus (DM)).		Level C	
	AHA 2011	Class I Level A Class IIa Level B	Schrader et al, 2005 Yusuf et al, 2000
Consistent level of evidence –High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that the optimal drug regimen to achieve the recommended level of reductions is uncertain because direct comparisons between regimens are limited. The available data indicate that diuretics or the combination of diuretics and an angiotensin-converting enzyme inhibitor is useful. The choice of specific drugs and targets should be individualized on the basis of pharmacological properties, mechanism of action, and consideration of specific patient characteristics for which specific agents are probably indicated (e.g., extracranial cerebrovascular occlusive disease, renal impairment, cardiac disease, and DM).	AHA-ASA 2014	Class I, Level A	Rashid et al, 2003 Schrader et al, 2005
Low volume – Non-current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline. PARM strongly endorses the use of diuretics; and the combination of diuretics and ACE inhibitors is effective in hypertension management. PARM strongly endorses that the choice of specific drugs and targets should be individualized on the basis of reviewed data and consideration of pharmacological properties and mechanism of action, as well as specific patient characteristics (e.g., extracranial cerebrovascular occlusive disease, renal impairment, cardiac disease, and DM).			

2017 Recommendation Statement			
There is evidence that initiation of BP therapy is indicated for previously untreated patients with ischemic stroke or TIA who, after the first several days, have an established BP \geq 140 mm Hg systolic or \geq 90 mm Hg diastolic.	AHA- ASA 2014	Class I, Level B	Arima et al, 2006 Liu et al, 2009 Chobanian et al, 2003 Go et al, 2014 Cushman et al, 2010 Goldstein et al, 2011

Initiation of therapy for patients with BP <140 mm Hg systolic and <90 mm Hg diastolic is of uncertain benefit.		Class IIb, Level C	
Moderate volume – Non-current			
PARM endorses that blood pressure therapy should be initiated in previously untreated patients with ischemic stroke or TIA who, after the first several days, have an established BP>140 mm Hg systolic or >90 mm Hg diastolic.			

2017 Recommendation Statement			
There is some evidence that resumption of BP therapy is indicated for previously treated patients with known hypertension for both prevention of recurrent stroke and prevention of other vascular events in those who have had an ischemic stroke or TIA and are beyond the first several days.	AHA- ASA 2014	Class I, Level A	Lawes et al, 2004 Yusuf et al, 2000 Turnbull et al, 2003
Low volume – Non-current			
PARM recommends that BP therapy be resumed for previously treated patients with known hypertension for both prevention of recurrent stroke and prevention of other vascular events in those who have had an ischemic stroke or TIA and are beyond the first several days.			

2017 Recommendation Statement			
There is some evidence that blood pressure lowering treatment should be initiated or modified before discharge from hospital.	CANADIAN 2013	B	Royal College of Physicians National Clinical guidelines for stroke, 2016 National Stroke Foundation Clinical Guidelines for Stroke Management, 2010
Low volume - Current			
PARM recommends that blood pressure lowering treatment should be initiated or modified, if necessary, before discharge from hospital.			

4.4 RECOMMENDATIONS FOR ANTIPLATELET USE

Table 22. Antiplatelet therapy in the management of stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that for patients with non-cardioembolic ischemic stroke or TIA, antiplatelet agents rather than	USVA/ DoD	Class I, Level A	Antithrombotic Trialists Collaboration, 2002
	NSF	A	Antithrombotic Trialists Collaboration, 2002

oral anticoagulation are recommended to reduce the risk of recurrent stroke and other cardiovascular events.	AHA 2011	Class I Level A	Antithrombotic Trialists Collaboration, 2002
Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that for patients with non-cardioembolic ischemic stroke or TIA, the use of antiplatelet agents rather than oral anticoagulation is recommended to reduce the risk of recurrent stroke and other cardiovascular events.	AHA- ASA 2014	Class I, Level A	Antithrombotic Trialists Collaboration, 2002
	CANADIAN 2013	A	The Antithrombotic Trialists' Collaboration, 2002 Baigent et al, 2009
Consistent level of evidence – Low volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM endorses that for patients with non-cardioembolic ischemic stroke or TIA, antiplatelet agents rather than oral anticoagulation are recommended to reduce the risk of recurrent stroke and other cardiovascular events.			

2011 Recommendation Statement			
There is strong evidence that acetylsalicylic acid (50 to 325 mg/d), the combination of acetylsalicylic acid (25 mg) and extended-release dipyridamole (200mg), and clopidogrel (75 mg) are all acceptable options for initial therapy taking into consideration the patient's co-morbidities.	USVA/ DoD	Class IIa, Level A	Antiplatelet Trialists Collaboration, 1994 CAPRIE Steering Committee, 1996 Diener et al, 1996, 2004 The Canadian Cooperative Study Group, 1978
	USVA/ DoD	Class IIb, Level B	Bennett et al, 2000 Bhatt et al, 2002 CAPRIE Steering Committee, 1996 Ringleb et al, 2004
	NSF	A	Antithrombotic Trialists Collaboration, 2002 Sacco et al, 2008
	CSS	A	-
	AHA 2011	Class I Level A Class I Level B Class IIa Level B	Antiplatelet Trialists Collaboration, 1994 Antithrombotic Trialists Collaboration, 2002 CAPRIE Steering Committee, 1996 Diener et al, 1996 He et al, 1998 Johnson et al, 1999 Roberts et al, 2008 Sacco et al, 2008

			The Dutch TIA Trial Study Group, 1991 The ESPRIT Study Group, 2006 The ESPS Group, 1987 The SALT Collaborative Group, 1991 Weisman & Graham, 2002
Consistent level of evidence – High volume – Non-current –Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that Aspirin (50–325 mg/d) monotherapy or the combination of aspirin 25 mg and extended-release dipyridamole 200 mg twice daily (<i>Class I; Level of Evidence B</i>) is indicated as initial therapy after TIA or ischemic stroke for prevention of future stroke.	AHA-ASA 2014	Class I, Level A Class I, Level B	Farrell et al, 1991 The Dutch TIA Trial Study Group, 1991 The Canadian Cooperative Study Group, 1978 Antiplatelet Trialists' Collaboration, 1994 Johnson et al, 1999 The ESPS Group, 1987 Diener et al, 1996 The ESPRIT Study Group, 2006 Sacco et al, 2008 Dengler et al, 2010
	CANADIAN 2013	A	European/Australasian Stroke Prevention in Reversible Ischaemia Trial (ESPRIT) Wong et al, 2013 Prevention Regimen for Effectively avoiding Second Stroke (PRoFESS) trial, Sacco et al, 2008
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM strongly endorses that acetylsalicylic acid (50 to 325 mg/d), the combination of acetylsalicylic acid (25 mg) and extended-release dipyridamole (200mg), and clopidogrel (75 mg) are all acceptable options for initial therapy taking into consideration the patient's comorbidities.			

2011 Recommendation Statement			
There is some evidence that aspirin 300 mg daily should be commenced within 48 hours of ischemic stroke and continued for at least 14 days.	SIGN 2010	A, 1++	Sandercock et al, 2008a

Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is evidence that ASA therapy effectively reduces the risk for recurrent stroke and should be initiated as soon as it is safe following the onset of the stroke event and maintained over the long-term.	EBRSR 2016	Level 1a, Level 2	Acelajado & Oparil, 2012 Antithrombotic Trialists' collaborative (ATTC), 2002 Algra and van Gijn, 1999 Baigent et al, 2009 Swedish ASA Low-dose trial, 1991 Chinese Acute Stroke Trial Collaborative Group, 1997 Dutch TIA Trial Study Group, 1991 International Stroke Trial Collaborative Group, 1997 Brighton et al, 2013 Georgiadis et al, 2013 Diener & Ringleb, 2002 Garcia Rodriguez et al, 2011
High volume – Non-current			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline. PARM endorses that aspirin 300 mg daily should be commenced within 48 hours of ischemic stroke and continued for at least 14 days.			

2011 Recommendation Statement			
There is insufficient evidence that aspirin should be avoided within 24 hours of intravenous (IV) and intra-arterial (IA) thrombolytic therapy.	SIGN 2010	GPP	SIGN 2010
Low volume			
2017: No new evidence			
PARM suggests that aspirin should be avoided within 24 hours of IV or IA thrombolytic therapy.			

2011 Recommendation Statement			
There is some evidence that aspirin alone can be used, particularly in people who do not tolerate aspirin in combination with dipyridamole or clopidogrel.	NHMRC	A	Antithrombotic Trialists Collaboration, 2002
Low volume – Non-current			
2017: No new evidence			

PARM recommends that aspirin alone can be used, particularly in people who do not tolerate aspirin in combination with dipyridamole or clopidogrel.

2011 Recommendation Statement

There is insufficient evidence that for patients allergic to aspirin, clopidogrel is reasonable.	USVA/ DoD	Class IIa, Level B;	Knapp et al, 2004 Piette et al, 2004
	AHA 2011	Class IIa Level C	-

Inconsistent level of evidence – Low volume – Non-current –Uniform thought

2017 Updated Recommendations and Evidence Sources

There is some evidence that Clopidogrel (75 mg) monotherapy is a reasonable option for patients who are allergic to aspirin.	AHA-ASA 2014	Class IIa, Level B	CAPRIE Steering Committee, 1996 Sacco et al, 2008
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Low volume – Non-current

ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.

PARM recommends that for patients allergic to aspirin, clopidogrel is a reasonable option.

2011 Recommendation Statement

There is some evidence that in children with stroke, the usual maintenance dosage of acetylsalicylic acid is 1 to 5 mg/kg per day for the prevention of recurrent stroke. There is some evidence that for teens, the maximum dose should be up to 325 mg per day.	CSS	B	Hirsh et al, 2008
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Low volume – Non-current

2017: No new evidence

PARM recommends that in children with stroke, the usual maintenance dosage of acetylsalicylic acid is 1 to 5 mg/kg per day for the prevention of recurrent stroke and for teens, the maximum dose should be up to 325 mg per day.

2011 Recommendation Statement

There is insufficient evidence that clopidogrel may be considered an alternative for pediatric patients with contraindications to acetylsalicylic acid.	CSS	C	Soman et al, 2006
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Low volume – Non-current

2017 Updated Recommendations and Evidence Sources

There is insufficient evidence for the use of clopidogrel in children at this time. Clopidogrel may be considered as an alternative for adolescents at a dose of 1	AHA- ASA 2014	C	Soman et al, 2006
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mg/kg/day up to a maximum of 75 mg/day especially in the context of ASA allergy. Younger children may have higher anti-platelet effects of clopidogrel, and the suggested doses should be considered within the range of 0.2 – 0.5 mg/kg/day.			
Low volume – non-current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM suggests that clopidogrel may be considered an alternative for pediatric patients with contraindications to acetylsalicylic acid. The recommended dose for adolescents is 1 mg/kg/day up to a maximum of 75 mg/day especially in the context of ASA allergy. The suggested dose of clopidogrel for younger children should be considered within the range of 0.2 – 0.5 mg/kg/day.			

2011 Recommendation Statement

There is some evidence that the combination of aspirin and clopidogrel is not recommended for secondary prevention of cerebrovascular disease in people who do not have acute coronary disease or recent coronary stent.	NSF	A	Bhatt et al, 2006 Diener et al, 2004
	SIGN 2010	2	Kennedy et al, 2007
	USVA/ DoD	Class III, Level A	Diener et al, 1996
	AHA 2011	Class III Level A	Bhatt et al, 2006 Diener et al, 2004 Kennedy et al, 2007

Inconsistent level of evidence – Moderate volume – Non-current – Uniform thought

2017 Updated Recommendations and Evidence Sources

There is some evidence that combination of aspirin and clopidogrel, when initiated days to years after a minor stroke or TIA and continued for 2 to 3 years, increases the risk of hemorrhage relative to either agent alone and is not recommended for routine long-term secondary prevention after ischemic stroke or TIA, unless there is an alternate indication (e.g., coronary drug-eluting stent requiring dual antiplatelet therapy).	AHA-ASA 2014	Class III, Level A	Diener et al, 2004 Benavente et al, 2012 Bhatt et al, 2006 Wang et al, 2013 Kennedy et al, 2007
	CANADIAN 2013	A	Bhatt et al, 2006 Kennedy et al, 2007 Benavente et al, 2012 Cote et al, 2014 Wang et al, 2013 Palacio et al, 2015 Deiner et al, 2004

Inconsistent level of evidence – Moderate volume – Non-current – Uniform thought

ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.

PARM does not recommend the combination of aspirin and clopidogrel for the secondary prevention of cerebrovascular disease in people who do not have acute coronary disease or recent coronary stent.

4.5 RECOMMENDATIONS FOR LIPID LOWERING

Table 23. Serum lipid management as a component of stroke prevention

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that patients who have had an ischemic stroke or transient ischemic attack should have their serum lipid levels assessed and aggressively managed.	CSS	A	-
None			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that lipid levels, including total cholesterol, total triglycerides, low-density lipoprotein [LDL] cholesterol, and high-density lipoprotein [HDL] cholesterol, should be measured on all patients presenting with stroke or TIA.	CANADIAN 2013	B	The Heart Protection Study, 2002
Low volume – Non-current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM recommends that patients who have had an ischemic stroke or transient ischemic attack should have their serum lipid levels assessed and aggressively managed.			

2011 Recommendation Statement			
There is insufficient evidence that fasting lipid levels (total cholesterol, total glycerides, low-density lipoprotein [LDL] cholesterol, high-density lipoprotein [HDL] cholesterol) should be measured every one to three years for men 40 years or older and for women who are postmenopausal and/or 50 years or older. Adults at any age should have their blood lipid levels measured if they have a history of diabetes, smoking, hypertension, obesity, ischemic heart disease, renal vascular disease, peripheral vascular disease, ischemic stroke,	CSS	C	-

transient ischemic attack, or asymptomatic carotid stenosis.			
None			
2017: No new evidence			
PARM suggests that fasting lipid levels (total cholesterol, total glycerides, LDL cholesterol, HDL cholesterol) should be measured every one to three years for men 40 years or older and for women who are postmenopausal and/or 50 years or older.			
PARM suggests that adults at any age should have their blood lipid levels measured if they have a history of diabetes, smoking, hypertension, obesity, ischemic heart disease, renal vascular disease, peripheral vascular disease, ischemic stroke, transient ischemic attack, or asymptomatic carotid stenosis.			

2011 Recommendation Statement			
There is some evidence that other parameters need to be considered, including a 50% reduction in LDL concentration or apolipoprotein B level of <0.80 g/L.	CSS	B	Genest et al, 2009
Low volume – Current			
2017: No new evidence			
PARM recommends that other parameters may be considered including a 50% reduction in LDL concentration or apolipoprotein B level of <0.80 g/L be assessed.			

2011 Recommendation Statement			
There is strong evidence that therapy with a statin agent should be used with a patient with ischemic stroke or TIA.	NSF	A	Amarenco et al, 2009 Manktelow & Potter, 2009
	SIGN 2010	1++	Amarenco et al, 2004a Amarenco et al, 2006 Cheung et al, 2004 Heart Protection Study Collaborative Group, 2004
	CSS	A	-
	AHA 2011	Class I Level B	Amarenco et al, 2004a Bang et al, 2008 Bansal et al, 2007 Collins et al, 2004 Freiberg et al, 2008 Ovbiagele, 2007
Consistent level of evidence –High volume – Current – Uniform thought			
2017: No new evidence			
PARM strongly endorses the use of statin in patients with ischemic stroke or TIA.			

2011 Recommendation Statement			
There is strong evidence that statin agents are recommended,	USVA/ DoD	Class I, Level A	Amarenco et al, 2003 Collins et al, 2004

and the target goal for cholesterol lowering for those with coronary heart disease or symptomatic atherosclerotic disease is an LDL-C of < 100 mg/dL and LDL-C of < 70 mg/dL for very-high-risk persons with multiple risk factors.	SSP	Class I, Level A	-
	AHA 2011	Class IIa Level B	Amarenco et al, 2007 Amarenco et al, 2004a
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that a statin should be prescribed as secondary prevention to patients who have had an ischemic stroke or transient ischemic attack in order to achieve a target LDL cholesterol consistently less than 2.0 mmol/L or >50% reduction of LDL cholesterol, from baseline.	CANADIAN 2013	B	Amarenco et al, 2006 Putala et al, 2011 CCS Lipid Guideline update, 2016 Baigent et al, 2010 Mihaylova et al, 2012 O'Regan et al, 2008 Yusuf et al, 2016 Armitage et al, 2010
High volume – Non-current			
ADAPTE 3: The recommendation and the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM endorses that a statin should be prescribed as secondary prevention to patients who have had an ischemic stroke or transient ischemic attack in order to achieve a target LDL cholesterol consistently less than 2.0 mmol/L or >50% reduction of LDL cholesterol, from baseline.			

2017 Recommendation Statement			
There is some evidence that for individuals with stroke, a recent acute coronary syndrome or established coronary disease, treatment to more aggressive targets (LDL-C <1.8 mmol/L or >50% reduction) should be considered.	CANADIAN 2013	A	Vytorin Efficacy International Trial (IMPROVE-IT)
Low volume			
PARM recommends that for individuals with stroke, a recent acute coronary syndrome or established coronary disease, a more aggressive target of LDL-C < 1.8 mmol/L or > 50% reduction from baseline should be considered in the treatment program.			

2017 Recommendation Statement			
There is some evidence that adults with diabetes and ischemic stroke are at high risk of further vascular events and should also be treated with a statin to achieve a low-density lipoprotein cholesterol ≤2.0 mmol/L.	CANADIAN 2013	B	Baigent et al, 2010
Low volume – Non-current			

PARM recommends that adults with diabetes and ischemic stroke should also be treated with a statin to achieve a low-density lipoprotein cholesterol ≤ 2.0 mmol/L in order to decrease the risk of further vascular events.

2011 Recommendation Statement

There is strong evidence that statins should not be used routinely for hemorrhagic strokes.	NSF	B	Amarenco et al, 2009 Manktelow & Potter, 2009
	SIGN 2010	1++	Amarenco et al, 2004a Amarenco et al, 2006 Cheung et al, 2004 Heart Protection Study Collaborative Group, 2004
Consistent level of evidence – Low volume – Current – Uniform thought			
2017: No new evidence			
PARM does not endorse the use of statins in patients with hemorrhagic strokes.			

2011 Recommendation Statement

There is strong evidence that patients with ischemic stroke or TIA presumed to be due to an atherosclerotic origin but with no preexisting indications for statins (normal cholesterol levels, no comorbid coronary artery disease (CAD), or no evidence of atherosclerosis) are reasonable to consider for treatment with a statin agent to reduce the risk of vascular events.	USVA/ DoD	Class IIa, Level B	Amarenco et al, 2004b
	SSP	Class IIa, Level B	-
	AHA 2011	Class I Level B	Amarenco et al, 2004a Bang et al, 2008 Bansal et al, 2007 Collins et al, 2004 Freiberg et al, 2008 Ovbiagele, 2007
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
2017: No new evidence			
PARM strongly endorses that patients with ischemic stroke or TIA presumed to be due to an atherosclerotic origin but with no preexisting indications for statins (normal cholesterol levels, no comorbid CAD, or no evidence of atherosclerosis) should be considered for treatment with a statin agent to reduce the risk of vascular events.			

2017 Recommendation Statement

There is evidence that statin therapy with intensive lipid-lowering effects is recommended to reduce risk of stroke and cardiovascular events among patients with ischemic stroke or TIA presumed to be of atherosclerotic origin and an LDL-C level ≥ 100 mg/dL with or without evidence for other clinical ASCVD.	AHA-ASA 2014	Class I, Level B	Stone et al, 2013 NCEP, 2001 Goff et al, 2013
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Low volume - Current
PARM recommends that statin therapy with intensive lipid-lowering effects is recommended to reduce the risk of stroke and cardiovascular events among patients with ischemic stroke or TIA presumed to be of atherosclerotic origin and an LDL-C level ≥ 100 mg/dL with or without evidence for other clinical ASCVD.

2011 Recommendation Statement			
There is evidence that ischemic stroke or TIA patients with low HDL-C may be considered for treatment with niacin or gemfibrozil.	USVA/DoD	Class IIb, Level B	Bloomfield Rubins et al, 2001 The Coronary Drug Project Research Group, 1975
	SSP	Class IIb, Level B	-
	AHA 2011	Class IIb, Level B	Bloomfield Rubins et al, 2001 The Coronary Drug Project Research Group, 1975
Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017: No new evidence			
PARM endorses that ischemic stroke or TIA patients with low HDL-C may be considered for treatment with niacin or gemfibrozil.			

2011 Recommendation Statement			
There is some evidence that patients with ischemic stroke or TIA with elevated cholesterol or comorbid coronary artery disease should be otherwise managed according to the NCEP III guidelines, which include lifestyle modification, dietary guidelines, and medication recommendations	AHA 2011	Class I, Level A	Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults, 2001 Grundy et al, 2004
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that patients with ischemic stroke or TIA and other comorbid ASCVD should be otherwise managed according to the 2013 ACC/AHA cholesterol guidelines, which include lifestyle modification, dietary recommendations, and medication recommendations.	AHA-ASA 2014	Class I, Level A	Stone et al, 2013
Low volume - Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			

PARM recommends that patients with ischemic stroke or TIA with elevated cholesterol or comorbid coronary artery disease should be otherwise managed according to the NCEP III guidelines and the 2013 ACC/AHA cholesterol guidelines, which include lifestyle modification, dietary guidelines, and medication recommendations.

4.6 RECOMMENDATIONS FOR CAROTID STENOSIS

Table 24. Management options for carotid artery stenosis to decrease the risk for stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that optimal medical therapy, which should include antiplatelet therapy, statin therapy, and risk factor modification, is recommended for all patients with carotid artery stenosis and a TIA or stroke.	AHA 2011	Class I Level B	-
None			
2017: No new evidence			
PARM recommends that optimal medical therapy, which should include antiplatelet therapy, statin therapy, and risk factor modification, be used for all patients with carotid artery stenosis and a TIA or stroke.			

2011 Recommendation Statement			
There is strong evidence that for patients with recent TIA or ischemic stroke within the last 6 months and ipsilateral severe (70% to 99%) carotid artery stenosis, CEA (Carotid Endarterectomy) should be offered as soon as possible, optimally within fourteen days of the incident event once the patient is clinically stable and performed by a specialist surgeon with low rates of perioperative morbidity and mortality of <6%.	USVA/ DoD	Class I-A	Barnett et al, 1998 European Carotid Surgery Trialists Collaboration Group, 1991 Mayberg et al, 1991
	CSS	A	Brott et al, 2010
	NSF	A	Cina et al, 1999 Ederle et al, 2007 Rothwell et al, 1996, 2003, 2004
	SSP	Class I, Level A	Barnett et al, 1998 Farrel et al, 1998 Mayberg et al, 1991 Rothwell et al, 2003
	AHA (2011)	Class I, Level A Class IIa; Level B	Baron et al, 2008 Eckstein et al, 2002 Rothwell et al, 2003
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			

There is strong evidence that for patients with a TIA or ischemic stroke within the past 6 months and ipsilateral severe (70%–99%) carotid artery stenosis as documented by noninvasive imaging, CEA is recommended if the perioperative morbidity and mortality risk is estimated to be <6%.	AHA-ASA 2014	Class I, Level A	North American Symptomatic Carotid Endarterectomy Trial Collaborators, 1991 European Carotid Surgery Trialists Collaborative Group, 1991 Mayberg et al, 1991 Rothwell et al, 2003
	CANADIAN 2013	B	North American Symptomatic Carotid Endarterectomy Trial (NASCET), 1991 European Carotid Surgery Trial (ECST), 1998 Veterans Affairs Trial Mayberg et al, 1991 Rerkasem & Rothwell, 2011
	EBRSR 2016	1a	Barnett et al, 1998 Goldszmidt & Caplan, 2003 Barnett, 1991 Bettmann et al, 1998 Hill et al, 2004 NASCET Trial Collaborators, 1991, 1998 ECST Trial Collaborative Group, 1991, 2003 Rothwell et al, 2003
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM strongly endorses that for symptomatic carotid stenosis patients with recent TIA or ischemic stroke within the last 6 months and ipsilateral severe (70% to 99%) carotid artery stenosis, should be offered CEA as soon as possible, optimally within fourteen days of the incident event once the patient is clinically stable and CEA must be performed by an expert cardiac interventionist/specialist surgeon with low rates of perioperative morbidity and mortality of <6%.			

2011 Recommendation Statement

There is some evidence that CAS (carotid angiography and stenting) is indicated as an alternative to CEA for symptomatic patients at average or low risk of complications	AHA (2011)	Class I; Level B	Brott et al, 2010 CAVATAS Investigators, 2001 Hobson, 2002 Mas et al, 2006 Ringleb et al, 2006
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<p>associated with endovascular intervention when the diameter of the lumen of the internal carotid artery is reduced by >70% by noninvasive imaging or >50% by catheter angiography.</p> <p>CAS in the above setting is reasonable when performed by operators with established periprocedural morbidity and mortality rates of 4% to 6%, similar to those observed in trials of CEA and CAS</p>		Class IIa Level B	Stoner et al, 2006
Moderate volume – Current			
2017 Updated Recommendations and Evidence Sources			
<p>There is some evidence that CAS is indicated as an alternative to CEA for symptomatic patients at average or low risk of complications associated with endovascular intervention when the diameter of the lumen of the ICA is reduced by >70% by noninvasive imaging or >50% by catheter-based imaging or noninvasive imaging with corroboration and the anticipated rate of periprocedural stroke or death is <6%.</p> <p>CAS and CEA in the above settings should be performed by operators with established periprocedural stroke and mortality rates of <6% for symptomatic patients, similar to that observed in trials comparing CEA to medical therapy and more recent observational studies.</p>	AHA-ASA 2014	Class IIa, Level B	Cohen et al, 2011 Bonati et al, 2012
Low volume - current			
<p>ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.</p> <p>PARM recommends CAS (carotid angiography and stenting) be used as an alternative to CEA for symptomatic patients at average or low risk of complications associated with endovascular intervention when the diameter of the lumen of the internal carotid artery is reduced by >70% by noninvasive imaging or >50% by catheter angiography.</p>			

2011 Recommendation Statement			
There is some evidence that among patients with symptomatic severe stenosis (>70%) in whom the stenosis is difficult to access surgically, medical conditions are present that greatly increase the risk for surgery, or when other specific circumstances exist, such as radiation induced stenosis or restenosis after CEA, CAS may be considered.	AHA (2011)	Class IIb Level B	Brott et al, 2010 CAVATAS Investigators, 2001 Hobson, 2002 Mas et al, 2006 Ringleb et al, 2006 Stoner et al, 2006
Moderate volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is evidence that among patients with symptomatic severe stenosis (>70%) in whom anatomic or medical conditions are present that greatly increase the risk for surgery or when other specific circumstances exist such as radiation-induced stenosis or restenosis after CEA, CAS is reasonable.	AHA-ASA 2014	Class IIa, Level B	CAVATAS, 2001 Yadav et al, 2004 Liu et al, 2012 Ranther et al, 2013 International Carotid Stenting Study Investigators, 2010 Carotid Stenting Trialists' Collaboration, 2010
Moderate volume – Non-current			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends that among patients with symptomatic severe stenosis (>70%) in whom the stenosis is difficult to access surgically, medical conditions are present that greatly increase the risk for surgery, or when other specific circumstances exist, such as radiation induced stenosis or restenosis after CEA, CAS may be used.			

2011 Recommendation Statement			
There is some evidence that for patients with asymptomatic stenosis of > 60% with a life expectancy of at least 5 years, CEA is recommended. The perioperative risk can be reliably documented to be <3%.	SSP	Class I, Level A	-
None			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that carotid endarterectomy may be considered for selected patients with 60 to 99 percent carotid stenosis who are asymptomatic or were remotely symptomatic (i.e., greater than six months).	CANADIAN 2013	A	Asymptomatic Carotid Atherosclerosis Study (ACAS) Group MRC [Medical Research Council] Asymptomatic Carotid Surgery Trial (ACST) Collaborative Trial

<p>a. Patients should be evaluated to determine eligibility for carotid endarterectomy, such as a life expectancy of more than five years, and an acceptable risk of surgical complications.</p> <p>b. In carefully selected patients, carotid endarterectomy should be performed by a surgeon who routinely audits their performance results and demonstrates a less than 3 percent risk of peri-operative morbidity and mortality.</p>			Veterans Affairs Trial Chambers & Donnan, 2008 Halliday et al, 2010
	EBRSR 2016	1a	MRC-ACST Trial Collaborative Group, 2004 ACST Trial Collaborative Group, 2010 Veterans Affairs Cooperative Study Group, 1993 Asymptomatic Carotid Artery Study (ACAS) Group, 1995 Barnett & Meldrum, 2001 Dodick et al, 2004 Guay & Ochroch, 2012
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
<p>PARM strongly endorses that carotid endarterectomy may be considered for selected patients with 60 to 99 percent carotid stenosis who are asymptomatic or were remotely symptomatic (i.e., greater than six months). Patients should be evaluated to determine eligibility for carotid endarterectomy, such as a life expectancy of more than five years, and an acceptable risk of surgical complications. Carotid endarterectomy should be performed by a surgeon who routinely audits their performance results and demonstrates a less than 3 percent risk of peri-operative morbidity and mortality.</p>			

2011 Recommendation Statement			
There is insufficient evidence that for patients with recent TIA or ischemic stroke and ipsilateral moderate (50% to 69%) carotid stenosis or carotid endarterectomy is recommended, depending on patient-specific factors such as age, gender, comorbidities, and severity of initial symptoms.	USVA/ DoD	Class I,A	Kappelle et al, 1999 Streifler et al, 1995
	NSF	A	Chambers et al, 2005 Cina et al, 1999
	SSP	Class I, Level A	Barnett et al, 1998 Farrel et al, 1998 Mayberg et al, 1991 Rothwell et al, 2003
	AHA (2011)	Class I Level B	Barnett et al, 1998
Consistent level of evidence – Moderate volume – Non-current – Variable thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that for patients with recent TIA or ischemic stroke and ipsilateral moderate (50%–69%) carotid stenosis as documented by catheter-based imaging or	AHA-ASA 2014	Class I, Level B	Brott et al, 2011 Barnett et al, 1998 Tu et al, 2003 Ferguson et al, 1999 Hugl et al, 2006 Brott et al, 2010

noninvasive imaging with corroboration (e.g., magnetic resonance angiogram or computed tomography angiogram), CEA is recommended depending on patient-specific factors, such as age, sex, and comorbidities, if the perioperative morbidity and mortality risk is estimated to be <6%.			Howard et al (CREST), 2011 Hingorani et al, 2004
	CANADIAN 2013	B	North American Symptomatic Carotid Endarterectomy Trial (NASCET), 1991 European Carotid Surgery Trial (ECST), 1998 Veterans Affairs Trial Mayberg et al, 1991 Rerkasem & Rothwell, 2011
	EBRSR 2016	1a	Barnett & Meldrum, 2001 Rothwell et al, 2003
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends that for patients with recent TIA or ischemic stroke and ipsilateral moderate (50%–69%) carotid stenosis as documented by catheter-based imaging or noninvasive imaging with corroboration (e.g., magnetic resonance angiogram or computed tomography angiogram), CEA is recommended depending on patient-specific factors, such as age, sex, and comorbidities, if the perioperative morbidity and mortality risk is estimated to be <6%.			

2011 Recommendation Statement

There is strong evidence that when the degree of stenosis is <50%, there is no indication for CEA.	USVA/DoD	Class III, A	Alberts, 2001 CAVATAS Investigators, 2001 Grubb et al, 1998 Henderson et al, 2000 Higashida et al, 2004 Jordan et al, 1998 Naylor et al, 1998 Rothwell et al, 2004 Schmiedek et al, 1994 The EC/IC Bypass Study Group, 1985
	SSP	Class III, Level A	Ederle et al, 2009 Jeng et al, 2008
	AHA (2011)	Class III, Level A	Tu et al, 2003

Consistent level of evidence – High volume – Non-current –Uniform thought

2017: No new evidence

PARM strongly endorses that when the degree of stenosis is <50%, there is no indication for CEA.

2011 Recommendation Statement			
There is some evidence that no significant difference was found comparing endovascular treatment and surgery in asymptomatic patients with risk of stroke or death at 30 days.	SIGN 2010	1++	Engelter et al, 2003
Low volume – Non-current			
2017: No new evidence			
PARM does not recommend surgery in asymptomatic patients with risk of stroke or death at 30 days since no significance difference was found comparing endovascular treatment and surgery in asymptomatic patients.			

2011 Recommendation Statement			
There is some evidence angioplasty and stenting may be considered for patients with high risk of stroke recurrence and a “hostile surgical neck” (for example, previous radical neck dissection or radiotherapy).	SIGN 2010	1++	Engelter et al, 2003
Low volume – Non-current			
2017: No new evidence			
PARM recommends that angioplasty and stenting may be considered for patients with high risk of stroke recurrence and a “hostile surgical neck” (for example, previous radical neck dissection or radiotherapy).			

2011 Recommendation Statement			
There is some evidence that standard antiplatelet treatment should be given after CEA.	SIGN 2010	1++	Engelter et al, 2003
Low volume – Non-current			
2017: No new evidence			
PARM recommends that standard antiplatelet treatment should be given after CEA.			

2011 Recommendation Statement			
There is some evidence carotid stenting should not routinely be undertaken for patients with carotid stenosis.	NSF	A	Eckstein et al, 2008 Ederle et al, 2007
Low volume – Current			
2017: No new evidence			
PARM recommends that carotid stenting should not routinely be undertaken for patients with carotid stenosis.			

2011 Recommendation Statement			
There is some evidence that carotid endarterectomy is more appropriate than carotid stenting for patients over age 70 who are	CSS	A	Brott et al, 2010

otherwise fit for surgery because stenting carries a higher short-term risk of stroke and death.			
Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that it is reasonable to consider patient age in choosing between CAS and CEA. For older patients (i.e., older than ≈70 years), CEA may be associated with improved outcome compared with CAS, particularly when arterial anatomy is unfavorable for endovascular intervention. For younger patients, CAS is equivalent to CEA in terms of risk for periprocedural complications (i.e., stroke, MI, or death) and long-term risk for ipsilateral stroke.	AHA-ASA 2014	Class IIa, Level B	Voeks et al, 2012 Bonati et al, 2012
	CANADIAN 2013	A	Stenting and Aggressive Medical Management for Preventing Stroke in Intracranial Stenosis (SAMMPRIS) trial Chimowitz et al, 2011 Vitesse Stent Ischemic Therapy (VISSIT) Zaidat et al, 2015 Carotid and Vertebral Artery Transluminal Angioplasty Study (CAVATAS) Brown et al, 2001 International Carotid Stenting Study (ICSS) trial Ederle et al, 2010 Carotid Revascularization Endarterectomy Versus Stenting Trial (CREST) trial Brott et al, 2010 Bonati et al, 2012 Murad et al, 2011
	EBRSR 2016	1a	Roubin et al, 2001 Hobson et al, 2004 Gray et al, 2007 Zahn et al, 2007 Henry et al, 2008 Stingle et al, 2008 deDonato et al, 2008 Chaturvedi et al, 2010 Mantese et al, 2010 Bonati et al, 2010 Economopoulos et al, 2011 Chiam et al, 2009 Malek et al, 2000
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			

PARM endorses that it is reasonable to consider patient age in choosing between CAS and CEA. For older patients (i.e., older than ≈70 years), CEA may be associated with improved outcome compared with CAS, particularly when arterial anatomy is unfavorable for endovascular intervention. For younger patients, CAS is equivalent to CEA in terms of risk for periprocedural complications (i.e., stroke, MI, or death) and long-term risk for ipsilateral stroke.

2017 Recommendation Statement

There is evidence that carotid angioplasty and stenting may be as effective as carotid endarterectomy in preventing strokes. The rates of restenosis are comparable between the two procedures.	EBRSR 2016	1a	CAVATAS I Investigators, 2001 CAVATAS III, 2007 CAVATAS Investigators, 2009 Brooks et al, 2001 Brooks et al, 2004 Steinvauer et al, 2008 CREST Investigators Bonati et al, 2009 Groschel et al, 2005 Lal et al, 2012 Whooley et al, 2000 Malek et al, 2000 Kastrup et al, 2003 Martin, 2001 Fanelli et al, 2012 Moratto et al, 2012 Al-Damluji et al, 2013 Mathur et al, 1998 Bowser et al, 2003 Mehta et al, 2007
High volume – Non-current			
PARM endorses carotid angioplasty and stenting as an alternative to carotid endarterectomy in preventing strokes. The rates of restenosis are comparable between the two procedures.			

2017 Recommendation Statement

There is strong evidence that when revascularization is indicated for patients with TIA or minor, nondisabling stroke, it is reasonable to perform the procedure within 2 weeks of the index event rather than delay surgery if there are no contraindications to early revascularization.	AHA-ASA 2014	Class IIa, Level B	Brott et al, 2011 North American Symptomatic Carotid Endarterectomy Trial Collaborators, 1991 European Carotid Surgery Trialists Collaborative Group, 1991 Mayberg et al, 1991 Ferguson et al, 1999 Rerkasem et al, 2009 Rerkasem et al, 2011 Rothwell et al, 2004
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	EBRSR 2016	1b	Rothwell & Goldstein, 2004 Fairhead et al, 2005 Ballota et al, 2002 Gasecki et al, 1994 Rothwell et al, 2004b Patterson et al, 2009
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses that when revascularization is indicated for patients with TIA or minor, nondisabling stroke, it is reasonable to perform the procedure within 2 weeks of the index event rather than delay surgery if there are no contraindications to early revascularization.			

2017 Recommendation Statement			
There is insufficient evidence that for patients with a recent (within 6 months) TIA or ischemic stroke ipsilateral to a stenosis or occlusion of the middle cerebral or carotid artery, EC/IC bypass surgery is not recommended.	AHA-ASA 2014	Class III, Level A	The EC/IC Bypass Study Group, 1985 Grubb et al, 1998 Schmeidek et al, 1994 Powers et al, 2011
Moderate volume – Non-current			
PARM suggests that for patients with a recent (within 6 months) TIA or ischemic stroke ipsilateral to a stenosis or occlusion of the middle cerebral or carotid artery, EC/IC bypass surgery is not recommended.			

4.7 RECOMMENDATIONS FOR INTRACRANIAL ATHEROSCLEROSIS

Table 25. Management options for intracranial atherosclerosis post-stroke

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is some evidence that for patients with a stroke or TIA caused by 50% to 99% stenosis of a major intracranial artery, aspirin 325 mg/d is recommended in preference to warfarin.	AHA-ASA 2014	Class I, Level B	Chimowitz et al, 2005 Chimowitz et al, 2011
Low volume – Non-current			
PARM recommends that for patients with a stroke or TIA caused by 50% to 99% stenosis of a major intracranial artery, aspirin 325 mg/d is recommended in preference to warfarin.			

2017 Recommendation Statement			
There is some evidence that for patients with recent stroke or TIA (within 30 days) attributable to severe stenosis (70%–99%) of a major intracranial artery, the addition of clopidogrel 75 mg/d to	AHA-ASA 2014	Class IIb, Level B	Kwon et al, 2011 Wang et al, 2013

aspirin for 90 days might be reasonable.			
Low volume - Current			
PARM recommends that for patients with recent stroke or TIA (within 30 days) attributable to severe stenosis (70%–99%) of a major intracranial artery, the addition of clopidogrel 75 mg/d to aspirin for 90 days might be reasonable.			

2017 Recommendation Statement

There is some evidence that for patients with a stroke or TIA attributable to 50% to 99% stenosis of a major intracranial artery, maintenance of SBP below 140 mm Hg and high intensity statin therapy are recommended.	AHA-ASA 2014	Class I, Level B	Chimowitz et al, 2005 Chaturvedi et al, 2007 Turan et al, 2007
Low volume – Non-current			
PARM recommends that for patients with a stroke or TIA attributable to 50% to 99% stenosis of a major intracranial artery, maintenance of SBP below 140 mm Hg and high intensity statin therapy are recommended.			

2017 Recommendation Statement

There is insufficient evidence that for patients with a stroke or TIA attributable to moderate stenosis (50%–69%) of a major intracranial artery, angioplasty or stenting is not recommended given the low rate of stroke with medical management and the inherent periprocedural risk of endovascular treatment.	AHA-ASA 2014	Class III, Level B	Chimowitz et al (SAMMPRIS Trial Investigators), 2011
Low volume – Non-current			
PARM suggests that for patients with a stroke or TIA attributable to moderate stenosis (50%–69%) of a major intracranial artery, angioplasty or stenting is not recommended given the low rate of stroke with medical management and the inherent periprocedural risk of endovascular treatment.			

4.8 RECOMMENDATIONS FOR ORAL CONTRACEPTION

Table 26. Oral contraception in the context of stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that the decision of whether to start or continue oral contraception, in women of child-bearing age with a history of stroke should be	NSF	C	Baillargeon et al, 2005 Chaktoura et al, 2009 Chan et al, 2004

discussed with the individual patient and based on an overall assessment of risk and benefit. Non-hormonal methods of contraception should be considered.			
Low volume – Non-current			
2017: No new evidence			
PARM recommends that the decision of whether to start or continue oral contraception, in women of child-bearing age with a history of stroke should be discussed with the individual patient and based on an overall assessment of risk and benefit. Non-hormonal methods of contraception should be considered.			

4.9 RECOMMENDATIONS FOR DIABETES

Table 27. Screening for and management of diabetes mellitus as a risk factor for stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that hyperglycemia occurs in 20% to 63% of patients admitted with ischemic stroke and in the absence of prior diabetes.	SIGN 2010	1+, 3	Allport et al, 2004 Baird et al, 2003 Capes et al, 2001 Gray et al, 2007 Kiers et al, 1992 Parsons et al, 2002 Vancheri et al, 2005
It is associated with larger infarct volumes and cortical involvement which may be associated with ischemia of the insular cortex, and which may be associated with poorer functional outcome.			
The relative risk of death in hyperglycemic non-diabetic stroke patients is increased by 3.3 times (95% CI 2.3 to 4.6).			
Patients with ischemic stroke without previously diagnosed type 2 diabetes may have impaired glucose tolerance or diabetes confirmed by oral glucose tolerance test (OGTT), which persists at discharge.			
Moderate volume – Non-current			
2017: No new evidence			
PARM endorses that patients admitted for ischemic stroke be screened for hyperglycemia.			

2011 Recommendation Statement			
There is evidence that patients with hyperglycemia (random blood glucose >7 mmol/L) should be formally assessed by OGTT to exclude or confirm a diagnosis of impaired glucose tolerance or diabetes.	SIGN 2010	C	Allport et al, 2004 Baird et al, 2003 Capes et al, 2001 Kiers et al, 1992 Parsons et al, 2002 Vancheri et al, 2005
Moderate volume – Non-current			
2017: No new evidence			
PARM endorses that patients with hyperglycemia (random blood glucose >7 mmol/L) should be formally assessed by OGTT to exclude or confirm a diagnosis of impaired glucose tolerance or diabetes.			

2011 Recommendation Statement			
There is some evidence that all individuals in the general population should be evaluated annually for the risk of type 2 diabetes on the basis of demographic and clinical criteria.	CSS	C	Idris et al, 2006
Low volume – Current			
2017: No new evidence			
PARM recommends that all individuals in the general population should be evaluated annually for the risk of type 2 diabetes on the basis of demographic and clinical criteria.			

2011 Recommendation Statement			
There is some evidence that fasting plasma glucose should be performed every three years in individuals > 40 years of age to screen for diabetes.	CSS	C	Idris et al, 2006
Low volume – Current			
2017: No new evidence			
PARM recommends that fasting plasma glucose should be performed every three years in individuals > 40 years of age to screen for diabetes.			

2011 Recommendation Statement			
There is evidence that glucose control is recommended to near-normoglycemic levels among diabetics with ischemic stroke or TIA to reduce microvascular complications.	USVA/DoD	Class 1 Level A	American Diabetes Association, 2004
	SIGN 2010	GPP	-
	CSS	A	The Action to Control Cardiovascular Risk in Diabetes Study Group, 2008
Inconsistent level of evidence – Low volume – Non-current – Uniform thought			
2017: No new evidence			
PARM endorses that glucose control is recommended to near-normoglycemic levels among diabetics with ischemic stroke or TIA to reduce microvascular complications.			

2011 Recommendation Statement			
There is some evidence that routine use of insulin regimens to lower blood glucose in patients with moderate hyperglycemia after acute stroke is not recommended.	SIGN 2010	B	Gray et al, 2007
Low volume – Current			
2017: No new evidence			
PARM does not recommend that routine use of insulin regimens to lower blood glucose in patients with moderate hyperglycemia after acute stroke.			

2011 Recommendation Statement			
There is evidence that the goal for HbA1c should be <7% and that glycemic control, shown to reduce the occurrence of microvascular complications (nephropathy, retinopathy and peripheral neuropathy) in several clinical trials, is recommended in multiple guidelines of both primary and secondary prevention of stroke and cardiovascular disease.	USVA/ DoD	Class IIa, Level B	American Diabetes Association, 2004 Goldstein et al, 2001 Grundy, 2004 Grundy et al, 1999 Ohkubo et al, 1995 Pearson et al, 2002 Reichard et al, 1993 Smith et al, 2001
	SSP	Class I, Level A	Staaf et al, 2001
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that glycemic targets should be individualized: however, lowering A1C values to ≤7% in both type 1 and type 2 diabetes (and stroke or transient ischemic attack), provides strong benefits for the prevention of microvascular complications.	CANADIAN 2013	A	Action to Control Cardiovascular Risk in Diabetes Study (ACCORD, glucose-lowering arm) investigators, Gerstein et al, 2008 Veterans Affairs Diabetes Trial, Duckworth et al, 2009 The Action in Diabetes and Vascular Disease: Preterax and Diamicron Modified Release Controlled Evaluation (ADVANCE) trial, Patel et al, 2008 Marso et al, 2010

Moderate volume – Non-current
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.
PARM strongly endorses that the goal for HbA1c should be < 7% for adequate glycemic control to reduce the occurrence of microvascular complications (nephropathy, retinopathy,

and peripheral neuropathy) included in the guidelines of both primary and secondary prevention of stroke and cardiovascular disease.

2011 Recommendation Statement			
There is evidence that among diabetic patients with TIA or stroke, glucose control is recommended to near-normoglycemic levels to reduce microvascular complications and possible macrovascular complications. The goal of hemoglobin A1c should be less than 7%.	SSP	Class I, Level A Class IIa, Level B Class IIb, Level B	Gaede et al, 2003
	AHA (2011)	Class I Level B	Executive summary: Standards of medical care in diabetes—2009, 2009
Consistent level of evidence – Low volume – Current – Uniform thought			
2017: No new evidence			
PARM endorses that among diabetic patients with TIA or stroke, glucose control is recommended to near-normoglycemic levels to reduce microvascular complications and possible macrovascular complications. The goal of hemoglobin A1c should be less than 7%.			

2011 Recommendation Statement			
There is some evidence that hypoglycemia should be corrected according to local protocols.	SIGN 2010	GPP	-
None			
2017: No new evidence			
PARM suggests that hypoglycemia should be corrected according to local protocols.			

2017 Recommendation Statement			
There is evidence that after a TIA or ischemic stroke, all patients should be screened for DM with testing of fasting plasma glucose, HbA1c, or an oral glucose tolerance test. Choice of test and timing should be guided by clinical judgment and recognition that acute illness may temporarily perturb measures of plasma glucose. In general, HbA1c may be more accurate than other screening tests in the immediate post-event period.	AHA-ASA 2014	Class IIa, Level C	Kaplan et al, 2005 American Diabetes Association, 2013 Tabak et al, 2012 Goldstein et al, 2011 O'Donnell et al, 2010 Kannel et al, 1979 Hyvarinen et al, 2009 Lee et al, 2012 Selvin et al, 2010 Hier et al, 1991 Callahan et al, 2011 Petty et al, 1998
	CANADIAN 2013	C	Diabetes Canada, 2016
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
PARM endorses that after a TIA or ischemic stroke, all patients should be screened for diabetes mellitus with testing of fasting plasma glucose, HbA1c, or an oral glucose			

tolerance test. The choice of test and timing should be guided by clinical judgment. HbA1c may be more accurate than other screening tests in the immediate post-event period.

2017 Recommendation Statement			
There is evidence that the use of existing guidelines from the ADA for glycemic control and cardiovascular risk factor management is recommended for patients with an ischemic stroke or TIA who also have DM or pre-DM.	AHA-ASA 2014	Class I, Level B	American Diabetes Association, 2013 Tuomilehto et al, 2001 Knowler et al, 2002 Buse et al, 2007
Moderate volume – Non-current			
PARM endorses the use of existing guidelines from the ADA and from local diabetes societies for glycemic control and cardiovascular risk factor management for patients with an ischemic stroke or TIA who also have diabetes mellitus or pre-diabetes.			

4.10 RECOMMENDATIONS FOR PATENT FORAMEN OVALE

Table 28. Management of patent foramen ovale in the context of stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that for patients with an ischemic stroke or TIA and a PFO, antiplatelet therapy is reasonable to prevent a recurrent event.	USVA/DoD	Class IIa, Level B	-
	NSF	C	Homma et al, 2002
	SIGN 2010	B	Homma et al, 2002 Mas et al, 2001
	AHA 2011	Class IIa Level B	Homma et al, 2002 Mas et al, 2001
Inconsistent level of evidence – Low volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that for patients with an ischemic stroke or TIA and a PFO who are not undergoing anticoagulation therapy, antiplatelet therapy is recommended.	AHA-ASA 2014	Class 1, Level B	Homma et al, 2002
Low volume – Non-current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM endorses that patients with ischemic Stroke and PFO should be treated with antiplatelet therapy.			
2011 Recommendation Statement			
There is conflicting evidence that warfarin is reasonable for high-risk patients who have other	USVA/DoD	Class IIa Level C	-
	NSF	C	-

indications for oral anticoagulation, such as those with an underlying hypercoagulable state or evidence of venous thrombosis.			
Consistent level of evidence – Low volume – Variable thought			
2017: No new evidence			
PARM suggests the use of warfarin in high-risk patients who have other indications for oral anticoagulation such as those with an underlying hypercoagulable state or evidence of venous thrombosis.			

2017 Recommendation Statement			
There is some evidence that for patients with a recent ischemic stroke or TIA attributed to a PFO who do not undergo PFO closure and are aged 60 years or younger, either antiplatelet or anticoagulant therapy is recommended for secondary stroke prevention, unless there is a separate evidence-based indication for chronic anticoagulant therapy.	CANADIAN 2013	B	Furlan et al, 2012 Meier et al, 2013 Carroll et al, 2013
Low level - Current			
PARM recommends that for patients with a recent ischemic stroke or TIA attributed to a PFO who do not undergo PFO closure and are aged 60 years or younger, either antiplatelet or anticoagulant therapy is recommended for secondary stroke prevention, unless there is a separate evidence-based indication for chronic anticoagulant therapy.			

2011 Recommendation Statement			
There are insufficient data to establish whether anticoagulation is equivalent or superior to aspirin for secondary stroke prevention in patients with PFO.	AHA (2011)	Class IIb Level B	Homma et al, 2002 Mas et al, 2001
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence to establish whether anticoagulation is equivalent or superior to aspirin for secondary stroke prevention in patients with PFO.	AHA-ASA 2014	Class IIb, Level B	Homma et al, 2002
Low volume – Non-current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM suggests that anticoagulation is equivalent or superior to aspirin for secondary stroke prevention in patients with PFO.			

2011 Recommendation Statement			
There is conflicting evidence to make a recommendation about PFO closure in patients with a first stroke and a PFO. There is insufficient evidence that transcatheter closure of PFO may be considered for patients with recurrent cryptogenic stroke on optimal medical management.	USVA/ DoD	Class IIb Level C	-
	NSF	GPP	-
	SIGN 2010	D	Khairy et al, 2003
	AHA 2011	Class IIb Level C	Casaubon et al, 2007 Harrer et al, 2006 Windecker et al, 2004
Consistent level of evidence – Moderate volume – Non-current – Variable thought			
2017: No new evidence			
PARM suggests transcatheter closure of PFO for patients with recurrent cryptogenic stroke on optimal medical management.			

2017 Updated Recommendations and Evidence Sources			
There is conflicting evidence regarding the benefit for PFO closure in reducing the risk of recurrent stroke for patients with a cryptogenic ischemic stroke or TIA and a PFO without evidence for DVT. There is evidence that for carefully selected patients with a recent ischemic stroke or TIA attributed to a PFO, PFO device closure plus long-term antiplatelet therapy is recommended over long-term antithrombotic therapy alone provided all the following criteria are met: a. Age 18-60 years; b. The diagnosis of the index stroke event is confirmed by imaging as a non-lacunar embolic ischemic stroke or a TIA with positive neuroimaging or cortical symptoms; c. The patient has been evaluated by a neurologist or clinician with stroke expertise, and the PFO is felt to be the most likely cause for the index stroke event following a thorough etiological evaluation to exclude alternate etiologies.	AHA-ASA 2014	Class III, Level A	Furlan et al, 2012 Carroll et al, 2013 Meier et al, 2013 Johnston et al, 2012 Messe et al, 2013
	CANADIAN 2013	A	Furlan et al, 2012 Meier et al, 2013 Carroll et al, 2013 Mas et al, 2017 Sondergaard et al, 2017 Saver et al, 2017
	EBRSR 2016	1a	Carroll et al, 2013 Hornung et al, 2013 Furlan et al, 2012 Meier et al, 2013
Inconsistent level of evidence – High volume – Current – Variable thought			
PARM endorses PFO device closure plus long-term antiplatelet therapy for patients with a recent ischemic stroke or TIA attributed to a PFO, provided the following criteria are met:			

- a. Age 18-60 years;
- b. The diagnosis of the index stroke event is confirmed by imaging as a non-lacunar embolic ischemic stroke or a TIA with positive neuroimaging or cortical symptoms;
- c. The patient has been evaluated by a neurologist or clinician with stroke expertise, and the PFO is felt to be the most likely cause for the index stroke event following a thorough etiological evaluation to exclude alternate etiologies.

2017 Recommendation Statement

There is some evidence that when anticoagulation is contraindicated, an inferior vena cava filter is reasonable.	AHA-ASA 2014	Class IIa, Level C	Whitlock et al, 2012
Low volume - Current			
PARM recommends that when anticoagulation is contraindicated, an inferior vena cava filter is a reasonable option for patients with a stroke or TIA and a PFO.			

4.11 RECOMMENDATIONS FOR HORMONE REPLACEMENT THERAPY

Table 29. Hormone replacement therapy in the context of stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is strong evidence that for women with ischemic stroke or TIA, postmenopausal hormone replacement therapy (HRT) (with estrogen with or without progestin) is not recommended.	USVA/ DoD	Class III, Level A	Anderson et al, 2004 Hulley et al, 1998 Rossouw et al, 2002 Simon et al, 2001 Viscoli et al, 2001
AHA (2011)			
Class III Level A			
Grady et al, 2002 Grodstein et al, 2008 Hendrix et al, 2006 Rossouw et al, 2007 Utian et al, 2008 Viscoli et al, 2001 Wassertheil-Smoller et al, 2003			
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that estrogen-containing oral contraceptives or hormone replacement therapy should be discouraged or discontinued in female patients with TIA or ischemic stroke.	CANADIAN 2013	B	Bath & Gray, 2005 Renoux et al, 2010 Lidegaard et al, 2012 Yang et al, 2009
Moderate volume – Non-current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM strongly endorses against the use of postmenopausal hormone therapy (with estrogen with or without a progestin) in women with ischemic stroke or TIA.			

2011 Recommendation Statement			
There is some evidence that following stroke, HRT should be stopped. The decision when to resume HRT after a stroke should be discussed with the patient and based on an overall assessment of risk and benefit.	NSF	B	Bath & Gray, 2005 Gabriel Sanchez et al, 2005 Magliano et al, 2006 Sare et al, 2008
Moderate volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is evidence that estrogen-containing oral contraceptives or hormone replacement therapy should be discouraged or discontinued in female patients with TIA or ischemic stroke.	CANADIAN 2013	B	Bath & Gray, 2005 Renoux et al, 2010 Lidegaard et al, 2012 Yang et al, 2009
Moderate volume – Non-current			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM endorses that estrogen-containing oral contraceptives or hormone replacement therapy should be discontinued in female patients with TIA or ischemic stroke. The decision when to resume HRT after a stroke should be discussed with the patient and based on an overall assessment of risk and benefit.			

4.12 RECOMMENDATIONS FOR METABOLIC SYNDROME

Table 30. Management of metabolic syndrome in the prevention of stroke

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is evidence that for patients who are screened and classified as having the metabolic syndrome, management should focus on counseling for lifestyle modification (diet, exercise, and weight loss) for vascular risk reduction.	AHA-ASA 2014	Class I, Level C	Dixon et al, 2008 Giugliano et al, 2008 Tchernof et al, 2002 Deedwania et al, 2006 Esposito, 2004 Hanefeld et al, 2007 Ivey et al, 2007 Tjonna et al, 2008
High volume – Non-current			
PARM endorses that management of patients who are screened and classified as having the metabolic syndrome should focus on counseling for lifestyle modification (diet, exercise, and weight loss) for vascular risk reduction.			

2017 Recommendation Statement			
There is some evidence that preventive care for patients with the metabolic syndrome should include appropriate treatment for individual components of the syndrome,	AHA-ASA 2014	Class I, Level A	Rodriguez-Colon, 2009 Qiao et al, 2009

which are also stroke risk factors, particularly dyslipidemia and hypertension.			
Low volume – Non-current			
PARM recommends that preventive care for patients with the metabolic syndrome should include appropriate treatment for individual components of the syndrome, which are also stroke risk factors, particularly dyslipidemia and hypertension.			

4.13 RECOMMENDATIONS FOR CARDIAC ABNORMALITIES

Table 31. Screening and management of cardiac abnormalities in the context of stroke

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is some evidence that patients with suspected transient ischemic attack or ischemic stroke should have a 12-lead ECG to assess cardiac rhythm and identify atrial fibrillation or flutter or evidence of structural heart disease (e.g. myocardial infarction, left ventricular hypertrophy)	CANADIAN 2013	Level B	Edwards et al, 2016
Low volume - Current			
PARM recommends that patients with suspected transient ischemic attack or ischemic stroke should have a 12-lead ECG to assess cardiac rhythm and identify atrial fibrillation or flutter or evidence of structural heart disease.			

2017 Recommendation Statement			
There is some evidence that for patients being investigated for an acute embolic ischemic stroke or TIA of undetermined source, ECG monitoring at least 24 hours is recommended as part of the initial stroke work-up to detect paroxysmal atrial fibrillation in patients who would be potential candidates for anticoagulant therapy.	CANADIAN 2013	A	Higgins et al, 2013
Low volume - current			
PARM recommends that patients being investigated for an acute embolic ischemic stroke or TIA of undetermined source should have ECG monitoring for at least 24 hours as part of the initial stroke work-up to detect paroxysmal atrial fibrillation in patients who would be potential candidates for anticoagulant therapy.			

2017 Recommendation Statement			
There is evidence that for patients being investigated for an acute	CANADIAN 2013	A	Sposato et al, 2015

embolic ischemic stroke or TIA of undetermined source whose initial short-term ECG monitoring does not reveal atrial fibrillation but a cardioembolic mechanism is suspected, prolonged ECG monitoring for at least 2 weeks is recommended to improve detection of paroxysmal atrial fibrillation in selected patients who are not already receiving anticoagulant therapy but would be potential anticoagulant candidates.			EMBRACE trial, Gladstone et al, 2014 FIND-AF trial, Wachter et al, 2016 CRYSTAL-AF trial, Sanna et al, 2014
Moderate volume – current			
PARM endorses that in patients being investigated for an acute embolic ischemic stroke or TIA of undetermined source whose initial short-term ECG monitoring does not reveal atrial fibrillation but a cardioembolic mechanism is suspected, prolonged ECG monitoring for at least 2 weeks should be done in order to improve detection of paroxysmal atrial fibrillation in selected patients who are not already receiving anticoagulant therapy but would be potential anticoagulant candidates.			

2017 Recommendation Statement			
There is evidence that for patients who have experienced an acute ischemic stroke or TIA with no other apparent cause, prolonged rhythm monitoring (\approx 30 days) for AF is reasonable within 6 months of the index event.	AHA-ASA 2014	Class IIa, Level C	Flint et al, 2012 Tayal et al, 2010 Ziegler et al, 2010 Ziegler et al, 2012 Glotzer, 2009
Moderate volume – Non-current			
PARM endorses that for patients who have experienced an acute ischemic stroke or TIA with no other apparent cause, prolonged rhythm monitoring (\approx 30 days) for AF should be done within 6 months of the index event.			

2017 Recommendation Statement			
There is evidence that VKA therapy, apixaban, and dabigatran are all indicated for the prevention of recurrent stroke in patients with nonvalvular AF, whether paroxysmal or permanent. The selection of an antithrombotic agent should be individualized on the basis of risk factors, cost, tolerability, patient preference, potential for drug interactions, and other clinical characteristics, including renal function and time in INR therapeutic range if the patient has been taking VKA therapy.	AHA-ASA 2014	Class I, Level A, B	EAFT, 1993 Glotzer et al, 2003 Hart et al, 2007 Risk factors for stroke and efficacy of antithrombotic therapy in atrial fibrillation, 1994 Connolly et al, 2010 Connolly et al, 2009 Adam et al, 2012 Southworth et al, 2013 Diener et al, 2011 Connolly et al, 2011 Granger et al, 2011 Easton et al, 2012

High volume – Non-current
PARM endorses that VKA therapy, apixaban, and dabigatran are all indicated for the prevention of recurrent stroke in patients with nonvalvular AF, whether paroxysmal or permanent. The selection of an antithrombotic agent should be individualized on the basis of risk factors, cost, tolerability, patient preference, potential for drug interactions, and other clinical characteristics, including renal function and time in INR therapeutic range if the patient has been taking VKA therapy.

2017 Recommendation Statement			
There is some evidence that rivaroxaban is reasonable for the prevention of recurrent stroke in patients with nonvalvular AF.	AHA-ASA 2014	Class IIa, Level B	Patel, 2011 Hankey et al, 2012
Low volume - Current			
PARM recommends that it is reasonable to prescribe Rivaroxaban for the prevention of recurrent stroke in patients with nonvalvular AF.			

2017 Recommendation Statement			
There is evidence that in most patients requiring anticoagulants for atrial fibrillation, direct non-vitamin K oral anticoagulants (DOAC) such as apixaban, dabigatran, edoxaban, or rivaroxaban should be prescribed in preference over warfarin.	CANADIAN 2013	A	RE-LY trial, Connolly et al, 2009 Connolly et al, 2013 ROCKET-AF, Patel et al, 2011 Hankey et al, 2012 ARISTOTLE trial, Granger et al, 2011 Easton et al, 2012 AVERROES trial, Connolly et al, 2011 ENGAGE AF-TIMI 48 trial, Giugliano et al, 2013
High volume – Current			
PARM endorses that in most patients requiring anticoagulants for atrial fibrillation, direct non-vitamin K oral anticoagulants (DOAC) such as apixaban, dabigatran, edoxaban, or rivaroxaban should be prescribed in preference over warfarin.			

2017 Recommendation Statement			
There is some evidence that for patients with ischemic stroke or TIA with paroxysmal (intermittent), persistent, or permanent AF in whom VKA therapy is begun, a target INR of 2.5 is recommended (range, 2.0–3.0).	AHA-ASA 2014	Class I, Level A	Singer et al, 2008 Hylek et al, 1996 Stroke Prevention in Atrial Fibrillation Investigators, 1996
Low volume – Non-current			
PARM recommends that for patients with ischemic stroke or TIA with paroxysmal (intermittent), persistent, or permanent AF in whom VKA therapy is begun, a target INR of 2.5 is recommended (range, 2.0–3.0).			

2017 Recommendation Statement			
There is evidence that the combination of oral anticoagulation (i.e., warfarin or one of the newer agents) with antiplatelet therapy is not recommended for all patients after ischemic stroke or TIA but is reasonable in patients with clinically apparent CAD, particularly an acute coronary syndrome or stent placement.	AHA-ASA 2014	Class IIb, Level C	Rothberg et al, 2005 Akins et al, 2007 Lane et al, 2011 Hansen et al, 2010 Antithrombotic Trialists Collaboration, 2002 Jneid et al, 2012 Steinhubl et al, 2002 Yusuf et al, 2001 Dewilde et al, 2013 You et al, 2012
High volume – Non-current			
PARM endorses that the combination of oral anticoagulation with antiplatelet therapy should not be routinely used for all patients after ischemic stroke or TIA, but the use of the said combination may be reasonable in patients with clinically apparent coronary artery disease, particularly acute coronary syndrome or coronary artery stent placement.			

2017 Recommendation Statement			
There is evidence that for most patients with a stroke or TIA in the setting of AF, it is reasonable to initiate oral anticoagulation within 14 days after the onset of neurological symptoms.	AHA-ASA 2014	Class IIa, Level B	Johnston et al, 2000 Berge et al, 2000 Lee et al, 2010 Lansberg et al, 2012
Moderate volume – Non-current			
PARM endorses that for most patients with a stroke or TIA in the setting of AF, it is reasonable to initiate oral anticoagulation within 14 days after the onset of neurological symptoms.			

2017 Recommendation Statement			
There is evidence that in the presence of high risk for hemorrhagic conversion (i.e., large infarct, hemorrhagic transformation on initial imaging, uncontrolled hypertension, or hemorrhage tendency), it is reasonable to delay initiation of oral anticoagulation beyond 14 days.	AHA-ASA 2014	Class IIa, Level B	Connolly et al, 2009 Diener et al, 2010 Patel, 2011 Granger, 2011 Lansberg, 2012
Moderate volume – Non-current			
PARM endorses that in the presence of high risk for hemorrhagic conversion, it is reasonable to delay initiation of oral anticoagulation beyond 14 days.			

2017 Recommendation Statement			
There is some evidence that for patients with AF and a history of stroke or TIA who require temporary interruption of oral anticoagulation,	AHA-ASA 2014	Class IIa, Level C	Douketis, 2012

bridging therapy with an LMWH (or equivalent anticoagulant agent if intolerant to heparin) is reasonable, depending on perceived risk for thromboembolism and bleeding.			
Low volume - Current			
PARM recommends that for patients with AF and a history of stroke or TIA who require temporary interruption of oral anticoagulation, bridging therapy with an LMWH (or equivalent anticoagulant agent if intolerant to heparin) is reasonable, depending on perceived risk for thromboembolism and bleeding.			

2017 Recommendation Statement			
There is strong evidence that for patients with ischemic stroke or TIA and AF who are unable to take oral anticoagulants, aspirin alone is recommended. The addition of clopidogrel to aspirin therapy, compared with aspirin therapy alone, might be reasonable.	AHA-ASA 2014	Class I, Level A Class IIb, Level B	Singer et al, 2008 ACTIVE Investigators, 2009 Connolly et al, 2011
	EBRSR 2016	1b	ACTIVE-A, Connolly et al, 2009a ACTIVE-W, Connolly et al, 2006 Lee et al, 2013
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
PARM strongly endorses that for patients with ischemic stroke or TIA and AF who are unable to take oral anticoagulants, aspirin alone is recommended. The addition of clopidogrel to aspirin therapy, compared with aspirin therapy alone, might be reasonable.			

2017 Recommendation Statement			
There is some evidence that for patients with a mechanical heart valve, warfarin is recommended for stroke prevention with careful INR monitoring; non-vitamin K oral anticoagulants are contraindicated.	CANADIAN 2013	B	PROACT trial, Puskas et al, 2014 Eikelboom et al, 2013 Massel & Little, 2013
Low volume - Current			
PARM recommends that for patients with a mechanical heart valve, warfarin is recommended for stroke prevention with careful INR monitoring; non-vitamin K oral anticoagulants are contraindicated.			

2017 Recommendation Statement			
There is conflicting evidence for the usefulness of closure of the left atrial appendage with the WATCHMAN device in patients with ischemic stroke or TIA and AF.	AHA-ASA 2014	Class IIb, Level B (uncertain)	Holmes et al, 2009
	CANADIAN 2013	B (may be considered)	PROTECT-AF, Holmes et al, 2009 PREVAIL study, Holmes et al, 2014

Consistent level of evidence - Low volume – Non-current – Variable thought
PARM suggests closure of the left atrial appendage with the Watchman device in patients with ischemic stroke or TIA and AF if found beneficial to the patient and if it is available.

4.14 RECOMMENDATIONS DURING PREGNANCY AND FOR BREASTFEEDING WOMEN

Table 32. Management options for stroke in the context of pregnancy

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is some evidence that in the presence of a high-risk condition that would require anticoagulation outside of pregnancy, the following options are reasonable: a. LMWH twice daily throughout pregnancy, with dose adjusted to achieve the LMWH manufacturer's recommended peak anti-Xa activity 4 hours after injection, or b. Adjusted-dose UFH throughout pregnancy, administered subcutaneously every 12 hours in doses adjusted to keep the mid-interval activated partial thromboplastin time at least twice control or to maintain an anti-Xa heparin level of 0.35 to 0.70 U/mL, or c. UFH or LMWH (as above) until the 13th week, followed by substitution of a VKA until close to delivery, when UFH or LMWH is resumed.	AHA-ASA 2014	Class IIa, Level C	Bates et al, 2012 Lebaudy, 2008
Low volume - Current			
PARM recommends that in the presence of a high-risk condition that would require anticoagulation outside of pregnancy, the following options are reasonable: a. LMWH twice daily throughout pregnancy, with dose adjusted to achieve the LMWH manufacturer's recommended peak anti-Xa activity 4 hours after injection, or b. Adjusted-dose UFH throughout pregnancy, administered subcutaneously every 12 hours in doses adjusted to keep the mid-interval activated partial thromboplastin time at least twice control or to maintain an anti-Xa heparin level of 0.35 to 0.70 U/mL, or c. UFH or LMWH (as above) until the 13th week, followed by substitution of a VKA until close to delivery, when UFH or LMWH is resumed.			
2017 Recommendation Statement			
There is some evidence that for pregnant women receiving adjusted-dose LMWH therapy for	AHA-ASA 2014	Class IIa, Level C	Bates et al, 2012

a high-risk condition that would require anticoagulation outside of pregnancy, and when delivery is planned, it is reasonable to discontinue LMWH ≥24 hours before induction of labor or cesarean section.			
Low volume - Current			
PARM recommends that for pregnant women receiving adjusted-dose LMWH therapy for a high-risk condition that would require anticoagulation outside of pregnancy, and when delivery is planned, it is reasonable to discontinue LMWH ≥24 hours before induction of labor or cesarean section.			

2017 Recommendation Statement			
There is some evidence that in the presence of a low-risk situation in which antiplatelet therapy would be the treatment recommendation outside of pregnancy, UFH or LMWH, or no treatment may be considered during the first trimester of pregnancy depending on the clinical situation.	AHA-ASA 2014	Class IIb, Level C	Helmes, 2009
Low volume – Non-current			
PARM recommends that in the presence of a low-risk situation in which antiplatelet therapy would be the treatment recommendation outside of pregnancy, UFH or LMWH, or no treatment may be considered during the first trimester of pregnancy depending on the clinical situation.			

2017 Recommendation Statement			
There is some evidence that in the presence of a low-risk situation in which antiplatelet therapy would be the treatment recommendation outside of pregnancy, low-dose aspirin (50–150 mg/d) is reasonable after the first trimester of pregnancy.	AHA-ASA 2014	Class IIa, Level B	CLASP, 1994 CLASP, 1995 Dulley, 2007
Low volume – Non-current			
PARM recommends that in the presence of a low-risk situation in which antiplatelet therapy would be the treatment recommendation outside of pregnancy, low-dose aspirin (50–150 mg/d) is reasonable after the first trimester of pregnancy.			

4.15 RECOMMENDATIONS FOR RECREATIONAL DRUG USE

Table 33. Recreational drug use in the context of stroke

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			

There is some evidence that individuals with stroke and known recreational drug use that may increase the risk of stroke (such as cocaine, amphetamines) should be counseled to discontinue use if not prescribed for medical indications and should be provided with appropriate support and referrals to services and resources for drug addiction and rehabilitation.	CANADIAN 2013	B	Kaku & Lowenstein, 1990 Cheng et al, 2016 Westover et al, 2007
Low volume – Non-current			
PARM recommends that individuals with stroke and known recreational drug use that may increase the risk of stroke (such as cocaine, amphetamines) should be counseled to discontinue use if not prescribed for medical indications and should be provided with appropriate support and referrals to services and resources for drug addiction and rehabilitation.			

4.16 PARM CONTEXT POINTS

Table 34. Context points for minimum and additional standard care of practice for secondary prevention of stroke

	Minimum standard care of practice	Additional standard care of practice
Practice method	Laboratory assessment consisting of the following: 1. Lipid profile 2. Diabetic profile 3. Blood uric acid Monitoring of blood pressure, body weight, physical activity profile, presence of depression, nutritional intake	2 D echocardiogram Carotid duplex scan Carotid endarterectomy, as needed
Equipment	Blood chemistry analyzer Medications Dietary and lifestyle advice forms Exercise prescription	Ultrasound machine Vascular surgery unit (hospital setting)
Workforce	Attending physician Physiatrist Physical therapist Nutritionist Neurologist Medical technologist Pharmacist	Vascular surgeon Psychiatrist Exercise physiologist/sports scientist

Training	Within competency	Within competency
When is it done	Commenced during hospital admission or initial consultation	Commenced during hospital admission or initial consultation
Reassessment using at least one standard outcome measure	Monthly initially and progressing to less frequent contact depending on patient's condition	Monthly initially and progressing to less frequent contact depending on patient's condition

4.17 SUMMARY OF RECOMMENDATIONS

RECOMMENDATIONS FOR IDENTIFICATION OF RISK FACTORS

PARM strongly endorses that persons at risk of stroke and patients who have had a stroke should be assessed and informed for vascular disease risk factors, lifestyle management issues and possible strategies to modify identified risk factors. It should be performed within one week of onset. At a minimum this includes checking for: raised blood pressure (sustained over 130/90 mmHg), hyperlipidemia and diabetes mellitus.

PARM strongly endorses that interventions should be individualized and delivered using behavioral techniques, such as educational or motivational counselling.

PARM suggests that patients should be encouraged to take responsibility for their own health and be supported to identify, prioritize, and manage their risk factors.

PARM endorses that urgent assessment and initiation of treatment following ischemic attack be performed, not only for the patient's effective medical management, but also in order to reduce hospital costs, length of stay and risk for early stroke.

PARM endorses that an educational program that includes stroke prevention and post-discharge management of risk factors be provided to patients in order to improve long-term benefits in the management of blood pressure, lipid levels, body mass, and physical activity.

PARM endorses that referrals to appropriate specialists should be made where required, in order to provide patients with more comprehensive assessments and more appropriate programs to manage specific risk factors.

PARM suggests that at every check-up with a healthcare professional, patients should be assessed for adherence to individualized secondary prevention plans, including adherence to medications, diet management, rehabilitation therapy, exercise participation, and other lifestyle topics specific to the patient.

LIFESTYLE MEASURES

RECOMMENDATIONS FOR SMOKING

PARM endorses that smoking cessation substantially reduces the risks of recurring stroke and other cardiovascular diseases.

PARM suggests that smoking cessation substantially reduces the risks of recurring stroke and other cardiovascular diseases, although the decrease is dependent on the duration of cessation.

PARM strongly endorses that all ischemic stroke or TIA patients who have smoked in the past year should be strongly encouraged to stop smoking. Those who live with the patient should also be advised on the importance of smoking cessation.

PARM strongly endorses the use of pharmacologic treatment and behavioral therapy to address tobacco dependence.

PARM recommends promoting a smoke-free environment for every healthcare encounter for every active smoker.

PARM strongly endorses a combination of nicotine replacement therapy, bupropion or nortriptyline therapy, nicotine receptor partial agonist therapy and/or behavior therapy and skills training

PARM strongly endorses that physicians provide unambiguous, non-judgmental and personally relevant advice regarding the importance to stop smoking for all smokers and offer assistance with a smoking cessation attempt—either directly or through referral to appropriate resources.

PARM strongly endorses that patients should be advised to avoid second-hand tobacco smoke after TIA or ischemic stroke. Family members and/or caregivers should also be counselled about the harmful effects of exposure to second-hand smoke.

PARM recommends that patient smoking status should be identified, assessed and documented in all healthcare settings involved in the management of stroke (inpatient, outpatient, community-based).

PARM recommends that people who are not ready to quit smoking should be offered some form of motivation in order to prepare them to quit.

PARM recommends that there should be protocols to help stroke patients who are current smokers to manage nicotine withdrawal in the inpatient setting.

RECOMMENDATIONS FOR DIET / NUTRITION

PARM strongly endorses patients to have a diet low in saturated fat and salt but high in fruits and vegetables to reduce blood pressure as well as cardiovascular risk.

PARM recommends educating patients on the benefits associated with increased consumption of omega-3 fatty acids for the prevention of cardiovascular or stroke disease.

PARM does not endorse that people should be advised to stop taking supplemental omega-3 fatty acids.

PARM recommends that all individuals should eat at least two portions of fish (140 grams) per week, one of which should be a fatty fish.

PARM recommends that people with hypertension should be advised to reduce their salt intake as much as possible to lower blood pressure (no more than 6 grams per day).

PARM endorses that for daily salt intake, for persons 9 to 50 years, the ‘adequate intake’ is 1500 mg. ‘Adequate intake’ decreases to 1300 mg for persons 50 to 70 years and to 1200 mg for persons over 70 years. A daily upper consumption limit of 2300 mg should not be exceeded by any age group. Current evidence states that daily sodium intake from all sources should be no more than 2,000 mg per day for individuals with TIA or stroke.

PARM endorses that increasing fruit and vegetable consumption is recommended to reduce risk of stroke or TIA in a dose –respondent fashion.

PARM does not recommend routine vitamin supplementation following ischemic stroke as it would not prevent recurrence of stroke.

PARM endorses against routine supplementation with a single vitamin or combination of vitamins until more studies can show their benefit against stroke.

PARM endorses that individuals with TIA or stroke should be educated on the importance of eating a healthy balanced diet that includes lean meat, whole grains and protein from plant sources which are low in saturated and trans fats, low in cholesterol and low in sodium.

PARM endorses that individuals with TIA or stroke should be educated on maintaining a healthy balanced diet that is high in fresh vegetables and fruit, and to avoid fruit and vegetable preparations with added sugars, artificial sweeteners, sauces and salt.

PARM endorses that individuals with TIA or stroke should be counseled and educated to eat a healthy balanced diet that includes:

- a. a variety of natural/whole foods at each meal
- b. fewer highly processed foods
- c. a diet high in fresh vegetables and fresh fruit;
- d. fat-free or skim milk and alternatives, and dietary and soluble fibre
- e. lean meats, whole grains and protein from plant sources which are low in saturated and trans fats, low in cholesterol (< 200 mg daily for patients at increased vascular risk) and low in sodium.

PARM strongly endorses that individuals with TIA or stroke should be educated to follow a Mediterranean-type diet, which is high in vegetables, fruit, whole grains, fish, nuts and olive oil and low in red meat.

PARM endorses the need for further research in order to determine the potential benefits of vitamin B supplementation on atherosclerotic progression.

PARM endorses that caution should be taken in prescribing stroke patients with folic acid and/or vitamins B6 & B12. Although these have shown to reduce plasma homocysteine levels, subsequent cardiovascular outcomes and stroke risk may not be improved.

PARM recommends that further research should be done in order to determine if concurrent antiplatelet use may alter the action of vitamin therapy.

PARM recommends that patients with a history of ischemic stroke or TIA and signs of undernutrition should be referred for individualized nutritional counselling.

RECOMMENDATIONS FOR PHYSICAL ACTIVITY

PARM recommends physical activity as a significant modifiable factor in lifestyle modification for individuals with hypertension and type 2 diabetes because of its benefits for reducing hypertension and improving glycemic control.

PARM recommends cardiorespiratory fitness training as a feasible means for stroke survivors to improve aerobic fitness, walking speed and endurance, balance and functional activity.

PARM endorses that patients with ischemic stroke or TIA who are capable of engaging in physical activity should have at least 3 to 4 sessions of supervised moderate to vigorous-intensity aerobic physical exercises per week in order to reduce stroke risk factors. Each session should last an average of 40 minutes.

PARM recommends three 40-minute sessions of treadmill training a week for six months with a program of common components of conventional rehabilitation.

PARM recommends that individuals who have had a stroke or TIA should be encouraged to start a regular exercise program, supervised by a healthcare professional such as a physical therapist or cardiac rehabilitation professional, at least on initiation of an exercise regimen.

PARM suggests that a combination of aerobic exercise and strength training could improve cardiovascular fitness after stroke.

PARM suggests educating patients on the perceived reasons why older people do not participate in physical activities, namely lack of interest, lack of access to a car, shortness of breath, joint pain, dislike of going out alone, perceived lack of fitness, lack of energy and doubting that exercise can lengthen life.

PARM endorses that patients who are willing and able to initiate increased physical activity after a stroke should be referred to a comprehensive, behavior-oriented program.

PARM endorses that modest to high levels of activity be performed regularly (minimum of once/week for at least 30 minutes) in order to reduce the risk for stroke and cardiovascular disease.

PARM endorses that individuals with TIA or stroke should be educated to consistently reduce sedentary behaviors and to increase physical activity as tolerated.

RECOMMENDATIONS FOR WEIGHT MAINTENANCE

PARM endorses that weight reduction may be considered for all overweight ischemic stroke or TIA patients to maintain the goal of a BMI of 18.5 to 24.9 kg/m² and a waist circumference of <35 in for women and <40 in for men.

PARM endorses that clinicians should encourage weight management through an appropriate balance of caloric intake, physical activity, and behavioral counseling.

PARM endorses that the use of dietary interventions to reduce weight are moderately effective at reducing blood pressure.

PARM endorses that all patients with TIA or stroke should be screened for obesity through measurement of body mass index.

PARM endorses that individuals with TIA or stroke who are overweight should be educated to set healthy weight loss goals and develop individualized plans to achieve goals. A referral to a dietitian should also be included in the patient's plan.

RECOMMENDATIONS FOR ALCOHOL CONSUMPTION

PARM recommends the avoidance of heavy alcohol consumption and binge drinking as these increase the risk of stroke.

PARM strongly endorses that a primary goal for secondary stroke prevention is to eliminate or reduce alcohol consumption in heavy drinkers through established screening and counselling methods.

PARM endorses limiting drinking to low to moderate levels. That is: 1 glass of wine per day, or no more than 2 – 3 units of alcohol per day for non-pregnant women, and 2 glasses of wine per day or no more than 3 – 4 units of alcohol per day for men.

PARM recommends informing patients that irregular and binge drinking (more than 5 drinks at one sitting) has also been associated with an increased risk for hemorrhagic stroke.

RECOMMENDATIONS FOR BLOOD PRESSURE

PARM strongly endorses the assessment and effective management of blood pressure in all persons at risk for stroke, because hypertension is the single most important modifiable risk factor for stroke.

PARM strongly endorses that antihypertensive treatment is recommended for prevention of recurrent stroke and other vascular events in persons who have had an ischemic stroke and are beyond the hyperacute period.

PARM recommends that regular screening for hypertension (at least every 2 years in most adults and more frequently in minority population and the elderly) and appropriate management including dietary changes, lifestyle modification and pharmacological therapy are needed for primary stroke prevention.

PARM strongly endorses that target blood pressure level reduction from pretreatment baseline blood pressure should be individualized, and it is reasonable to achieve a systolic blood pressure <140 mm Hg and a diastolic pressure <90 mm Hg.

PARM recommends the using the current guidelines for management of hypertension from the British Hypertension Society suggest systolic blood pressure should be treated to <140 mm Hg and diastolic blood pressure to <85 mm Hg with a target of 130/80 mm Hg for patients with diabetes.

PARM recommends that blood pressure lowering treatment be prescribed to patients with diabetes for the prevention of first or recurrent stroke, with the goal of achieving a target systolic blood pressure consistently lower than 130 mm Hg and a target diastolic blood pressure consistently lower than 80 mm Hg.

PARM suggests that blood pressuring lowering treatment be given to patients with non-diabetic chronic kidney disease and stroke in order to prevent first or recurrent stroke, with the goal of consistently achieving a blood pressure lower than 140/90 mm Hg.

PARM recommends that several lifestyle modifications should be included as part of a comprehensive approach to antihypertensive therapy. These modifications include salt restriction; weight loss; consumption of a diet rich in fruits, vegetables, and low-fat dairy products; regular aerobic physical activity; and limited alcohol consumption.

PARM strongly endorses the use of diuretics; and the combination of diuretics and ACE inhibitors is effective in hypertension management.

PARM strongly endorses that the choice of specific drugs and targets should be individualized on the basis of reviewed data and consideration of pharmacological properties and mechanism of action, as well as specific patient characteristics (e.g., extracranial cerebrovascular occlusive disease, renal impairment, cardiac disease, and DM).

PARM endorses that blood pressure therapy should be initiated in previously untreated patients with ischemic stroke or TIA who, after the first several days, have an established BP \geq 140 mm Hg systolic or \geq 90 mm Hg diastolic.

PARM recommends that BP therapy be resumed for previously treated patients with known hypertension for both prevention of recurrent stroke and prevention of other vascular events in those who have had an ischemic stroke or TIA and are beyond the first several days.

PARM recommends that blood pressure lowering treatment should be initiated or modified, if necessary, before discharge from hospital.

RECOMMENDATIONS FOR ANTIPLATELET USE

PARM endorses that for patients with non-cardioembolic ischemic stroke or TIA, antiplatelet agents rather than oral anticoagulation are recommended to reduce the risk of recurrent stroke and other cardiovascular events.

PARM strongly endorses that acetylsalicylic acid (50 to 325 mg/d), the combination of acetylsalicylic acid (25 mg) and extended-release dipyridamole (200mg), and clopidogrel (75 mg) are all acceptable options for initial therapy, taking into consideration the patient's co-morbidities.

PARM endorses that aspirin 300 mg daily should be commenced within 48 hours of ischemic stroke and continued for at least 14 days.

PARM suggests that aspirin should be avoided within 24 hours of IV or IA thrombolytic therapy.

PARM recommends that aspirin alone can be used, particularly in people who do not tolerate aspirin in combination with dipyridamole or clopidogrel.

PARM recommends that for patients allergic to aspirin, clopidogrel is a reasonable option.

PARM recommends that in children with stroke, the usual maintenance dosage of acetylsalicylic acid is 1 to 5 mg/kg per day for the prevention of recurrent stroke and for teens, the maximum dose should be up to 325 mg per day.

PARM suggests that clopidogrel may be considered an alternative for pediatric patients with contraindications to acetylsalicylic acid. The recommended dose for adolescents is 1 mg/kg/day up to a maximum of 75 mg/day especially in the context of ASA allergy. The suggested dose of clopidogrel for younger children should be considered within the range of 0.2 – 0.5 mg/kg/day.

PARM does not recommend the combination of aspirin and clopidogrel for the secondary prevention of cerebrovascular disease in people who do not have acute coronary disease or recent coronary stent.

RECOMMENDATIONS FOR LIPID LOWERING

PARM recommends that patients who have had an ischemic stroke or transient ischemic attack should have their serum lipid levels assessed and aggressively managed.

PARM suggests that fasting lipid levels (total cholesterol, total glycerides, LDL cholesterol, HDL cholesterol) should be measured every one to three years for men 40 years or older and for women who are postmenopausal and/or 50 years or older.

PARM suggests that adults at any age should have their blood lipid levels measured if they have a history of diabetes, smoking, hypertension, obesity, ischemic heart disease, renal vascular disease, peripheral vascular disease, ischemic stroke, transient ischemic attack, or asymptomatic carotid stenosis.

PARM recommends that other parameters may be considered including a 50% reduction in LDL concentration or apolipoprotein B level of <0.80 g/L be assessed.

PARM strongly endorses the use of statin in patients with ischemic stroke or TIA.

PARM endorses that a statin should be prescribed as secondary prevention to patients who have had an ischemic stroke or transient ischemic attack in order to achieve a target LDL cholesterol consistently less than 2.0 mmol/L or >50% reduction of LDL cholesterol, from baseline.

PARM recommends that for individuals with stroke, a recent acute coronary syndrome or established coronary disease, a more aggressive target of LDL-C < 1.8 mmol/L or > 50% reduction from baseline should be considered in the treatment program.

PARM recommends that adults with diabetes and ischemic stroke should also be treated with a statin to achieve a low-density lipoprotein cholesterol \leq 2.0 mmol/L in order to decrease the risk of further vascular events.

PARM does not endorse the use of statins in patients with hemorrhagic strokes.

PARM strongly endorses that patients with ischemic stroke or TIA presumed to be due to an atherosclerotic origin but with no pre-existing indications for statins (normal cholesterol levels, no comorbid CAD, or no evidence of atherosclerosis) should be considered for treatment with a statin agent to reduce the risk of vascular events.

PARM recommends that statin therapy with intensive lipid-lowering effects is recommended to reduce the risk of stroke and cardiovascular events among patients with ischemic stroke or TIA presumed to be of atherosclerotic origin and an LDL-C level \geq 100 mg/dL with or without evidence for other clinical ASCVD.

PARM endorses that ischemic stroke or TIA patients with low HDL-C may be considered for treatment with niacin or gemfibrozil.

PARM recommends that patients with ischemic stroke or TIA with elevated cholesterol or comorbid coronary artery disease should be otherwise managed according to the NCEP III guidelines and the 2013 ACC/AHA cholesterol guidelines, which include lifestyle modification, dietary guidelines, and medication recommendations.

RECOMMENDATIONS FOR CAROTID STENOSIS

PARM recommends that optimal medical therapy, which should include antiplatelet therapy, statin therapy, and risk factor modification, be used for all patients with carotid artery stenosis and a TIA or stroke.

PARM strongly endorses that for symptomatic carotid stenosis patients with recent TIA or ischemic stroke within the last 6 months and ipsilateral severe (70% to 99%) carotid artery stenosis, should be offered CEA as soon as possible, optimally within fourteen days of the incident event once the patient is clinically stable and CEA must be performed by an expert cardiac interventionist/specialist surgeon with low rates of perioperative morbidity and mortality of <6%.

PARM recommends CAS (carotid angiography and stenting) be used as an alternative to CEA for symptomatic patients at average or low risk of complications associated with endovascular intervention when the diameter of the lumen of the internal carotid artery is reduced by >70% by non-invasive imaging or >50% by catheter angiography.

PARM recommends that among patients with symptomatic severe stenosis (>70%) in whom the stenosis is difficult to access surgically, medical conditions are present that greatly increase the risk for surgery, or when other specific circumstances exist, such as radiation induced stenosis or restenosis after CEA, CAS may be used.

PARM strongly endorses that carotid endarterectomy may be considered for selected patients with 60 to 99 percent carotid stenosis who are asymptomatic or were remotely symptomatic (i.e., greater than six months). Patients should be evaluated to determine eligibility for carotid endarterectomy, such as a life expectancy of more than five years, and an acceptable risk of surgical complications. Carotid endarterectomy should be performed by a surgeon who routinely audits their performance results and demonstrates a less than 3 percent risk of perioperative morbidity and mortality.

PARM recommends that for patients with recent TIA or ischemic stroke and ipsilateral moderate (50%–69%) carotid stenosis as documented by catheter-based imaging or non-invasive imaging with corroboration (e.g., magnetic resonance angiogram or computed tomography angiogram), CEA is recommended depending on patient-specific factors, such as age, sex, and comorbidities, if the perioperative morbidity and mortality risk is estimated to be <6%.

PARM strongly endorses that when the degree of stenosis is <50%, there is no indication for CEA.

PARM does not recommend surgery in asymptomatic patients with risk of stroke or death at 30 days since no significance difference was found comparing endovascular treatment and surgery in asymptomatic patients.

PARM recommends that angioplasty and stenting may be considered for patients with high risk of stroke recurrence and a “hostile surgical neck” (for example, previous radical neck dissection or radiotherapy).

PARM recommends that standard antiplatelet treatment should be given after CEA.

PARM recommends that carotid stenting should not routinely be undertaken for patients with carotid stenosis.

PARM endorses that it is reasonable to consider patient age in choosing between CAS and CEA. For older patients (i.e., older than \approx 70 years), CEA may be associated with improved outcome compared with CAS, particularly when arterial anatomy is unfavorable for endovascular intervention. For younger patients, CAS is equivalent to CEA in terms of risk for periprocedural complications (i.e., stroke, MI, or death) and long-term risk for ipsilateral stroke.

PARM endorses carotid angioplasty and stenting as an alternative to carotid endarterectomy in preventing strokes. The rates of restenosis are comparable between the two procedures.

PARM strongly endorses that when revascularization is indicated for patients with TIA or minor, nondisabling stroke, it is reasonable to perform the procedure within 2 weeks of the index event rather than delay surgery if there are no contraindications to early revascularization.

PARM suggests that for patients with a recent (within 6 months) TIA or ischemic stroke ipsilateral to a stenosis or occlusion of the middle cerebral or carotid artery, EC/IC bypass surgery is not recommended.

RECOMMENDATIONS FOR INTRACRANIAL ATHEROSCLEROSIS

PARM recommends that for patients with a stroke or TIA caused by 50% to 99% stenosis of a major intracranial artery, aspirin 325 mg/d is recommended in preference to warfarin.

PARM recommends that for patients with recent stroke or TIA (within 30 days) attributable to severe stenosis (70%–99%) of a major intracranial artery, the addition of clopidogrel 75 mg/d to aspirin for 90 days might be reasonable.

PARM recommends that for patients with a stroke or TIA attributable to 50% to 99% stenosis of a major intracranial artery, maintenance of SBP below 140 mm Hg and high intensity statin therapy are recommended.

PARM suggests that for patients with a stroke or TIA attributable to moderate stenosis (50%–69%) of a major intracranial artery, angioplasty or stenting is not recommended given the low rate of stroke with medical management and the inherent periprocedural risk of endovascular treatment.

RECOMMENDATIONS FOR ORAL CONTRACEPTION

PARM recommends that the decision of whether to start or continue oral contraception, in women of child-bearing age with a history of stroke should be discussed with the individual patient and based on an overall assessment of risk and benefit. Non-hormonal methods of contraception should be considered.

RECOMMENDATIONS FOR DIABETES

PARM endorses that patients admitted for ischemic stroke be screened for hyperglycemia.

PARM endorses that patients with hyperglycemia (random blood glucose >7 mmol/L) should be formally assessed by OGTT to exclude or confirm a diagnosis of impaired glucose tolerance or diabetes.

PARM recommends that all individuals in the general population should be evaluated annually for the risk of type 2 diabetes on the basis of demographic and clinical criteria.

PARM recommends that fasting plasma glucose should be performed every three years in individuals > 40 years of age to screen for diabetes.

PARM endorses that glucose control is recommended to near-normoglycemic levels among diabetics with ischemic stroke or TIA to reduce microvascular complications.

PARM does not recommend that routine use of insulin regimens to lower blood glucose in patients with moderate hyperglycemia after acute stroke.

PARM strongly endorses that the goal for HbA1c should be $< 7\%$ for adequate glycemic control to reduce the occurrence of microvascular complications (nephropathy, retinopathy, and peripheral neuropathy) included in the guidelines of both primary and secondary prevention of stroke and cardiovascular disease.

PARM endorses that among diabetic patients with TIA or stroke, glucose control is recommended to near-normoglycemic levels to reduce microvascular complications and possible macrovascular complications. The goal of hemoglobin A1c should be less than 7%.

PARM suggests that hypoglycemia should be corrected according to local protocols.

PARM endorses that after a TIA or ischemic stroke, all patients should be screened for diabetes mellitus with testing of fasting plasma glucose, HbA1c, or an oral glucose tolerance test. The choice of test and timing should be guided by clinical judgment. HbA1c may be more accurate than other screening tests in the immediate post-event period.

PARM endorses the use of existing guidelines from the ADA and from local diabetes societies for glycemic control and cardiovascular risk factor management for patients with an ischemic stroke or TIA who also have diabetes mellitus or pre-diabetes.

RECOMMENDATIONS FOR PATENT FORAMEN OVALE

PARM endorses that patients with ischemic Stroke and PFO should be treated with antiplatelet therapy.

PARM suggests the use of warfarin in high-risk patients who have other indications for oral anticoagulation such as those with an underlying hypercoagulable state or evidence of venous thrombosis.

PARM recommends that for patients with a recent ischemic stroke or TIA attributed to a PFO who do not undergo PFO closure and are aged 60 years or younger, either antiplatelet or anticoagulant therapy is recommended for secondary stroke prevention, unless there is a separate evidence-based indication for chronic anticoagulant therapy.

PARM suggests that anticoagulation is equivalent or superior to aspirin for secondary stroke prevention in patients with PFO.

PARM suggests transcatheter closure of PFO for patients with recurrent cryptogenic stroke on optimal medical management.

PARM endorses PFO device closure plus long-term antiplatelet therapy for patients with a recent ischemic stroke or TIA attributed to a PFO, provided the following criteria are met:

- a. Age 18-60 years;
- b. The diagnosis of the index stroke event is confirmed by imaging as a non-lacunar embolic ischemic stroke or a TIA with positive neuroimaging or cortical symptoms;
- c. The patient has been evaluated by a neurologist or clinician with stroke expertise, and the PFO is felt to be the most likely cause for the index stroke event following a thorough etiological evaluation to exclude alternate etiologies.

PARM recommends that when anticoagulation is contraindicated, an inferior vena cava filter is a reasonable option for patients with a stroke or TIA and a PFO.

RECOMMENDATIONS FOR HORMONE REPLACEMENT THERAPY

PARM strongly endorses against the use of postmenopausal hormone therapy (with estrogen with or without a progestin) in women with ischemic stroke or TIA.

PARM endorses that estrogen-containing oral contraceptives or hormone replacement therapy should be discontinued in female patients with TIA or ischemic stroke. The decision when to resume HRT after a stroke should be discussed with the patient and based on an overall assessment of risk and benefit.

RECOMMENDATIONS FOR METABOLIC SYNDROME

PARM endorses that management of patients who are screened and classified as having

the metabolic syndrome should focus on counseling for lifestyle modification (diet, exercise, and weight loss) for vascular risk reduction.

PARM recommends that preventive care for patients with the metabolic syndrome should include appropriate treatment for individual components of the syndrome, which are also stroke risk factors, particularly dyslipidemia and hypertension.

RECOMMENDATIONS FOR CARDIAC ABNORMALITIES

PARM recommends that patients with suspected transient ischemic attack or ischemic stroke should have a 12-lead ECG to assess cardiac rhythm and identify atrial fibrillation or flutter or evidence of structural heart disease.

PARM recommends that patients being investigated for an acute embolic ischemic stroke or TIA of undetermined source should have ECG monitoring for at least 24 hours as part of the initial stroke work-up to detect paroxysmal atrial fibrillation in patients who would be potential candidates for anticoagulant therapy.

PARM endorses that in patients being investigated for an acute embolic ischemic stroke or TIA of undetermined source whose initial short-term ECG monitoring does not reveal atrial fibrillation but a cardioembolic mechanism is suspected, prolonged ECG monitoring for at least 2 weeks should be done in order to improve detection of paroxysmal atrial fibrillation in selected patients who are not already receiving anticoagulant therapy but would be potential anticoagulant candidates.

PARM endorses that for patients who have experienced an acute ischemic stroke or TIA with no other apparent cause, prolonged rhythm monitoring (\approx 30 days) for AF should be done within 6 months of the index event.

PARM endorses that VKA therapy, apixaban, and dabigatran are all indicated for the prevention of recurrent stroke in patients with nonvalvular AF, whether paroxysmal or permanent. The selection of an antithrombotic agent should be individualized on the basis of risk factors, cost, tolerability, patient preference, potential for drug interactions, and other clinical characteristics, including renal function and time in INR therapeutic range if the patient has been taking VKA therapy.

PARM recommends that it is reasonable to prescribe Rivaroxaban for the prevention of recurrent stroke in patients with nonvalvular AF.

PARM endorses that in most patients requiring anticoagulants for atrial fibrillation, direct non-vitamin K oral anticoagulants (DOAC) such as apixaban, dabigatran, edoxaban, or rivaroxaban should be prescribed in preference over warfarin.

PARM recommends that for patients with ischemic stroke or TIA with paroxysmal (intermittent), persistent, or permanent AF in whom VKA therapy is begun, a target INR of 2.5 is recommended (range, 2.0–3.0).

PARM endorses that the combination of oral anticoagulation with antiplatelet therapy should not be routinely used for all patients after ischemic stroke or TIA, but the use of the said combination may be reasonable in patients with clinically apparent coronary artery disease, particularly acute coronary syndrome or coronary artery stent placement.

PARM endorses that for most patients with a stroke or TIA in the setting of AF, it is reasonable to initiate oral anticoagulation within 14 days after the onset of neurological symptoms.

PARM endorses that in the presence of high risk for hemorrhagic conversion, it is reasonable to delay initiation of oral anticoagulation beyond 14 days.

PARM recommends that for patients with AF and a history of stroke or TIA who require temporary interruption of oral anticoagulation, bridging therapy with an LMWH (or equivalent anticoagulant agent if intolerant to heparin) is reasonable, depending on perceived risk for thromboembolism and bleeding.

PARM strongly endorses that for patients with ischemic stroke or TIA and AF who are unable to take oral anticoagulants, aspirin alone is recommended. The addition of clopidogrel to aspirin therapy, compared with aspirin therapy alone, might be reasonable.

PARM recommends that for patients with a mechanical heart valve, warfarin is recommended for stroke prevention with careful INR monitoring; non-vitamin K oral anticoagulants are contraindicated.

PARM suggests closure of the left atrial appendage with the Watchman device in patients with ischemic stroke or TIA and AF if found beneficial to the patient and if it is available.

RECOMMENDATIONS DURING PREGNANCY AND FOR BREASTFEEDING WOMEN

PARM recommends that in the presence of a high-risk condition that would require anticoagulation outside of pregnancy, the following options are reasonable:

- a. LMWH twice daily throughout pregnancy, with dose adjusted to achieve the LMWH manufacturer's recommended peak anti-Xa activity 4 hours after injection, or
- b. Adjusted-dose UFH throughout pregnancy, administered subcutaneously every 12 hours in doses adjusted to keep the mid-interval activated partial thromboplastin time at least twice control or to maintain an anti-Xa heparin level of 0.35 to 0.70 U/mL, or
- c. UFH or LMWH (as above) until the 13th week, followed by substitution of a VKA until close to delivery, when UFH or LMWH is resumed.

PARM recommends that for pregnant women receiving adjusted-dose LMWH therapy for a high-risk condition that would require anticoagulation outside of pregnancy, and when delivery is planned, it is reasonable to discontinue LMWH ≥ 24 hours before induction of labor or cesarean section.

PARM recommends that in the presence of a low-risk situation in which antiplatelet therapy would be the treatment recommendation outside of pregnancy, UFH or LMWH, or no treatment may be considered during the first trimester of pregnancy depending on the clinical situation.

PARM recommends that in the presence of a low-risk situation in which antiplatelet therapy would be the treatment recommendation outside of pregnancy, low-dose aspirin (50–150 mg/d) is reasonable after the first trimester of pregnancy.

RECOMMENDATIONS FOR RECREATIONAL DRUG USE

PARM recommends that individuals with stroke and known recreational drug use that may increase the risk of stroke (such as cocaine, amphetamines) should be counseled to discontinue use if not prescribed for medical indications and should be provided with appropriate support and referrals to services and resources for drug addiction and rehabilitation.

5. Lower Extremity Interventions

Each year, stroke affects nearly 800,000 individuals, with many survivors experiencing persistent difficulty with daily tasks as a direct consequence (AHA-ASA 2016). Stroke frequently results in physical deficits which impair an individual's ability to move, leading to numerous post-stroke complications (Langhorne et al, 2002; Canadian Stroke Network 2010). Stroke frequently affects balance and the use of the legs, leading to difficulty or loss of the ability to walk independently. Spasticity, another complication of stroke, defined as a velocity dependent increase of muscle tone with exaggerated tendon jerks, can interfere with functional recovery, be painful, and hinder rehabilitation efforts. If not managed appropriately, stroke survivors may experience a loss of range of motion at involved joints of the ankle and foot, which can cause difficulties with ambulation (CANADIAN 2013). Poor mobility interferes with an individual's capacity to perform activities of daily living. Hence, an important aim of stroke physiotherapy is to promote the recovery of strength, movement and mobility. Multiple approaches, numerous interventions and several mobility aids have been proposed over the years to improve an individual's recovery after a stroke. The evidence on the effectiveness of these approaches, interventions and aids are reviewed and discussed in this section. The goal is to provide the stroke patient with the most appropriate rehabilitation program to improve mobility and lower extremity strength based on the individual's motor strength, muscle tone, previous level of functioning and current medical conditions.

5.1 APPROACH TO THERAPY

Table 35. Approach to therapy for lower extremity rehabilitation of stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that standardized, valid, and reliable test procedures to document the severity of upper and lower extremity impairment (strength, coordination, tone, ROM, pain) are recommended in inpatient and outpatient settings.	AHA 2010	Class I Level B	Bohannon & Smith, 1987 Boissy et al, 1999 Duncan et al, 1992, 1994, 2000 Gladstone et al, 2002 Jørgensen et al, 1995 Kalra & Crome, 1993 McDonnell et al, 2006 Patel et al, 2000 Salter et al, 2008 Studenski et al, 2001, 2004
High volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is evidence that Clinicians with expertise in rehabilitation must use standardized, valid assessment tools to evaluate the	CANADIAN 2013	Level B	Gresham et al, 1995 Asberg and Nydevik, 1991 Ween et al, 1996

patient's stroke related impairments, functional activity limitations, and role participation restrictions. Tools should be adapted for use with patients who have communication differences or limitations where required.			Oczkowski & Barreca, 1993
	CAMEROON 2013	Level C	CMAJ Update, 2010
	AHA-ASA 2016	Class I Level C	Miller et al, 2010 Gresham et al, 1995 National Clinical Guideline for Stroke, 3rd ed 2008 Teasell et al, 2003 Stein et al, 2015 Wee et al, 2005 Lang et al, 2011 Sumathipala et al, 2012 Duncan et al, 2005 Kollen et al, 2006
Inconsistent level of evidence – High volume – Non-current – Uniform Thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM endorses the use of standardized, valid and reliable assessment tools for the evaluation of impairment.			

2011 Recommendation Statement			
There is some evidence that the use of standardized, valid, and reliable tools to document the level of assistance needed for mobility (bed mobility, transfers, sitting, walking) and self-care (toileting, eating, washing oneself, dressing, domestic life) are recommended in inpatient and outpatient settings. At a minimum, FIM mobility items, Berg Balance Score, and the 10-meter walk should be used to assess gait velocity, Functional Ambulation Classification, and assistance needed during daily activities		Class II Level B, C	Beninato et al, 2006 Berg et al, 1995 Hamilton et al, 1987, 1994 Holden et al, 1986 Perry et al, 1995 Richards & Olney, 1996 Salbach et al, 2001 Schmid et al, 2007 Van der Putten et al, 1999
High volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is evidence that clinicians should formally assess the patient's ADLs and IADLs,	CAMEROON 2013	Level C	CMAJ Update, 2010 ASA, 2007

<p>communication abilities, and functional mobility using standardized and valid tools. They may also consider use of standardized questionnaires to assess stroke survivor perception of motor impairments, activity limitations, and participation. Mobility assessment with a standardized tool may be useful, and a standardized measure of balance and gait speed (for those who can walk) may be considered for planning post acute rehabilitation care and for safety counseling with the patient and family.</p>	<p>AHA-ASA 2016</p>	<p>Class I, IIb Level B, C</p>	<p>Quinn et al, 2009 WHO ICF, 2008 Goljar et al, 2010 Stein et al, 2015 Chumney et al, 2010 Nakao et al, 2010 Ng et al, 2007 Di Monaco et al, 2010 O'Dell et al, 2013 Wee et al, 2005 Lang et al, 2011 Perry et al, 1995 Sumathipala et al, 2012 Duncan et al, 2005 Kollen et al, 2006 EBRSR, 2016 Hsueh et al, 2013 Chen et al, 2013 Baker et al, 2011 Barak et al, 2006 Bland et al, 2013 Roos et al, 2012 Mahoney et al, 1965 Holbrook et al, 1983 Moore et al, 2010 Roos et al, 2012</p>
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Inconsistent level of evidence – High volume – Non-current – Uniform Thought

ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.

PARM endorses the use of standardized, valid and reliable assessment tools to document the level of assistance for mobility and self-care. These would include tests for strength, coordination, tone, ROM, pain and tools to document the level of assistance needed for mobility (bed mobility, transfers, sitting, walking) and self-care. At a minimum, FIM mobility items, Berg Balance Score, and the 10-meter walk should be used to assess gait velocity, Functional Ambulation Classification, and assistance needed during daily activities.

2011 Recommendation Statement

<p>There is strong evidence that a mixture of different approaches is significantly more effective than no treatment.</p>	<p>SIGN 2010</p>	<p>1++</p>	<p>Pollock et al, 2007 Van Peppen et al, 2004</p>
	<p>USVA/Dod</p>	<p>I</p>	<p>Paci, 2003</p>
	<p>CSS</p>	<p>A</p>	<p>Langhorne et al, 2009</p>

Consistent level of evidence – Moderate volume – Current – Uniform thought

2017: No new evidence

PARM strongly endorses that treatment of stroke patients with lower extremity weakness should use multiple treatment approaches which is more effective than no treatment.

2011 Recommendation Statement			
There is strong evidence that neurodevelopmental techniques (NDT) for motor learning are equal to other treatment approaches.	SIGN 2010	1++	Pollock et al, 2007 Van Peppen et al, 2004
	USVA/ DoD	I	Basmajian et al, 1987 Brunham & Snow, 1992 Dickstein et al, 1986 Gelber et al, 1995
	CSS	Early-B Late -B	Langhammer & Stanghelle, 2000 Luke et al, 2004 Mulder et al, 1986 Paci, 2003 Wagenaar et al, 1990
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that the effectiveness of neurophysiological approaches (i.e. neurodevelopmental therapy, proprioceptive neuromuscular facilitation) compared with other treatment approaches for motor retraining after an acute stroke has not been established. Motor Learning and Bobath are not superior to one another, and may be beneficial in improving motor recovery.	AHA-ASA 2016	Class IIb, Level B	Eng JJ et al, 2007 Langhammer B et al, 2011
	EBRSPR 2016	Level Ia	Brock et al, 2011 Chan et al, 2006 Chung et al, 2014 Dean et al, 1997 Gelber et al, 1995 Hafsteinsdottir et al, 2005 Langhammer & Stanghelle, 2000 Langhammer & Stanghelle et al, 2003 Lennon et al, 2006 Miller et al, 1998 Mudie et al, 2002 Patel et al, 1998 Pollock et al, 2002 Richards et al, 1993 Salbach et al, 2004 Stern et al, 1970 Van Vliet et al, 2005 Wang et al, 2005
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation and strength of evidence remains unchanged from the 2011 PARM guideline.			
PARM strongly endorses that Neurodevelopmental Technique is equal to other treatment approaches in improving motor recovery.			

2011 Recommendation Statement			
There is evidence that task specific training could improve walking distance and speed, sitting, and standing up.	NSF	A	McClellan & Ada, 2004 Wever et al, 2009
	USVA/Dod	I	Ada et al, 2003 Dean et al, 2007
	CSS Sit to stand	C	Blennerhassett & Dite, 2004 Marigold et al, 2005 Richards et al, 2004 Barreca et al, 2004 Cheng et al, 2001 Dean et al, 2000a Salbach et al, 2004, 2005 Sullivan et al, 2007 Yang et al, 2005, 2006
	Gait	B	
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that task and goal-oriented training that is progressively adapted, meaningful, salient, and involves active participation should be used to improve performance of selected lower-extremity tasks.	CANADIAN 2013	Early: B Late: B	English & Hillier, 2010 Port et al, 2012 Salbach et al, 2004, 2005 Pollock et al, 2007
Moderate volume – Non-current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM endorses task specific training in improving transfer skills, mobility and gait. It should be progressively adapted, relevant and involve active participation of patients.			

2017 Recommendation Statement			
There is some evidence that once medically stable, all patients with stroke should receive the intensity and duration of clinically relevant therapy defined in their individualized rehabilitation plan appropriate to their needs and tolerance levels, with the duration of therapy being dependent on stroke severity. Better results can be obtained if physical therapy takes place twice day (morning and afternoon) for 45 – 60 minutes depending on patient's tolerance. The team should be consistent in promoting	CAMEROON 2013	Level A	ASA, 2007 HSFO, 2007 CMAJ, 2010 EBRSR, 2013
		Level C	

the practice of skills gained in therapy into the patient's daily routine.			
Moderate volume – Non-current			
PARM recommends that all patients with stroke should receive clinically relevant therapy defined in their individualized rehabilitation plan, appropriate to their needs and tolerance level once medically stable. Better results can be obtained if physical therapy takes place twice day (morning and afternoon) for 45 – 60 minutes depending on patient's tolerance. The skills gained in therapy should be incorporated into the patient's daily routine.			

2017 Recommendation Statement			
There is some evidence that post-stroke patients who have difficulty in activities of daily living, including self-care, productivity and leisure, should receive therapy or multidisciplinary interventions targeting activities of daily living.	CAMEROON 2013	Level A	AU, 2010 CMAJ, 2010
Low volume – Non-current			
PARM recommends therapy or multidisciplinary interventions targeting activities of daily living to post-stroke patients who have difficulty in self-care, productivity and leisure.			

2017 Recommendation Statement			
There is some evidence that post-stroke patients with difficulties in mobility should be offered an exercise program and should be monitored throughout the program.	CAMEROON 2013	Level B	AU, 2010 CMAJ, 2010
Low volume – Non-current			
PARM recommends a monitored exercise program to post-stroke patients with difficulties in mobility.			

2017 Recommendation Statement			
There is evidence that assessment of all individuals with stroke should be done before discharge from acute care hospitalization, and the findings be incorporated into the care transition and the discharge planning process. Periodic assessments with the same standardized tools to document progress in rehabilitation may be useful.	AHA-ASA 2016	Class I Level B Class I Level C	Miller et al, 2010 Gresham et al, 1995 National Clinical Guideline for Stroke 3rd ed, 2008 Teasell et al, 2003 Stein et al, 2015 Wee et al, 2005 Lang et al, 2011 Sumathipala et al, 2012 Duncan et al, 2005 Kollen et al, 2006
High volume – Non-current			

PARM endorses assessment of all individuals with stroke before discharge from acute care hospitalization for care transition and discharge planning. It may be useful to do periodic assessments with the same standardized tools to document progress in rehabilitation

2017 Recommendation Statement

There is some evidence that the use of technology (accelerometers, step activity monitors, pedometers) as an objective means of assessing real-world activity and participation of individuals with stroke may be considered.	AHA-ASA 2016	Class IIb, Level C	Moore et al, 2010 Rand et al, 2009 Dobkin et al, 2011 Dobkin et al, 2011 Carroll et al, 2012
Moderate volume – Non-current			
PARM recommends considering the use of accelerometers, step activity monitors, or pedometers as an objective means of assessing real-world activity and participation of individuals with stroke.			

2017 Recommendation Statement

There is some evidence that self-management programs may not improve gait or balance post stroke.	EBRSR 2016	Level 1a	Lindvall and Forsberg, 2014 Liu and Chan, 2014
Low volume – Current			
PARM does not recommend self-management programs to improve gait or balance post-stroke.			

2017 Recommendation Statement

There is some evidence that caregiver mediated programs may improve gait and balance outcomes post-stroke.	EBRSR 2016	Level 1b	Wang et al, 2015
Low volume – Current			
PARM recommends caregiver mediated programs to improve gait and balance outcomes post-stroke.			

2017 Recommendation Statement

There is evidence that after completion of formal stroke rehabilitation, participation in a program of exercise or physical activity at home or in the community is recommended.	AHA-ASA 2016	Level I Class A	Hartman-Maeir et al, 2007 Chen et al, 2011 Management of Stroke Rehabilitation Working Group, 2010 Ivey et al, 2008 ACSM, 2013 Nicholson et al, 2013 Morris et al, 2012 Holman et al, 2004 van Veenendaal et al, 1996
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			Simpson et al, 2011 Damush et al, 2007 Banks et al, 2012 van der Ploeg et al, 2007 Boysen et al, 2009 Jones et al, 2009 Joubert et al, 2009
High volume – Non-current			
PARM endorses participation in a program of exercise or physical activity at home or in the community after completion of formal stroke rehabilitation.			

5.2 GAIT TRAINING

Table 36. Gait training for stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is strong evidence that repetitive practice of walking improves gait speed, functional ambulation and walking distance.	SIGN 2010 USVA/ DoD	1++ 1	French et al, 2007 Ada et al, 2003 Blennerhassett & Dite, 2004 Dean et al, 2007 Marigold et al, 2005 Richards et al, 2004 Sullivan et al, 2007 Yang et al, 2005
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017: No new evidence			
PARM strongly endorses the use of a tailored repetitive practice of walking or components of walking to improve functional ambulation.			

2011 Recommendation Statement			
There is strong evidence that muscle strength training improves strength, but there is insufficient evidence on improving functional outcomes, which includes walking ability. Some evidence shows that muscle strength training does not have any adverse effect on spasticity.	SIGN 2010 USVA/ DoD	1+ 1	Ada et al, 2006 Glinsky et al, 2007 Eng, 2004 Cramp et al, 2006 Mead et al, 2007 Moreland et al, 2003 Ouellette et al, 2004 Tihanyi et al, 2007
Consistent level of evidence – High volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that incorporating strengthening interventions is reasonable to	AHA-ASA 2016	Class IIa, Level A	Eng et al, 2007 Mehta et al, 2012 Pak et al, 2008

<p>consider for recovery of gait capacity and gait related mobility tasks. Progressive resistance training may help with lower limb strength, however, strength training may not improve gait speed.</p> <p>The presence of spasticity should not limit the use of strength training in the leg.</p>	CANADIAN 2013	Level B	SIGN, 2010 VA/DoD, 2010 Flansbjer et al, 2008 Flansbjer et al, 2012 Cooke et al, 2010
	EBRSR 2016	Level 1a, 1b	Mares et al, 2014 Mead et al, 2007 Clark and Patten, 2013 Lee et al, 2010 Kim et al, 2001 Cooke et al, 2010 Ouellette et al, 2004 Kim et al, 2015 Son et al, 2014 Duncan et al, 1998 Flansbjer et al, 2012 Flansbjer et al, 2008 Bale et al, 2008 Moreland et al, 2003 Dean et al, 2000 Lee et al, 2013 Inaba et al, 1973 Glasser, 1986 Page et al, 2008 Lee and Kang, 2013 Park et al, 2014

Consistent level of evidence – High volume – Non-current – Uniform thought

ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.

PARM strongly endorses strength training for improving muscle strength. Strength training has no adverse effect on spasticity.

2011 Recommendation Statement

There is evidence that gait-oriented physical fitness training after stroke can improve gait speed and endurance and some evidence that it may reduce the degree of dependence on other people during walking.

SIGN 2010

1++

Saunders et al, 2009
Van de Port et al, 2007
Van Peppen et al, 2004

Low volume – Current

2017: No new evidence

PARM endorses gait-oriented physical fitness training in patients who are medically stable and are functionally safe to participate when the goal is to improve functional ambulation.

2011 Recommendation Statement

There is conflicting evidence in the effectiveness of functional

SIGN 2010

1++, 1+, 2+
(insufficient evidence)

Van Peppen et al, 2004,
2006

electrical stimulation (FES) in improving gait, muscle strength or functional outcome after stroke.	USVA/ Dod	1	Glanz et al, 1996 Glinsky et al, 2007
	CSS	Early: A Late: A *should not be assumed to have sustained effects	Daly et al, 2006 Kottink et al, 2004, 2007 McCabe et al, 2008 Ng & Hui-Chan, 2007 Ng et al, 2008 Pomeroy et al, 2006 Robbins et al, 2006 Sheffler et al, 2006
Inconsistent level of evidence – High volume – Current – Variable thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that functional electrical stimulation (FES) may improve gait, improve muscle force, strength and function in selected patients, but the effects should not be assumed to be sustained.	CANADIAN 2013	Early: A Late: A	Pomeroy et al, 2006 Ambrosini et al, 2011
	EBRSR 2016	1a, 2	Kottink et al, 2004 Spach et al, 2014 Morone et al, 2012 Yamaguchi et al, 2012 Ambrosini et al, 2012 Bae et al, 2014 Daly et al, 2006 Kunkel et al, 2013 Everaert et al, 2013 Daly et al, 2011 Tan et al, 2014 You et al, 2014 Knutson et al, 2013 Yan et al, 2005 Salisbury et al, 2013 Bogataj et al, 1995 Cozean et al, 1998 Chung et al, 2015 Bethoux et al, 2014 Kojovic et al, 2009 Kluding et al, 2013 Tong et al, 2006 Kim et al, 2013 Shendkar et al, 2015
Consistent level of evidence – High volume – Current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends the use of functional electrical stimulation for the treatment of foot drop. Its effect is immediate but sustained effect is not assumed.			

2011 Recommendation Statement

There is evidence that the use of an ankle foot orthosis improves walking speed, efficiency and gait	NSF	C	Leung & Moseley, 2003
	SIGN 2010	2+	Bleyenheuft et al, 2008 De Wit et al, 2004

pattern or weight bearing during stance.	USVA/ Dod	1	Pohl & Mehrholz, 2006 Wang et al, 2007
	CSS	Early: A Late: A	Chen et al, 1999 Jeong & Kim, 2007 Sheffler et al, 2006 Thaut et al, 1997, 2007 Thijssen et al, 2007 Tyson & Rogerson, 2009 Tyson & Thornton, 2001 Wang et al, 2005, 2007
Inconsistent level of evidence – High volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that ankle-foot orthoses (AFO) may improve gait and range of motion. It can be used in individuals with remediable gait impairments (e.g., foot drop) to compensate, improve mobility and paretic ankle and knee kinematics, kinetics, and energy cost of walking, following proper assessment and with follow-up to verify its effectiveness. Lower-extremity orthotic devices can be used for ankle instability or dorsiflexor weakness to help the patient walk.	CANADIAN 2013	Early: A Late: A (Foot drop) Early: C Late: C (Ankle stabilization)	de Wit et al, 2004 Wang et al, 2007 Tyson & Kent, 2013
	AHA-ASA 2016	Class I, Level A (Foot drop) Class I, Level B (Ankle instability or dorsiflexor weakness)	Sheffler et al, 2006 Doğan et al, 2011 Tyson et al, 2013 Tyson et al, 2012 Tyson et al, 2009 Thijssen et al, 2007 Erel et al, 2011 de Sèze et al, 2011
	EBRSR 2016	Level 1a, 2	Forrester et al, 2014 Ding et al, 2015 Wang et al, 2007 de Wit et al, 2004 Pohl and Mehrholz, 2006 Erel et al, 2011 De Seze et al, 2011 Kosak et al, 2000 Chen et al, 1999 Pardo et al, 2015 Tyson and Rogerson, 2009 Beckerman et al, 1996
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM endorses the use of ankle foot orthosis in patients with persistent foot drop to improve walking speed, efficiency and gait pattern. However, it should not be routinely used and it should be individually fitted. There should be a proper assessment by a physiatrist prior to use. Regular assessment is also recommended.			

2011 Recommendation Statement			
There is insufficient high quality evidence to make generalizations about the relative effects of different walking aids.	SIGN 2010 USVA/ Dod	2-	Laufer 2002, 2003
Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017: No new evidence			
PARM suggests the use of walking aids only after a full assessment of its potential benefits and harms in relation to the individual's stage of recovery and presentation has been made.			

2017 Recommendation Statement			
There is strong evidence that repetitive and intense use of novel tasks that challenge the patient to acquire necessary motor skills to use the involved limb during functional tasks and activities is recommended for all individuals with gait limitations after stroke.	CAMEROON 2013	Level A	SCORE, 2007
	AHA-ASA 2016	Class I, Level A	Veerbeek et al, 2011 Langhorne et al, 2009 French et al, 2007 Eng et al, 2007 Dickstein et al, 2008 Dean et al, 2012
	EBRSR 2016	Level 1a, 2	Blennerhasset & Dite, 2004 Tung et al, 2010 Salbach et al, 2004 Marigold et al, 2005 Verma et al, 2005 van de Port et al, 2012 Dean et al, 2000 Yang et al, 2006 Yang et al, 2007 Mudge et al, 2009 Outermans et al, 2010 Dean et al, 2000 Barreca et al, 2004 Shim et al, 2012
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses the repetitive and intense use of novel tasks for all individuals with gait limitations after stroke. These tasks should challenge the patient to acquire necessary motor skills to use the involved limb during functional tasks and activities.			

2017 Recommendation Statement			
There is evidence that early intensive therapy may improve gait, general motor function and independent function in individuals with stroke within the first 3 months, but not after 6 months.	EBRSR 2016	1a, 2	Kwakkel et al, 1999 Kwakkel et al, 2002 Partridge et al, 2000 Green et al, 2002 Langhammer et al, 2007 Langahmmer et al, 2009 Wellwood, 2004 Hesse et al, 2011 Wade et al, 1992 Richards et al, 1993

			Bai et al, 2012 Langhammer et al, 2014 Jette et al, 2005
High volume – Non-current			
PARM endorses early intensive therapy to improve gait, general motor function and independent function in individuals with stroke within the first 3 months, but not after 6 months.			

2017 Recommendation Statement			
There is insufficient evidence that the need for gait aids, assistive devices, wheelchairs, and other special equipment should be evaluated on an individual basis. Prescription or purchase of a long-term device should be based on anticipation of a long-term need, and once provided, patients should be reassessed, as appropriate, to determine if changes are required or equipment can be discontinued.	CANADIAN 2013	Early: Level C Late: Level C	Duncan et al, 2005 Intercollegiate Stroke Working Party, 2012 Royal College of Physicians, 2008
Low volume – Non-current			
PARM suggests individual evaluation prior to prescription of gait aids, assistive devices, wheelchairs, and other special equipment based on long term need. Reassessment should be done, as appropriate, to determine if changes are required or equipment can be discontinued.			

2017 Recommendation Statement			
There is some evidence that ambulatory assistive devices (e.g., cane, walker) should be used to help with gait and balance impairments, as well as mobility efficiency and safety, when needed. These devices should be used for safety and function if other methods of performing the task/activity are not available or cannot be learned or if the patient's safety is a concern.	AHA-ASA 2016	Class I Level B, C	Jutai et al, 2007 Polese et al, 2012 Tyson et al, 2009 Laufer et al, 2002 Jutai et al, 2007 Tyson et al, 2009
Moderate volume – Non-current			
PARM recommends the use of ambulatory assistive devices to help with gait and balance impairments, as well as mobility efficiency and safety, when needed.			

2017 Recommendation Statement			
There is some evidence that wheelchairs should be used for non-ambulatory individuals or those with limited walking ability.	AHA-ASA 2016	Class I Level C	Mountain et al, 2010 RESNA Wheelchair Service Provision Guide, 2011

However, encouraging hemiplegic individuals to propel their own wheelchair may not improve ADLs. Additional research is required to investigate the impact of wheelchairs for improving mobilization post stroke.			Barrett et al, 2001 Mountain et al, 2010 Barker et al, 2006 Pettersson et al, 2007
	EBRSR 2016	Level Ib	Barrett et al, 2001
Inconsistent level of evidence – Moderate volume – Non-current – Uniform thought			
PARM recommends the use of wheelchairs for non-ambulatory individuals or those with limited walking ability. However, encouraging hemiplegic individuals to propel their own wheelchair may not improve ADLs.			

2017 Recommendation Statement

There is evidence that NMES is reasonable to consider as an alternative to an AFO for foot drop.	AHA-ASA 2013	Class IIa, Level A	Sabut et al, 2011 Ottawa Panel, 2006 Daly et al, 2006 Everaert et al, 2013 Kluding et al, 2013
Moderate volume – Non-current			
PARM endorses the use of NMES as a reasonable alternative to AFO for foot drop.			

2017 Recommendation Statement

There is some evidence that the effectiveness of TENS in conjunction with everyday activities for improving mobility, lower extremity strength, and gait speed is uncertain.	AHA-ASA 2016	Class IIb, Level B	Robbins et al, 2006 Ng et al, 2007 Ng et al, 2009 Tyson et al, 2013
Moderate volume – Non-current			
PARM does not recommend the routine use of TENS in conjunction with everyday activities for improving mobility, lower extremity strength, and gait speed.			

2017 Recommendation Statement

There is evidence that cardiovascular training in the form of fitness and mobility programs, aquatic therapy, and community/outpatient exercise programs as well as supervised programs may improve gait. Further research is required to identify the effectiveness of cycling programs, and home-based exercise programs on mobility and balance.	EBRSR 2016 (Cardiovascular fitness, aquatic therapy, and mobility training programs) (Home-based cardiovascular exercise programs) (Cycling training intervention)	1a 1b 1b, 2	Marzolini et al, 2012 Brown & DeBacher, 1987 Monga et al, 1988 Macko et al, 1997 Gjellesvik et al, 2012 Mehta et al, 2012 Brown & Kautz, 1998 Rimmer et al, 2000 Holt et al, 2001 Meek et al, 2003 Saunders et al, 2004 Pang et al, 2006 Pang et al, 2013 Tripp et al, 2014 Kim et al, 2014 Duncan et al, 2003 Kautz et al, 2005
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			Lennon et al, 2008 Olney et al, 2006 Park et al, 2014 Furnari et al, 2014 Bateman et al, 2001 Globas et al, 2012 Gordon et al, 2013 Toledano-Zarhi et al, 2011 Chu et al, 2004 Macko et al, 2005 Mayo et al, 2005 Seo et al, 2014 Katz-Leurer et al, 2003 Jeonhyeng et al, 2014 Song et al, 2015 Song et al, 2015 Jin et al, 2012 Letombe et al, 2010 Rimmer et al, 2000 Potempa et al, 1995
High volume – Non-current			
PARM endorses cardiovascular training in the form of fitness and mobility programs, aquatic therapy, and community/outpatient exercise programs as well as supervised programs to improve gait.			

5.2.1 OTHER TREATMENT MODALITIES FOR GAIT TRAINING

Table 37. Other treatment modalities for gait training in stroke patients

2011 Recommendation Statement			
There is conflicting evidence on the use of electromyographic (EMG) biofeedback in gait training.	NSF	C	Moreland et al, 1998
	SIGN 2010	1++	Woodford & Price, 2007 (not recommended)
Inconsistent level of evidence – Low volume – Non-current – Variable thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence on the uncertainty of the usefulness of electromyography biofeedback on lower limb function during gait training in patients after stroke.	AHA-ASA 2016	Class IIb, Level B	Woodford et al, 2007
	EBRSR 2016	Level 1a, 2	Moreland & Thomson, 1994 Moreland et al, 1998 Glanz et al, 1996 Woodford & Price, 2007 Jonsdottir et al, 2010 Lee et al, 2015 Cozean et al, 1988 Nurnside et al, 1982 Bradley et al, 1998 Intiso et al, 1994

			Mandel et al, 1990 Mulder et al, 1986 Stanton et al, 2011 Jonsdottir et al, 2010 Lee et al, 2015
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 4: The recommendation and strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM does not endorse the routine use of EMG biofeedback as an adjunct in gait training.			

2011 Recommendation Statement			
There is evidence that the use of treadmill automated or robotic device is no more effective than ground training in improving functional gait.	NSF	B	Mehrholz et al, 2007
	SIGN 2010	1++ 2++	Manning & Pomeroy, 2003 Moseley et al, 2005
	USVA/ Dod	1	Ada et al, 2003 Liston et al, 2000
	CSS	Early: B,C Late B	Pohl et al, 2002 Richards et al, 2004 Suputtitada et al, 2004
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that body-weight supported treadmill training may not be superior to conventional therapy at improving gait, motor function, or balance. Robot-assisted movement training to improve motor function and mobility after stroke in combination with conventional therapy may also be considered.	CANADIAN 2013	Early: Level A Late: Level A	Ada et al, 2010 Dean et al, 2010 Duncan et al, 2011
	AHA-ASA 2016	Class IIb, Level A	Dobkin et al, 2012 Ada et al, 2013 Dickstein et al, 2008 Polese et al, 2013 Høyer et al, 2012 Ada et al, 2010 Duncan et al, 2011 Mehrholz et al, 2013 Hornby et al, 2008 Swinnen et al, 2014 Stein et al, 2014
	EBRSR 2016	1a, 2	Ada et al, 2010 Kelley et al, 2013 Eich et al, 2004 MacKay-Lyons et al, 2013 Nilsson et al, 2001 Sullivan et al, 2007 Yen et al, 2008 Middleton et al, 2014 DePaul et al, 2015 Franceschini et al, 2009 Suputtitada et al, 2004

			Hoyer et al, 2012 Yang et al, 2012 Duncan et al, 2011 Da Cunha Filho et al, 2002 Moore et al, 2010 Kosak & Reding, 2000 Kim et al, 2014 Takao et al, 2015
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
<p>PARM strongly endorses that treadmill training could be used in conjunction with conventional gait training to enhance walking speed, endurance and walking distance. However, there is no conclusive evidence that body weight supported treadmill training is superior to ground training. It could be considered if other strategies for gait training are unsuccessful in patients with low ambulatory status. In the absence of a treadmill in the rehabilitation center, ground walking is highly endorsed.</p>			

2011 Recommendation Statement

There is evidence that there is no effect of visual feedback during balance platform training on balance, gait or mobility outcomes.	SIGN 2010	1++	Barclay-Goddard et al, 2004 Van Peppen et al, 2006
Low volume – Non-current			
2017: No new evidence			

PARM does not endorse the use of visual feedback during balance platform training to improve balance nor functional gait.

2011 Recommendation Statement

There is insufficient evidence that joint position biofeedback could be used with gait training.	NSF	C	Langhorne et al, 2009
Low volume – Current			
2017: No new evidence			

PARM suggests the use of joint position biofeedback as an additional treatment modality in conjunction with ambulation training.

2011 Recommendation Statement

There is some evidence that cueing for cadence could be used in addition to conventional walking training	NSF	B	Langhorne et al, 2009
Low volume – Current			
2017: No new evidence			

PARM recommends the use of cueing as an adjunct to ambulation training.

2011 Recommendation Statement			
There is some evidence that virtual reality training could be used in conjunction with ambulation training.	NSF	C	You et al, 2005
	USVA/Dod	1	Jaffe et al, 2004 Kim et al, 2009 Mirelman et al, 2009 Yang et al, 2008
Inconsistent levels of evidence – Moderate volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that virtual reality (VR) may be beneficial for the improvement of gait.	AHA-ASA 2016	Class IIb, Level B	Laver et al, 2011 Moreira et al, 2013
	EBRSR 2016	1a, 2	Laver et al, 2011 Laver et al, 2012 Smith et al, 2012 Fritz et al, 2013 Fritz et al, 2013 Llorens et al, 2015 Llorens et al, 2015 Caltagirone & Morone, 2014 Kim et al, 2009 Changho et al, 2015 McEwen et al, 2014 Rajaratnam et al, 2013 Mirelman et al, 2010 Kim et al, 2012 Jung et al, 2013 You et al, 2005 Singh et al, 2013 Corbetta et al, 2015
Consistent levels of evidence – High volume – Current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM endorses the use of virtual reality training as an adjunct to ambulation training.			
2017 Recommendation Statement			
There is evidence that mental practice or motor imagery may improve gait and balance outcomes post-stroke.	EBRSR 2016	1a, 2	Braun et al, 2012 Schuster et al, 2012 Malouin et al, 2009 Hosseini et al, 2012 Lee et al, 2015 Cho et al, 2013 Park et al, 2013
Moderate volume – Current			
PARM endorses the use of mental practice or motor imagery to improve gait and balance outcomes post-stroke.			

2017 Recommendation Statement			
There is evidence that auditory feedback may improve gait and muscle activity.	EBRSR 2016	1a, 2	Stanton et al, 2011 Zijlstra et al, 2010 Jung et al, 2015 Schauer et al, 2003 Kim and Oh, 2012 Ki et al, 2015 Jin-Seop & Duck-Won, 2012 MK et al, 1997 Dorsch et al, 2015

High volume – Current

PARM endorses the use of auditory feedback to improve gait and muscle activity.

2017 Recommendation Statement			
There is some evidence that rhythmic auditory cueing may improve walking speed and coordination.	AHA-ASA 2016	Class IIb, Level B	Wittwer et al, 2013
Low volume – Current			
PARM recommends the use of rhythmic auditory cueing to improve walking speed and coordination.			

2017 Recommendation Statement

There is evidence that VR may improve gait and balance when combined with treadmill training; however, when delivered alone, it may only improve balance.	EBRSR 2016	1a, 2	Cho et al, 2013 Cho et al, 2014 Cho et al, 2013 Kang et al, 2012 Yang et al, 2008 Yang et al, 2011
Moderate volume – Current			
PARM endorses the use of VR to improve balance, or combined use of VR with treadmill training to improve gait and balance when available.			

2017 Recommendation Statement

There is some evidence that bilateral leg training with a custom-made device may not improve lower limb motor function.	EBRSR 2016	1b	Johannsen et al, 2010
Low volume – Non-current			
PARM does not recommend bilateral leg training with a custom-made device.			

2017 Recommendation Statement

There is evidence that hippotherapy may not improve gait outcomes, and evidence for its effectiveness in balance is conflicting. However there may be an improvement on foot pressure.	EBRSR 2016	1a, 2 –	Sung et al, 2013 Lee et al, 2015 Lee, Kim, Yong et al, 2014 Baek et al, 2014 Beinotti et al, 2010 Han et al, 2012
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Moderate volume – Current PARM does not endorse the routine use of hippotherapy for improving gait outcomes of patients with stroke.

2017 Recommendation Statement			
There is some evidence that the effectiveness of water-based exercise for motor recovery after an acute stroke is unclear.	AHA-ASA 2016	Class IIb, Level B	Mehrholz et al, 2011
Low volume – Non-current			
PARM does not recommend water-based exercise for motor recovery after an acute stroke due to the uncertainty of its effectiveness.			

2017 Recommendation Statement			
There is evidence that group therapy with circuit training is a reasonable approach to improve walking.	AHA-ASA 2016	Class IIa, Level A	Dean et al, 2012 English et al, 2011 Mudge et al, 2009 Wevers et al, 2009
Moderate volume – Non-current			
PARM endorses group therapy with circuit training as a reasonable approach to improve walking.			

2017 Recommendation Statement			
There is evidence that practice walking with either a treadmill (with or without body-weight support) or overground walking exercise training combined with conventional rehabilitation may be reasonable for recovery of walking function.	AHA-ASA 2016	Class IIb, Level A	Duncan et al, 2011 Dobkin et al, 2012 Ada et al, 2013 Dickstein et al, 2008 Polese et al, 2013 Høyer et al, 2012 Ada et al, 2010
Moderate volume - Current			
PARM endorses practice walking with either a treadmill (with or without body-weight support) or overground walking exercise training combined with conventional rehabilitation for recovery of walking function.			

2017 Recommendation Statement			
There is strong evidence that the use of treadmill training without body weight support may improve lower limb impairments pertaining to gait velocity and function, but not balance. It can be used when over-ground training is not available or appropriate. When used, it is suggested that therapy should be provided for 30 minutes a day, five days a week, for two weeks.	CANADIAN 2013	Class IIb, Level A	Polese et al, 2013 Dickstein et al, 2008 Ada et al, 2013
	EBRSR 2016	1a, 2	Langhammer & Stanghelle, 2010 Globas et al, 2012 Kuys et al, 2011 Liston et al, 2000 Shaughnessy et al, 2012 Laufer et al, 2001 Ada et al, 2003 Macko et al, 2005

			Lau et al, 2011 Chen et al, 2014 Bang et al, 2014 Carda et al, 2013 Cho et al, 2015 Ijmker et al, 2013 Park et al, 2013
Consistent levels of evidence – High volume – Current – Uniform thought			
PARM strongly endorses the use of treadmill training without body weight support to improve lower limb impairments such as gait velocity and function. If appropriate and tolerated, it should be provided 30 minutes a day, five days a week, for two weeks.			

2017 Recommendation Statement			
There is evidence that body-weight supported treadmill training may be considered for patients who are non-ambulatory or have low ambulatory ability early after stroke. This method can be used for patients when walking practice is unsuccessful or unsafe.	CANADIAN 2013	Early: Level A Late: Level A	Duncan et al, 2011 Ada et al, 2010 Dean et al, 2010
Low volume – Non-current			
PARM recommends body-weight supported treadmill training as an option for patients who are non-ambulatory or have low ambulatory ability early after stroke, especially when walking practice is unsuccessful or unsafe.			

2017 Recommendation Statement			
There is evidence on the use of electromechanical-assisted training devices, such as Gait trainer and Lokomat, in improving gait of post stroke patients. The Gait trainer may improve gait but only when used in the acute phase of stroke, while the Lokomat may not be beneficial at improving gait or balance in the acute phase of stroke recovery and has limited and unclear evidence regarding its use in the chronic and subacute stroke phases.	EBRSR 2016	Level 1a, 2	Pohl et al, 2007 Ochi et al, 2015 Morone et al, 2011 Werner et al, 2002 Stein et al, 2014 Tong et al, 2006 Ng et al, 2008 Dias et al, 2007 Peurrala et al, 2009 Hesse et al, 2012 Waldman et al, 2013 Fisher et al, 2011 Watanabe et al, 2014 Dundar et al, 2014 Husemann et al, 2007 Mayr et al, 2007 Schwartz et al, 2009 van Nunen et al, 2015 Westlake and Patten, 2009 Chang et al, 2012 Ucar et al, 2014 Hidler et al, 2009

			Krewer et al, 2013 Freivogel et al, 2009 Hornby et al, 2008 Forrester et al, 2014 Monticone et al, 2013 Tea-Woo-Kim et al, 2014 Choi et al, 2013
High volume – Non-current			
PARM endorses the use Gait trainer, if available, in improving gait of patients in the acute phase of stroke. However, the effectiveness of the Lokomat remains unclear, and more research is needed to determine the benefits from using this device.			

5.3 SPASTICITY

Table 38. Management of spasticity in stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is no evidence that interventions to decrease spasticity other than a comprehensive therapy program should be routinely provided for people who have mild to moderate spasticity	NSF	GPP	-
None			
2017: No new evidence			
PARM does not endorse the routine use of interventions to decrease spasticity other than a comprehensive therapy program for people who have mild to moderate spasticity.			

2011 Recommendation Statement			
There is some evidence that anti-spasticity positioning, range of motion exercise, stretching and splinting can decrease or prevent contracture.	USVA/Dod	C, III	Gresham et al, 1995 Intercollegiate Working Party for Stroke, 2000 USVA/Dod, 2010
	CSS	Early-Level C Late-Level C	Kluding & Santos, 2008
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that spasticity and contractures should be treated or prevented by anti-spastic pattern positioning, range-of-motion exercises and/or stretching. However, there is conflicting evidence on the use of splints.	CANADIAN 2013	Early-Level C Late-Level C (Does not recommend splinting)	Kluding et al, 2008 USVA/Dod, 2010 Does not recommend splinting: SIGN, 2010 NSF, 2010
	EBRSR 2016	1b	Robinson et al, 2008

Though some of the current evidence do not recommend the use of splints, some evidence suggest that use of splints and tilt tables are both effective in the prevention of ankle contracture in the hemiplegic limb.		(for splinting)	
	AHA-ASA 2016	Class IIb, Level B (for splinting)	Robinson et al, 2008
Inconsistent level of evidence – Moderate volume – Non-current – Variable thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM recommends the use of splinting, range of motion exercise, stretching, and positioning in to reduce or prevent spasticity.			

2011 Recommendation Statement

There is evidence that patients with moderate to severe spasticity could be treated with botulinum toxin injection, either in conjunction with rehabilitation therapy or oral medication. It has inconsistent effects in improving walking speed and step length. Indications in the use of botulinum toxin include spasticity that is painful, impairs function, reduces the ability to participate in rehabilitation or compromises proper positioning or skin care	NSF	B	Elia et al, 2009 Garces et al, 2006 Rosales & Chua-Yap, 2008
	SIGN 2010	1++	Wade & Halligan, 2004
	USVA/DoD	B, I	Bhakta et al, 2008 Brashears et al, 2002 Childers et al, 2004 Francis et al, 2004
	CSS	Early – Level C Late – Level A	Burbaud et al, 1996 Kaji et al, 2010 Pittock et al, 2003

Inconsistent level of evidence – High volume – Non-current – Uniform thought

2017 Updated Recommendations and Evidence Sources

There is evidence that chemodenervation using botulinum toxin can be used to increase range of motion, improve gait, and decrease pain for patients with focal and/or symptomatically distressing spasticity. Targeted injection of botulinum toxin into lower limb muscles is recommended to reduce spasticity that interferes with gait function. However, treatment with botulinum toxin may not improve functional outcomes despite improvement in lower-limb spasticity.	CANADIAN 2013	Early- Level C Late- Level A	Foley et al, 2010 Kaji et al, 2010 Pittock et al, 2003 Burbaud et al, 1996
	AHA-ASA 2016	Class I, Level A	Duncan et al, 2005 VA/DoD, 2010 Brainin et al, 2011 Teasell et al, 2012 Kaji et al, 2010 Santamato et al, 2013 Santamato et al, 2013 Foley et al, 2010 Tok et al, 2012
	EBRSR 2016	1a, 1b, 2	Foley et al, 2010 Kaji et al, 2010 Pittock et al, 2003 Picelli et al, 2014 Kirrazli et al, 1998

			Dunne et al, 2012 Fietzek et al, 2014 Burbaud et al, 1996 Childers et al, 1996 Ward et al, 2014 Mancini et al, 2005 Pimentel et al, 2014 Roche et al, 2015 Tao et al, 2015 Ding et al, 2015 On et al, 1999 Reiter et al, 1998
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM endorses the use of Botulinum toxin injection in the treatment of lower extremity spasticity, if patients are able to afford the cost.			

2011 Recommendation Statement

There is some evidence that FES can be used in the management of spasticity.	NSF	C	Bakhtiary & Fatemy, 2008 Heckman et al, 1997 Yan & Hui-Chan, 2009
	SIGN 2010	1+	Glanz et al, 1996

Inconsistent level of evidence – Moderate volume – Non-current – Uniform thought

2017 Updated Recommendations and Evidence Sources

There is evidence functional electrical stimulation (FES) may improve spasticity outcomes post-stroke.	EBRSR 2016	1a, 2	You et al, 2014 Ng & Hui-Chan, 2007 Cheng et al, 2010 Mesci et al, 2009
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Moderate volume – Non-current

ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.

PARM endorses the use of FES in the management of spasticity, as an adjunct to rehabilitation therapy.

2011 Recommendation Statement

There is some evidence that EMG biofeedback can be used in the management of spasticity.	NSF	C	Bakhtiary & Fatemy, 2008 Heckman et al, 1997 Yan & Hui-Chan, 2009
	SIGN 2010	1+	Glanz et al, 1996

Inconsistent level of evidence – Moderate volume – Non-current – Uniform thought

2017: No new evidence

PARM recommends the use of EMG biofeedback in the management of spasticity, as an adjunct to rehabilitation therapy.

2011 Recommendation Statement			
There is strong evidence that oral anti-spasticity medications (e.g. tizanidine, dantrolene, baclofen, diazepam, gabapentin) are effective in decreasing lower extremity spasticity. The indication for their use include spasticity associated with pain, poor skin hygiene or decreased function. Tizanidine should be used specifically for chronic stroke patients. Common side effects include drowsiness, fatigue and weakness.	SIGN 2010	1+	Montane et al, 2004
	USVA/DoD	B, II-I	Gelber et al, 2001 Ketel & Kolb, 1984 Milanov, 1992
	CSS	Early – Level B Late – Level B	Gelber et al, 2001 Kamen et al, 2008
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
<p>There is evidence that oral pharmacological agents for spasticity can be useful in the management of spasticity, but may result in dose-limiting sedation or other side effects.</p> <p>Oral medications that can be prescribed for the treatment of disabling spasticity include:</p> <ul style="list-style-type: none"> a. Tizanidine b. Baclofen c. Tolperisone d. Dantrolene 	CANADIAN 2013	Early: Level C Late: Level B (Tizanidine) Early: Level C Late: Level C (Baclofen)	SIGN, 2010 VA/DoD, 2010 Duncan et al, 2005 RCP, 2012
	AHA-ASA 2016	Class IIa, Level A	Meythaler et al, 2004 Meythaler et al, 2001 Chyatte et al, 1971 Gelber et al, 2001 Bes et al, 1988 Medici et al, 1989 Ketel et al, 1984 Katrak et al, 1992 Medaer et al, 1991
	EBRSR 2016	1b (No difference between Baclofen and Tizanidine) 1b (Dantrolene) 1b, 2 (conflicting evidence on	Katrak et al, 1992 Medici et al, 1989 Ketel & Kolb, 1984 Stamenova et al, 2005

		use of Dantrolene)	
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM strongly endorses the use of oral medications, such as tizanidine, baclofen, and dantrolene in the treatment of lower extremity spasticity.			

2011 Recommendation Statement			
There is some evidence that diazepam and other benzodiazepines should be avoided in the management of spasticity because of the following side effects: interference with cerebral functions associated with recovery of function after stroke and sedation which will compromise an individual's ability to participate effectively in rehabilitation	USVA/DoD	D, II-2	Goldstein, 1995, 1998 Graham et al, 1999 Troisi et al, 2002
	CSS	Early – Level C Late – Level C	Katrak et al, 1992 (Cited in EBRSR 2009 via CSS)
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that benzodiazepines should be avoided due to sedating side effects, which may impair recovery.	CANADIAN 2013	Early- Level C Late- Level C	VA/DoD, 2010
Low volume – Non-current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM does not recommend the use of benzodiazepines for the treatment of spasticity because of their side effects.			

2011 Recommendation Statement			
There is conflicting evidence that intrathecal baclofen is effective in treating spasticity when other treatment options fail, such as oral medication or botulinum toxin injection.	SIGN 2010	3	Ivanhoe et al, 2006 Kofler et al, 2009
	USVA/ DoD	B, II-1	Francisco & Boake, 2003 Meythaler et al, 2001
Inconsistent level of evidence – Moderate volume – Non-current – Variable thought			
2017 Updated Recommendations and Evidence Sources			

<p>There is evidence that intrathecal baclofen therapy may be useful for severe spastic hypertonia that does not respond to other interventions.</p> <p>However, further research is required to determine the efficacy of ITB for reducing post-stroke spasticity.</p>	AHA-ASA 2016	Class IIb, Level A	Meythaler et al, 1996 Francisco et al, 2003 Horn et al, 2005 Ivanhoe et al, 2006 Rémy-Nériss et al, 2003 Francisco et al, 2006
	EBRSR 2016	1b	Meythaler et al, 2001 Bauer et al, 2015 Yamaguchi et al, 2012 Bakhtiyari & Fatemy, 2008
Inconsistent level of evidence – High volume – Non-current – Variable thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends the use of intrathecal baclofen when other treatment options in the management of spasticity fail.			

2011 Recommendation Statement			
There is insufficient evidence that injection of 50% ethyl alcohol into the tibial nerve motor branches is effective in reducing spasticity.	SIGN 2010	3	Jang et al, 2004
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that neurolysis in the lower limb may reduce spasticity, ankle clonus, and improve achilles tendon flexion. A single injection of phenol or ethyl alcohol may not improve spasticity, range of motion, neurological status or strength of the ankle plantar flexors. More research is needed to determine whether phenol or alcohol injections improve spasticity.	EBRSR 2016	1b, limited 2	Beckerman et al, 1996 Kocabas et al, 2010
Low volume – Non-current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM does not endorse injection of 50% ethyl alcohol nor neurosurgical procedures in the treatment of spasticity due to insufficient evidence for their effectiveness. Its unavailability is also a limiting factor of its use in the Philippines.			

2011 Recommendation Statement			
There is insufficient evidence that neurosurgical procedures such as	SIGN 2010	3	Rousseaux et al, 2008

tibial nerve neurotomy, dorsal rhizotomy or dorsal root entry zone lesion may be effective in reducing spasticity in the lower limbs following stroke.	USVA/Dod	Indeterminate, III	USVA/Dod, 2010
Consistent level of evidence – Low volume – Current – Uniform thought			
2017: No new evidence			
PARM does not endorse neurosurgical procedures in the treatment of spasticity due to insufficient evidence for their effectiveness. The relative unavailability and the cost of the procedure are also limiting factors for its use in the Philippines.			

2017 Recommendation Statement			
There is evidence that rehabilitation programs, compared to standard medications, may improve spasticity for the elbows, fingers and plantar flexion. Ankle exercises may improve balance. Despite this, evidence remains inconclusive.	EBRSR 2016	1b, 1a	Bai et al, 2014 Maynard et al, 2005 Yom et al, 2015 Kluding et al, 2008 Dundar et al, 2014
Moderate volume – Current			
PARM endorses rehabilitation programs, versus anti-spasticity medications alone, to improve spasticity in the elbows, fingers and plantar flexors.			

2017 Recommendation Statement			
There is some evidence that botulinum toxin combined with casting or taping may improve lower limb spasticity.	EBRSR 2016	1b, 2	Karadag-Saygi et al, 2010 Carda et al, 2011 Farina et al, 2007
Low volume – Non-current			
PARM recommends botulinum toxin combined with casting or taping to improve lower limb spasticity			

2017 Recommendation Statement			
There is evidence that transcutaneous electrical stimulation (TENS) may improve spasticity outcomes post-stroke. Physical modalities such as NMES or vibration applied to spastic muscles may be reasonable to improve spasticity temporarily as an adjunct to rehabilitation therapy.	AHA-ASA 2016	Class IIb, Level A	Sabut et al, 2011 Noma et al, 2009 Noma et al, 2012
	EBRSR 2016	1a, 2	Park et al, 2014 Levin & Hui-Chan, 2007 Yan & Hui-Chan, 2009 Hussain et al, 2013 Cho et al, 2013
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM recommends the use of physical modalities, such as TENS, NMES, or vibration, as adjuncts to rehabilitation therapy to improve spasticity.			

2017 Recommendation Statement			
There is insufficient evidence that therapeutic ultrasound may reduce alpha motor neuron excitability that is associated with ankle plantar flexor spasticity.	EBRSR 2016	Limited 2	Ansari et al, 2007
Low volume – Non-current			
PARM suggests the use of therapeutic ultrasound to reduce ankle plantar flexor spasticity.			

5.4 CONTRACTURES

Table 39. Management of contractures in stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that conventional therapy which includes range of motion exercises, positioning, splinting and stretching is effective the management of contractures.	CSS	Early – Level C Late – Level C	Kuding & Santos, 2008
	USVA/Dod	C, I	Robinson et al, 2008
	NSF	B	Burge et al, 2008 Gustafson & McKenna, 2006 Harvey et al, 2006 Horsley et al, 2007 Lannin et al, 2007 Rydwik et al, 2006 Turton & Britton, 2005
Inconsistent level of evidence – High volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that spasticity and contractures should be treated or prevented by anti-spastic pattern positioning, range-of-motion exercises and/or stretching. However, there is conflicting evidence on the use of splints. Though some of the available evidence do not recommend the use of splints, some evidence suggest that use of splints and tilt tables are both effective in the prevention of ankle contracture in the hemiplegic limb.	CANADIAN 2013	Early- Level C Late- Level C (Does not recommend splinting)	Kluding et al, 2008 USVA/Dod, 2010 Does not recommend splinting: SIGN, 2010 NSF, 2010
	EBRSR 2016	1b (Do splinting)	Robinson et al, 2008
	AHA-ASA 2016	Class IIb, Level B (Do splinting)	Robinson et al, 2008
Inconsistent level of evidence – Moderate volume – Non-current – Variable thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			

PARM endorses the use of range of motion exercise, positioning, splinting and stretching in the treatment of contractures.

5.5 CARDIORESPIRATORY FITNESS

Table 40. Cardiorespiratory fitness in stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is strong evidence that regular aerobic exercise improves cardiorespiratory fitness, gait speed and functional outcome. Participation in aerobic exercise either at home or in a community-based program should be done once patients have sufficient strength in the large lower limb muscle groups.	NSF	A	Pang et al, 2006 Saunders et al, 2009
	USVA/ Dod	I, A	Gordon et al, 2004 Macko et al, 1997 Potempa et al, 1996 Rimmer et al, 2000 Saunders et al, 2004 Teixeira-Salmela et al, 1999
Consistent level of evidence – High volume – Non-current –Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that after successful screening, an individually tailored exercise program is indicated to enhance cardiorespiratory fitness and to reduce the risk of stroke recurrence. Incorporating cardiovascular exercise is reasonable to consider for recovery of gait capacity and gait related mobility tasks.	AHA-ASA 2016	Class I Level A (Improved fitness) Level B (Stroke risk reduction) Class IIa, Level A (Gait recovery)	Smith et al, 2012 Hartman-Maeir et al, 2007 MacKay-Lyons et al, 2002 Kuys et al, 2006 Kaur et al, 2012 Manns et al, 2009 Alzahrani et al, 2011 Ashe et al, 2009 Fletcher et al, 2013 Stoller et al, 2012 Pang et al, 2006 Brazzelli et al, 2012 Ainsworth et al, 2011 Duncan et al, 2003 Mackay-Lyons et al, 2013 Chen et al, 2011 Rimmer et al, 2009 Billinger et al, 2012 Hackam et al, 2007 Mackay-Lyons et al, 2013 Lennon et al, 2008 Prior et al, 2011

			Management of Stroke Rehabilitation Working Group, 2010 Ivey et al, 2008 ACSM, 2013 Durstine, 2009 Gordon et al, 2004 Eng et al, 2007
High volume – Non-current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM strongly endorses the participation of stroke patients in a regular aerobic exercise program either at home or in a community-based program once there is sufficient strength of large muscle groups of the lower extremities.			

2011 Recommendation Statement			
There is strong evidence that considerations in incorporating a cardiorespiratory program should include the patient's medical co-morbidities and functional limitations, stroke risk factor profile, mood and possibly cognitive abilities.	CSS	Early- Level B Late- Level B	Chu et al, 2004 Duncan et al, 2003 Katz-Leurer et al, 2003 Lee et al, 2008 Pang et al, 2005 Potempa et al, 1995 Rimmer et al, 2000 Van de Port et al, 2007
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that patients should participate regularly in an aerobic exercise program that accommodates the patient's co-morbidities and functional limitations to improve gait speed, endurance, stroke risk factor profile, mood, and cognition, following medical clearance.	CANADIAN 2013	Early- Level A Late- Level A	Brazzelli et al, 2011 Pang et al, 2006 Jin et al, 2012 Globas et al, 2012 MacKay-Lyons et al, 2013
Moderate volume – Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM strongly endorses that patients be evaluated prior to initiation of an aerobic exercise program. These include medical comorbidities, functional limitations, stroke risk factors and cognitive abilities.			

2011 Recommendation Statement			
There is evidence that patients should be prescribed modified activities to allow age appropriate target heart rates to be achieved	CSS	B	MacKay-Lyons et al, 2005 Pang et al, 2005

for 20 to 30 minutes three times per week			
Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017: No new evidence			
PARM endorses that the exercise should be modified to allow appropriate target heart rate for a duration of 20 -30 minutes per session, two to three times per week			

5.6 BALANCE AND FALLS

Table 41. Balance and falls in stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that post-stroke patients should be screened for risks of falls by an experienced clinician. Screening for risk of falls should include identification of medical, functional, cognitive and environmental factors associated with potential falls and fall injuries.	NSF	GPP	-
	CSS	C	Aizen et al, 2007 Andersson et al, 2006 Czernuszenko & Czlonkowska, 2009 Maeda et al, 2009 Pouwels et al, 2009 Teasell et al, 2002 RNAO, 2005
	CSS	B, C	
Inconsistent level of evidence – Moderate volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that all patients with stroke should be screened for balance, balance confidence, and fall risk by an experienced clinician at admission, at all transition points, and/or whenever there is a change in health status, using a standardized balance assessment tool. Screening should also include identification of medical, functional, cognitive, and environmental factors associated with risk of falling and fall injuries (e.g. osteoporosis and low vitamin D levels).	CANADIAN 2013	Level B, C	Forster & Young, 1995 Teasell et al, 2002 Czernuszenko & Czlonkowska, 2009
	AHA-ASA 2016	Class I, Level C Class IIb, Level C	Pollock et al, 2011
Inconsistent level of evidence – Moderate volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM recommends that post-stroke patients should be evaluated for the risk of falls. It should include identification of medical, functional, cognitive and environmental factors associated with potential falls and fall injuries.			

2011 Recommendation Statement			
There is some evidence that intervention for falls prevention should be individualized and comprehensive.	CSS	A,B	Langhorne et al, 2007
Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that an individualized falls prevention plan should be implemented for each patient, based on risk assessment findings.	CANADIAN 2013	Level B	Batchelor et al, 2010 Dean et al, 2012 Batchelor et al, 2012
Low volume – Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM recommends that a program for fall prevention should be individualized and comprehensive.			

2011 Recommendation Statement			
There is evidence that visual feedback during balance platform training does not have an effect on balance, gait or mobility outcomes after stroke	SIGN 2010	1+	Barclay-Goddard et al, 2004 Van Peppen et al, 2006
Low volume – Non-current			
2017: No new evidence			
PARM does not recommend the use of visual feedback during balance platform training.			

2011 Recommendation Statement			
There is insufficient evidence that force platform biofeedback training leads to possible improvement in balance.	USVA/Dod	I, C	Barclay-Goddard et al, 2004 Cheng et al, 2001 Eser et al, 2008
Inconsistent level of evidence – Low volume – Non-current – Uniform thought			
2017: No new evidence			
PARM does not suggest the use of force platform biofeedback training.			

2011 Recommendation Statement			
There is insufficient evidence that tai chi exercises improved balance.	USVA/Dod	I, C	Hart et al, 2004
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that Tai Chi training may be reasonable for fall prevention.	AHA-ASA 2016	Class IIb, Level B	Taylor-Piliae et al, 2014
Low volume – Current			

ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.

PARM recommends the use of Tai-chi to improve balance in stroke patients.

2011 Recommendation Statement			
There is some evidence that aquatic therapy improves functional balance.	USVA/ Dod	I, B	Noh et al, 2008
Low volume – Current			
2017: No new evidence			
PARM recommends aquatic therapy to improve balance in stroke patients.			

2011 Recommendation Statement			
There is insufficient evidence that task specific training improves balance.	USVA/ Dod	I, C	Cheng et al, 2001 Marigold et al, 2005
Inconsistent level of evidence – Low volume – Current – Uniform thought			
2017: No new evidence			
PARM suggests the use of task specific training to improve balance in stroke patients.			

2011 Recommendation Statement			
There is insufficient evidence that cycling increases functional balance	USVA/ Dod	I, C	Katz-Leurer et al, 2006
Low volume – Current			
2017: No new evidence			
PARM suggests the use cycling to improve balance in stroke patients.			

2017 Recommendation Statement			
There is evidence that individuals with stroke who have poor balance, low balance confidence, and fear of falls or are at risk for falls should be provided with a balance training program.	AHA-ASA 2016	Class I, Level A	Gillespie et al, 2012 Struart et al, 2009 Batchelor et al, 2010 Batchelor et al, 2012 Lubetzky-Vilnai et al, 2010 Mehrholz et al, 2011 Kim et al, 2012 Kim et al, 2012 Jung et al, 2011 Byun et al, 2011 Karthikbabu et al, 2011 Lau et al, 2011 Saeys et al, 2012 Schmid et al, 2012 Aruin et al, 2012 Fisher et al, 2011 Schuster et al, 2012
High volume – Non-current			

PARM endorses that individuals with stroke who have poor balance, low balance confidence, and fear of falls or are at risk for falls should be provided with a balance training program.

2017 Recommendation Statement			
There is evidence that individuals with stroke discharged to the community should participate in exercise programs with balance training to reduce falls.	AHA-ASA 2016	Class I, Level A	Gillespie et al, 2012 Struart et al, 2009 Batchelor et al, 2010 Batchelor et al, 2012 Lubetzky-Vilnai et al, 2010 Mehrholz et al, 2011 Kim et al, 2012 Kim et al, 2012 Jung et al, 2011 Byun et al, 2011 Karthikbabu et al, 2011 Lau et al, 2011 Saeys et al, 2012 Schmid et al, 2012 Aruin et al, 2012 Fisher et al, 2011 Schuster et al, 2012
High volume – Non-current			
PARM endorses the participation of patients with stroke discharged to the community in exercise programs with balance training to reduce falls.			

2017 Recommendation Statement			
There is evidence that patients should be made aware of their increased risk for falls and given a list of precautions to reduce their risk of falling.	CANADIAN 2013	Level B	Royal College of Physicians, 2008 Va/DoD, 2010 Batchelor et al, 2010 Batchelor et al, 2012 Aizen et al, 2007 Czernuszenko et al, 2009 Teasell et al, 2002
Moderate volume – Non-current			
PARM endorses that patients should be made aware of their increased risk for falls and given a list of precautions to reduce their risk of falling.			

2017 Recommendation Statement			
There is evidence that individuals with stroke be evaluated for fall risk annually with an established instrument appropriate to the setting. It is reasonable that individuals with stroke and their caregivers receive information targeted to home and	AHA-ASA 2016	Class IIa, Level B	Ashburn et al, 2008 Batchelor et al, 2010 Tilson et al, 2010 Friedman et al, 2002 Tinetti et al, 1988 Weerdesteyn et al, 2008 Hempel et al, 2013

environmental modifications designed to reduce falls.			
Moderate volume – Non-current			
PARM endorses annual evaluation for fall risk of individuals with stroke with an established and appropriate instrument. Individuals with stroke and their caregivers should receive information on home and environmental modifications in order to reduce falls.			

2017 Recommendation Statement

There is some evidence that families and caregivers receive skills training to enable them to safely transfer and mobilize the patient. The patient, family, and caregiver should receive education regarding suitable gait aides, footwear, transfers, and wheelchair use (e.g., direction of transfer, transfer belt use, seatbelt use, arm support devices, foot rests, and brakes).	CANADIAN 2013	Level B	VA/DoD, 2010
Low volume – Non-current			
PARM recommends that families and caregivers of stroke patients receive education and skills training regarding suitable gait aids, footwear, transfers techniques, and wheelchair use to enable them to safely transfer and mobilize the patient.			

2017 Recommendation Statement

There is some evidence that when a patient experiences a fall, an assessment of the circumstances surrounding the fall should be conducted to identify precipitating factors. Pre-existing falls prevention plans should then be modified to reduce the risk of further falls.	CANADIAN 2013	Level C	VA/DoD, 2010 Batchelor et al, 2010 Aizen et al, 2007 Czernuszenko et al, 2009 Teasell et al, 2002
Moderate volume – Non-current			
PARM recommends assessment of all circumstances surrounding a fall to identify precipitating factors when a patient experiences a fall, and modification of pre-existing falls prevention plans to reduce the risk of further falls.			

2017 Recommendation Statement

There is evidence that trunk-specific balance training and balance-focused exercise programs may improve balance post stroke.	EBRSR 2016	Level 1a	Mudie et al, 2002 Karthikbabu et al, 2011 Jiejiao et al, 2012 Bower et al, 2014 Miklitsch et al, 2013 Gok et al, 2008 Saeys et al, 2012 Lee et al, 2012 Goljar et al, 2010
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			Cheng et al, 2001 Verheyden et al, 2009 Puckree et al, 2014 Chung et al, 2013 Allison et al, 2007 You et al, 2012 Lim et al, 2012
High volume – Current			
PARM endorses trunk-specific balance training and balance-focused exercise programs to improve balance post-stroke.			

2017 Recommendation Statement			
There is evidence that whole body and local vibration, thermal stimulation, balance-focused exercises, and interventions involving feedback may not improve balance outcomes.	EBRSR 2016	Level 1a, 2	Barclay-Goddard et al, 2004 Van Peppen et al, 2006 Van Nes et al, 2006 Mudie et al, 2002 Matumoto et al, 2014 Lau et al, 2012 Yelnik et al, 2008 Gok et al, 2008 Chen et al, 2011 Lee et al, 2014 Liang et al, 2012 Rao et al, 2013 Rao et al, 2013 Lee et al, 2013 Bang et al, 2014 Hsu et al, 2013 Goljar et al, 2010 Cheng et al, 2001 Morioka et al, 2003 De Seze et al, 2001 Sackley et al, 1997 Eser et al, 2008 Tankisheva et al, 2014 Marin et al, 2013 Kyochul et al, 2014 Lee et al, 2015 Kyung-Pil et al, 2015 Yavuzer et al, 2006 Wong et al, 1997 Walker et al, 2000 You et al, 2012 Chen et al, 2002 Shumway-Cook et al, 1998 Bayouk et al, 2006 Geiger et al, 2001 Yoon et al, 2013
High volume – Non-current			

PARM does not endorse the use of whole body and local vibration, thermal stimulation, balance-focused exercises, and interventions involving feedback to improve balance outcomes.

2017 Recommendation Statement

There is evidence that task-specific balance training programs, and virtual reality training may improve on balance, gait, and functional recovery post stroke. However effectiveness is uncertain.	EBRSR 2016	Level 2	Fargalit et al, 2013 Mudie et al, 2002 Karthikbabu et al, 2011 Bower et al, 2014 Miklitsch et al, 2013 Lee et al, 2012 Lee et al, 2014 Rao et al, 2013 Eser et al, 2008 Chung et al, 2013 Jung et al, 2012 Cho et al, 2012 Iyigun et al, 2015 Kim et al, 2012
High volume – Current			
PARM endorses task-specific balance training programs and virtual reality training as options to improve balance, gait and functional recovery post stroke			

2017 Recommendation Statement

There is some evidence that individuals with stroke be prescribed and fit with an assistive device or orthosis, if appropriate, to improve balance.	AHA-ASA 2016	Class I, Level A	Tyson et al, 2013
Low volume – Current			
PARM recommends prescription of assistive device or orthosis to individuals with stroke, if appropriate, to improve balance.			

2017 Recommendation Statement

There is some evidence that quad canes and walkers improve gait and balance more than when using a one-point cane or when no cane is provided.	EBRSR 2016	Class 1b, 2	Jeong et al, 2015 Lauffer et al, 2002
Low volume – Non-current			
PARM recommends the use of quad canes or walkers to improve gait and balance instead of a one-point cane.			

2017 Recommendation

There is some evidence that mirror therapy in combination with repetitive transcranial magnetic stimulation (rTMS) improves balance; however, when delivered alone, it does not	EBRSR 2016	1b	Cha et al, 2015 Mohan et al, 2013
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provide additional benefits to gait and lower limb motor function relative to conventional therapy.			
Low volume – Current			
PARM recommends the use of mirror therapy in combination with rTMS to improve balance of post-stroke patients.			

5.7 MEDICATIONS USED IN MOTOR RECOVERY

Table 42. Medications used in motor recovery following stroke

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is strong evidence that the use of Noradrenergic agents, such as Dextroamphetamine or Methylphenidate, may not improve lower limb functional impairments and is therefore not recommended.	AHA-ASA 2016	Class III, Level B	Martinsson et al, 2007 Gladstone et al, 2006
	EBRSR 2016	Level 1a	Sonde & Lokk, 2007 Sonde et al, 2001 Treig et al, 2003 Martinsson et al, 2003 Martinsson et al, 2003 Crisostomo et al, 1988 Walker-Baston, 1995 Lokk et al, 2011 Grade et al, 1998
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses against the use of Noradrenergic agents, such as Dextroamphetamine or Methylphenidate, for improving lower limb functional impairments.			

2017 Recommendation Statement			
Recommendation	Guideline	Body of Evidence	References
There is some evidence that Piracetam may improve motor function, but not ADL performance and neurological status, following stroke.	EBRSR 2016	Level 1a	Platt et al, 1993 De Deyn et al, 1997 Enderby et al, 1994
Low volume – Non-current			
PARM recommends the use of Piracetam to improve motor function of post-stroke patients.			

5.8 BRAIN STIMULATION

Table 43. Brain stimulation for the improvement of gait and balance in stroke patients

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is evidence that repetitive transcranial magnetic stimulation	EBRSR 2016	1a, 2	Chieffo et al, 2014 Lin et al, 2015

(rTMS) at high and low frequencies may be effective in improving balance, gait, and ADL performance.			Wang et al, 2012 Cha et al, 2015 Cha et al, 2014 Kakuda et al, 2013 Khedr et al, 2005 Jayaram & Stinear, 2009 Kakuda et al, 2013
High volume – Current			
PARM endorses the use of rTMS in improving balance, gait, and ADL performance of post-stroke patients.			

2017 Recommendation Statement			
There is evidence that transcranial direct current stimulation (tDCS) treatment may not improve gait or balance outcomes.	EBRSR 2016	1a	Chang et al, 2015 Gerojn et al, 2011 Tanaka et al, 2011 Danzl et al, 2013 Jayaram & Stinear, 2009
Moderate volume - Current			
PARM does not endorse the use of tDCS in improving gait or balance outcomes of post-stroke patients.			

2017 Recommendation Statement			
There is some evidence that galvanic vestibular stimulation (GVS) may not improve pusher behavior or lateropulsion; however, further research is necessary.	EBRSR 2016	1b	Krewer et al, 2013
Low volume - Current			
PARM does not recommend the use of GVS in improving pusher behavior or lateropulsion of post-stroke patients.			

5.9 ALTERNATIVE AND COMPLEMENTARY MEDICINE

Table 44. Alternative and complementary medicine for post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is evidence that acupuncture may not improve	AHA-ASA 2013	Class IIb, Level B	Ottawa Panel, 2006 Shiflett et al, 2007

lower extremity motor function or ADLs.	EBRSR 2016	Level 1a	Bai et al, 2013 Zhao et al, 2015 Park et al, 2005 Salom-Moreno et al, 2014 Johansson et al, 2001 Hsieh et al, 2007 Gosman-Hedstrom et al, 1998 Sze et al, 2002 Hopwood et al, 2008 Liu et al, 2009 Alexander et al, 2004 Fink et al, 2004 Naeser et al, 1994 Huang et al, 2014 Zhao et al, 2009 Wong et al, 1999 Johansson et al., 1993 Hegyi et al, 2012 Si et al, 1998
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM does not endorse acupuncture in improving lower extremity motor function or ADLs of patients with stroke.			

2017 Recommendation Statement

There is some evidence that acupressure, led by nurses, may improve lower limb motor function.	EBRSR 2016	Level 1b	Yue et al, 2013
Low volume – Current			
PARM recommends nurse-led meridian acupressure to improve lower limb motor function of patients with stroke.			

2017 Recommendation Statement

There is some evidence that traditional Chinese medicine may not improve lower limb function compared to placebo.	EBRSR 2016	Level 1a	Chen et al, 2012 Kong et al, 2009 Goto et al, 2009
Low volume – Non-current			
PARM does not endorse the use of traditional Chinese medicine to improve lower limb function in patients with stroke.			

5.10 PARM CONTEXT POINTS

Table 45. Context points for minimum and additional standard care of practice for lower extremity interventions post-stroke

	Minimum standard care of practice	Additional standard care of practice
Practice method	<p>Assessment:</p> <ul style="list-style-type: none"> - Lower extremity strength, coordination, spasticity, ROM and pain - Mobility and self-care capacity - Risk for falls <p>Multi-disciplinary therapy:</p> <ul style="list-style-type: none"> Modalities Strengthening exercises and walking program Neurodevelopmental techniques Mental practice/Motor imagery Task-oriented training ADL retraining Joint position and auditory biofeedback and cueing Anti-spasticity pharmacotherapy Caregiver-mediated programs, education and information provision 	<p>Use of technology for gait assessment</p> <p><i>In addition to multi-disciplinary therapy:</i></p> <ul style="list-style-type: none"> Treadmill and/or robot-assisted gait and movement training Virtual reality training Acupressure Tai chi Aquatic therapy Cycling Mirror therapy rTMS Use of AFO and individualized gait aids Spasticity management: <ul style="list-style-type: none"> - Splinting - Botulinum toxin injection - Intrathecal baclofen Group therapy with circuit training regimen
Equipment	<ul style="list-style-type: none"> Standardized assessment tools: FIM mobility items Berg Balance Score 10-meter walk Therapy room with parallel bars, obstacles, stairs and other necessary equipment 	<ul style="list-style-type: none"> Accelerometers Step activity monitors Pedometers Treadmill/Robot-assisted gait devices VR equipment Swimming pool Bicycle/LE ergometer Mirror AFO and gait assistive equipment Orthotics/splints Botulinum toxin, ultrasound machine

		Operating room, intrathecal administration device
Workforce	Attending physician Physiatrist Physical therapist Neurologist	Exercise physiologist/sports scientist, tai chi instructor Occupational therapist Orthotist Surgeon (Ortho/Neuro)
Training	Within competency	Within competency Training in robot-assisted therapy, tai chi, VR-assisted therapy, aquatic therapy Ultrasound techniques for botulinum toxin intramuscular injection Surgical training
When is it done	Assessments upon admission/initial consultation and/or prior to discharge Therapy upon admission or initial consultation	Prior to discharge from inpatient rehabilitation or on follow up, if without significant improvements
Reassessment using at least one standard outcome measure	Monthly	Monthly

5.11 SUMMARY OF PARM RECOMMENDATION STATEMENTS

APPROACH TO THERAPY

PARM endorses the use of standardized, valid and reliable assessment tools for the evaluation of impairment.

PARM endorses the use of standardized, valid and reliable assessment tools to document the level of assistance for mobility and self-care. These would include tests for strength, coordination, tone, ROM, pain and tools to document the level of assistance needed for mobility (bed mobility, transfers, sitting, walking) and self-care. At a minimum, FIM mobility items, Berg Balance Score, and the 10-meter walk should be used to assess gait velocity, Functional Ambulation Classification, and assistance needed during daily activities.

PARM strongly endorses that treatment of stroke patients with lower extremity weakness should use multiple treatment approaches which is more effective than no treatment.

PARM strongly endorses that Neurodevelopmental Technique is equal to other treatment approaches in improving motor recovery.

PARM endorses task specific training in improving transfer skills, mobility and gait. It should be progressively adapted, relevant and involve active participation of patients.

PARM recommends that all patients with stroke should receive clinically relevant therapy defined in their individualized rehabilitation plan, appropriate to their needs and tolerance level once medically stable. Better results can be obtained if physical therapy takes place twice day (morning and afternoon) for 45 – 60 minutes depending on patient's tolerance. The skills gained in therapy should be incorporated into the patient's daily routine.

PARM recommends therapy or multidisciplinary interventions targeting activities of daily living to post-stroke patients who have difficulty in self-care, productivity and leisure.

PARM recommends a monitored exercise program to post-stroke patients with difficulties in mobility.

PARM endorses assessment of all individuals with stroke before discharge from acute care hospitalization for care transition and discharge planning. It may be useful to do periodic assessments with the same standardized tools to document progress in rehabilitation

PARM recommends considering the use of accelerometers, step activity monitors, or pedometers as an objective means of assessing real-world activity and participation of individuals with stroke.

PARM does not recommend self-management programs to improve gait or balance post-stroke.

PARM recommends caregiver mediated programs to improve gait and balance outcomes post-stroke.

PARM endorses participation in a program of exercise or physical activity at home or in the community after completion of formal stroke rehabilitation.

GAIT TRAINING

PARM strongly endorses the use of a tailored repetitive practice of walking or components of walking to improve functional ambulation.

PARM strongly endorses strength training for improving muscle strength. Strength training has no adverse effect on spasticity.

PARM endorses gait-oriented physical fitness training in patients who are medically stable and are functionally safe to participate when the goal is to improve functional ambulation.

PARM recommends the use of functional electrical stimulation for the treatment of foot drop. Its effect is immediate but sustained effect is not assumed.

PARM endorses the use of ankle foot orthosis in patients with persistent foot drop to improve walking speed, efficiency and gait pattern. However, it should not be routinely used and it should be individually fitted. There should be a proper assessment by a physiatrist prior to use. Regular assessment is also recommended.

PARM suggests the use of walking aids only after a full assessment of its potential benefits and harms in relation to the individual's stage of recovery and presentation has been made.

PARM strongly endorses the repetitive and intense use of novel tasks for all individuals with gait limitations after stroke. These tasks should challenge the patient to acquire necessary motor skills to use the involved limb during functional tasks and activities.

PARM endorses early intensive therapy to improve gait, general motor function and independent function in individuals with stroke within the first 3 months, but not after 6 months.

PARM suggests individual evaluation prior to prescription of gait aids, assistive devices, wheelchairs, and other special equipment based on long term need. Reassessment should be done, as appropriate, to determine if changes are required or equipment can be discontinued.

PARM recommends the use of ambulatory assistive devices to help with gait and balance impairments, as well as mobility efficiency and safety, when needed.

PARM recommends the use of wheelchairs for non-ambulatory individuals or those with limited walking ability. However, encouraging hemiplegic individuals to propel their own wheelchair may not improve ADLs.

PARM endorses the use of NMES as a reasonable alternative to AFO for foot drop.

PARM does not recommend the routine use of TENS in conjunction with everyday activities for improving mobility, lower extremity strength, and gait speed.

PARM endorses cardiovascular training in the form of fitness and mobility programs, aquatic therapy, and community/outpatient exercise programs as well as supervised programs to improve gait.

OTHER TREATMENT MODALITIES FOR GAIT TRAINING

PARM does not endorse the routine use of EMG biofeedback as an adjunct in gait training.

PARM strongly endorses that treadmill training could be used in conjunction with conventional gait training to enhance walking speed, endurance and walking distance. However, there is no conclusive evidence that body weight supported treadmill training is superior to ground training. It could be considered if other strategies for gait training are unsuccessful in patients with low ambulatory status. In the absence of a treadmill in the rehabilitation center, ground walking is highly endorsed.

PARM does not endorse the use of visual feedback during balance platform training to improve balance nor functional gait.

PARM suggests the use of joint position biofeedback as an additional treatment modality in conjunction with ambulation training.

PARM recommends the use of cueing as an adjunct to ambulation training.

PARM endorses the use of virtual reality training as an adjunct to ambulation training.

PARM endorses the use of mental practice or motor imagery to improve gait and balance outcomes post-stroke.

PARM endorses the use of auditory feedback to improve gait and muscle activity.

PARM recommends the use of rhythmic auditory cueing to improve walking speed and coordination.

PARM endorses the use of Virtual Reality to improve balance, or combined use of VR with treadmill training to improve gait and balance when available.

PARM does not recommend bilateral leg training with a custom-made device.

PARM does not endorse the routine use of hippotherapy for improving gait outcomes of patients with stroke.

PARM does not recommend water-based exercise for motor recovery after an acute stroke due to the uncertainty of its effectiveness.

PARM endorses group therapy with circuit training as a reasonable approach to improve walking.

PARM endorses practice walking with either a treadmill (with or without body-weight support) or overground walking exercise training combined with conventional rehabilitation for recovery of walking function.

PARM strongly endorses the use of treadmill training without body weight support to improve lower limb impairments such as gait velocity and function. If appropriate and tolerated, it should be provided 30 minutes a day, five days a week, for two weeks.

PARM recommends body-weight supported treadmill training as an option for patients who are non-ambulatory or have low ambulatory ability early after stroke, especially when walking practice is unsuccessful or unsafe.

PARM endorses the use Gait trainer, if available, in improving gait of patients in the acute phase of stroke. However, the effectiveness of the Lokomat remains unclear, and more research is needed to determine the benefits from using this device.

SPASTICITY

PARM does not endorse the routine use of interventions to decrease spasticity other than a comprehensive therapy program for people who have mild to moderate spasticity.

PARM recommends the use of splinting, range of motion exercise, stretching, and positioning in to reduce or prevent spasticity.

PARM endorses the use of Botulinum toxin injection in the treatment of lower extremity spasticity, if patients are able to afford the cost.

PARM endorses the use of FES in the management of spasticity, as an adjunct to rehabilitation therapy.

PARM recommends the use of EMG biofeedback in the management of spasticity, as an adjunct to rehabilitation therapy.

PARM strongly endorses the use of oral medications, such as tizanidine, baclofen, and dantrolene in the treatment of lower extremity spasticity.

PARM does not recommend the use of benzodiazepines for the treatment of spasticity because of their side effects.

PARM recommends the use of intrathecal baclofen when other treatment options in the management of spasticity fail.

PARM does not endorse injection of 50% ethyl alcohol nor neurosurgical procedures in the treatment of spasticity due to insufficient evidence for their effectiveness. Its unavailability is also a limiting factor of its use in the Philippines.

PARM does not endorse neurosurgical procedures in the treatment of spasticity due to insufficient evidence for their effectiveness. The relative unavailability and the cost of the procedure are also limiting factors for its use in the Philippines.

PARM endorses rehabilitation programs, versus anti-spasticity medications alone, to improve spasticity in the elbows, fingers and plantar flexors.

PARM recommends botulinum toxin combined with casting or taping to improve lower limb spasticity

PARM recommends the use of physical modalities, such as TENS, NMES, or vibration, as adjuncts to rehabilitation therapy to improve spasticity.

PARM suggests the use of therapeutic ultrasound to reduce ankle plantar flexor spasticity.

CONTRACTURES

PARM endorses the use of range of motion exercise, positioning, splinting and stretching in the treatment of contractures.

CARDIORESPIRATORY FITNESS

PARM strongly endorses the participation of stroke patients in a regular aerobic exercise program either at home or in a community-based program once there is sufficient strength of large muscle groups of the lower extremities.

PARM strongly endorses that patients be evaluated prior to initiation of an aerobic exercise program. These include medical comorbidities, functional limitations, stroke risk factors and cognitive abilities.

PARM endorses that the exercise should be modified to allow appropriate target heart rate for a duration of 20 -30 minutes per session, two to three times per week

BALANCE AND FALLS

PARM recommends that post-stroke patients should be evaluated for the risk of falls. It should include identification of medical, functional, cognitive and environmental factors associated with potential falls and fall injuries.

PARM recommends that a program for fall prevention should be individualized and comprehensive.

PARM does not recommend the use of visual feedback during balance platform training.

PARM does not suggest the use of force platform biofeedback training.

PARM recommends the use of Tai-chi to improve balance in stroke patients.

PARM recommends aquatic therapy to improve balance in stroke patients.

PARM suggests the use of task specific training to improve balance in stroke patients.

PARM suggests the use of cycling to improve balance in stroke patients.

PARM endorses that individuals with stroke who have poor balance, low balance confidence, and fear of falls or are at risk for falls should be provided with a balance training program.

PARM endorses the participation of patients with stroke discharged to the community in exercise programs with balance training to reduce falls.

PARM endorses that patients should be made aware of their increased risk for falls and given a list of precautions to reduce their risk of falling.

PARM endorses annual evaluation for fall risk of individuals with stroke with an established and appropriate instrument. Individuals with stroke and their caregivers should receive information on home and environmental modifications in order to reduce falls.

PARM recommends that families and caregivers of stroke patients receive education and skills training regarding suitable gait aids, footwear, transfers techniques, and wheelchair use to enable them to safely transfer and mobilize the patient.

PARM recommends assessment of all circumstances surrounding a fall to identify precipitating factors when a patient experiences a fall, and modification of pre-existing falls prevention plans to reduce the risk of further falls.

PARM endorses trunk-specific balance training and balance-focused exercise programs to improve balance post-stroke.

PARM does not endorse the use of whole body and local vibration, thermal stimulation, balance-focused exercises, and interventions involving feedback to improve balance outcomes.

PARM endorses task-specific balance training programs and virtual reality training as options to improve balance, gait and functional recovery post stroke

PARM recommends prescription of assistive device or orthosis to individuals with stroke, if appropriate, to improve balance.

PARM recommends the use of quad canes or walkers to improve gait and balance instead of a one-point cane.

PARM recommends the use of mirror therapy in combination with rTMS to improve balance of post-stroke patients.

MEDICATIONS USED IN MOTOR RECOVERY

PARM strongly endorses against the use of Noradrenergic agents, such as Dextroamphetamine or Methylphenidate, for improving lower limb functional impairments.

PARM recommends the use of Piracetam to improve motor function of post-stroke patients.

BRAIN STIMULATION

PARM endorses the use of rTMS in improving balance, gait, and ADL performance of post-stroke patients.

PARM does not endorse the use of tDCS in improving gait or balance outcomes of post-stroke patients.

PARM does not recommend the use of GVS in improving pusher behavior or lateropulsion of post-stroke patients.

ALTERNATIVE AND COMPLEMENTARY MEDICINE

PARM does not endorse acupuncture in improving lower extremity motor function or ADLs of patients with stroke.

PARM recommends nurse-led meridian acupressure to improve lower limb motor function of patients with stroke.

PARM does not endorse the use of traditional Chinese medicine to improve lower limb function in patients with stroke.

6. Upper extremity interventions

Upper extremity impairments, most commonly paresis, are often more challenging than in lower extremities since a greater percentage of stroke survivors do not fully recover upper limb use that is significant for regaining independence. The goal of upper extremity rehabilitation is to facilitate and maximize functional recovery of the shoulder, elbow and hand for the performance of activities of daily living (ADLs), instrumental activities of daily living (iADLs), occupations and leisure.

6.1 INTENSITY OF TRAINING

Table 46. ADL and strength assessment and training to improve upper extremity function in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence to assess IADLs, leisure, and participation using such tools as the Frenchay Activities Index and Canadian Occupational Performance Measure for maintained functional independence and optimal participation.	AHA 2010	Class IIA Level B	Bakas et al, 2006a Bode et al, 2003 Booth & Swabey, 2009 Gräsel et al, 2005, 2006 Kagan et al, 2004 Külzer et al, 2008 Law et al, 1990 Rasquin et al, 2004
High volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that periodic upper extremity activity/function assessment with a standardized tool, such as Frenchay Activities Index, may be useful within and across facilities.	AHA-ASA 2016	Class IIb, Level C	Beebe et al, 2009 Kwakkel et al, 2004 Nijland et al, 2010 Harris et al, 2007 Lang et al, 2013 Bland et al, 2013 Holbrook, 1983
Moderate volume – Noncurrent			
ADAPTE 1: The recommendation is unchanged from the PARM 2011 guideline. PARM recommends assessing IADLs, leisure, and participation using such tools as the Frenchay Activities Index and Canadian Occupational Performance Measure for maintained functional independence and optimal participation.			

2011 Recommendation Statement			
There is strong evidence on the effectiveness of increased intensity of rehabilitation for	CSS	Early: A Late: A	Lincoln et al, 1999 Rodgers et al, 2003 Teasell et al, 2005
	SIGN 2010	1++	Kwakkel et al, 1997

improving upper limb function in patients with stroke.	NSF 2010	A	Cherney et al, 2008 Lincoln et al, 1999
Consistent level of evidence – Moderate volume – Noncurrent – Variable thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence on progressively adapted training programs that are aimed at increasing active enhancement and restoration of arm function.	EBRSR 2016	Level 1b	Harris et al, 2010 Da Silva 2015 Veerbeek 2014 English et al, 2015
	CANADIAN 2013	Early – Level A Late – Level A, C	Langhorne, 2009 French et al, 2007 Harris et al, 2009
Inconsistent level of evidence – Moderate volume – Noncurrent – Uniform thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM recommends increasing the intensity of rehabilitation which can improve the upper limb function in patients with stroke.			

2011 Recommendation Statement			
There is some evidence of the need to train specific ADLs and IADLs for inpatient, outpatient and chronic care settings.	AHA 2010	Class IIa Level B	Akinwuntan et al, 2005 Legg et al, 2006 Söderström et al, 2006
Low volume – Noncurrent			
2017 Updated Recommendations and Evidence Sources			
There is conflicting evidence on functional ADL training tailored to specific individual needs and eventual discharge setting.	AHA-ASA 2016	Class 1A, Level 1B	Bayona et al, 2005 (for) Hubbard et al, 2009 (for)
	CANADIAN 2013	Early: Level A Late: Level A	Langhorne et al, 2009 (against) French et al, 2007 (against)
	EBRSR 2016	Level 1b	Mares et al, 2014 (for) Bourbonnais et al, 2002 (against) Thielman 2013 (against)
Consistent level of evidence – Moderate volume – Non-current – Variable thought			

ADAPTE 3: The recommendation and the strength of evidence changed (decreased) from the 2011 PARM guideline.

PARM suggests training-specific ADLs and IADLs in inpatient, outpatient and chronic care settings. However, training should encourage the use of patients' affected limb during functional tasks and be designed to simulate partial or whole skills required in activities of daily living.

2011 Recommendation Statement			
There is evidence that rehabilitation should be structured within the first six months of stroke to improve upper limb function.	USVA/DoD	B	Cifu & Stewart, 1999 Langhorne et al, 1996 Kwakkel et al, 1999 Ottenbacher & Jannell, 1993
	SIGN 2010	GPP	Mead 2009
	NSF	A	Kwakkel et al, 2004
Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017: No new evidence			
PARM endorses that rehabilitation should be structured to provide much practice as much as possible within the first six (6) months of stroke to improve upper limb function.			

6.2 THERAPEUTIC APPROACHES

6.2.1 CONSTRAINT INDUCED MOVEMENT THERAPY

Table 47. Constraint induced movement therapy in the improvement of upper limb motor function in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that constraint induced movement therapy interventions confer a modest improvement in upper limb function in stroke patients.	CSS	GPP	-
	NSF	A	Langhorne et al, 2009
	SIGN 2010	1++	Bjorklund & Fecht, 2006 Bonaiuti et al, 2007 French et al, 2007 Hakkennes & Keating, 2005 Sirtori et al, 2009
	USVA/DoD	I	Hakkennes & Keating, 2005 Lin et al, 2008 Wolf et al, 2006, 2008
	Consistent level of evidence – High volume – Current – Uniform thought		
2017 Updated Recommendations and Evidence Sources			

There is strong evidence that constraint induced movement therapy improves dexterity, perceived use of arm and hand, quality of arm and hand movements.	AHA-ASA 2016	Class IIa, Level A	Wolf et al, 2006, 2010 Wu et al, 2012 Bonaiuti et al, 2007 Taub et al, 1993, 2006, 2013 Dromerick 2009 Boake 2007 Page et al, 2002, 2004, 2005, 2008 Wang 2011 Shi 2011 Smania 2012
	EBRSR 2016	Level 1b and 2	Page et al, 2009 Park et al, 2015 Mcintyre et al, 2012 Lin et al, 2007 Page et al, 2008, 2002, 2004 Smania et al, 2012 Wang et al, 2011 Wu et al, 2007 Wu 2007
Consistent level of evidence – High volume – Noncurrent – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM strongly endorses the use of constraint induced movement therapy (CIMT) to improve dexterity, perceived use and quality of arm and hand movements. Both original and modified version is reasonable to consider in eligible stroke survivors. MCIMT combined with mental practice may also improve upper limb function.			

2011 Recommendation Statement			
There is strong evidence that CIMT can be used in individuals with at least 10 degrees of finger extension, limited balance problems and intact cognition for improving upper limb function.	CSS	Early – A Late – A	Ottawa Panel et al, 2006
	NSF	A	Langhorne et al, 2009
	SIGN 2010	1++	Bjorklund & Fecht, 2006 Bonaiuti et al, 2007 Hakkennes & Keating, 2005 Mehrholz et al, 2007
	USVA/ DoD	A	Sirtori et al, 2009 Hakkennes & Keating, 2005 Lin et al, 2008 Wolf et al, 2006, 2008
Consistent high level of evidence – High volume – Current – Uniform thought			

2017 Updated Recommendations and Evidence Sources

There is evidence that traditional or modified CIMT should be used	CANADIAN 2013	Early – Level A	Dromerick et al, 2009 Wolf et al, 2009
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in select individuals with at least 20 degrees of active wrist extension and 10 degrees of active finger extension, with minimal sensory or cognitive deficits. Be aware of potential adverse events such as low mood and fatigue.		Late – Level A	Sirtori et al, 2009 Page et al, 2013
Moderate volume – Noncurrent			
<p>ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.</p> <p>PARM endorses the use of constraint induced movement therapy (CIMT) in post-stroke patients who have at least 10 degrees of active finger extension and at least 20 degrees of active wrist extension. Patient should also have limited sensory and balance problems, and intact cognition.</p>			

2011 Recommendation Statement			
There is conflicting evidence that CIMT has long term benefit.	CSS	A	Drummond & Walker, 1995 Gibson & Schkade, 1997 Gilbertson et al, 2000 Lincoln et al, 1999 Logan et al, 1997 Parry et al, 1999
	NSF	C	Rodgers et al, 2003
	SIGN 2010	1++	Dromerick et al, 2009 Hakkennes & Keating, 2005
	USVA/ DoD	-	Wolf et al, 2006
Inconsistent level of evidence – Low volume – Current – Variable thought			
2017: No new evidence			
PARM suggests that CIMT may provide some benefits in the long term.			

2011 Recommendation Statement			
There is conflicting evidence to recommend for or against CIMT in the first month post-stroke.	CSS	Early – A Late – N/A	Ottawa Panel et al, 2006
	NSF	C	Dromerick et al, 2009
Inconsistent level of evidence – Low volume – Current – Variable thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence to recommend initiation of modified CIMT, but not traditional CIMT, to appropriate patients in the first month post-stroke.	CANADIAN 2013	Early – Level A	Dromerick 2009 Sirtori 2009
Low volume – Non-current			

ADAPTE 4: The recommendation and the strength of evidence changes (increased) from the 2011 PARM guideline.

PARM recommends modified constraint induced movement therapy (CIMT), but not traditional CIMT, in the first month of stroke as long as the patient meets the inclusion criteria.

2017 Recommendation Statement

There is conflicting evidence on the use of trunk restraint, either delivered alone or combined with CIMT, for promoting upper limb motor function.	EBRSR 2016	Level 1a Level 2	Bang et al, 2015 (for) De Oliveira et al, 2015 (against) Lima et al, 2014 (against) Woodbury et al, 2009 (against) Wu et al, 2012 (against) Michaelsen et al, 2006 (for) Wee et al, 2014 (against)
Moderate volume – Current			
PARM does not suggest the use of trunk restraint for promoting upper limb motor function.			

6.2.2 IMAGERY / MENTAL PRACTICE / MENTAL IMAGERY

Table 48. Mental practice and imagery in the improvement of upper limb motor function in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is conflicting evidence on the effectiveness of imagery / mental practice / mental imagery for improving upper limb function in patients with stroke.	CSS	Early – Level A Late – Level B	Malouin et al, 2004 Riccio et al, 2010
	NSF	B	Sims et al, 2009
	SIGN 2010	1-, 2+, D	Braun et al, 2006
	USVA/ DoD	B	Braun et al, 2006 Liu et al, 2004
Inconsistent level of evidence – Moderate volume – Current – Variable thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence to encourage use of mental practice/imagery as an adjunct to upper extremity rehabilitation for	AHA-ASA 2016	Class IIa, Level A	Butler et al, 2006 Page et al, 2001, 2007, 2011 Liu et al, 2004, 2009 Bovend'Eerdt et al, 2010

enhancement of sensorimotor recovery.	CANADIAN 2013	Early – Level A Late – Level B	Barclay-Goddard et al, 2011 Paget et al, 2001a, b, c, 2005, 2007 Verbeek et al, 2014
	EBSR 2016	Level 1a Level 2	Page et al, 2007, 2005, 2001 Dijkerman et al, 2004 Lee et al, 2012 Liu et al, 2014 Muller et al, 2007 Oostra et al, 2013 Park et al, 2015 Rajesh et al, 2015
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 4: The recommendation and the strength of evidence changes (increased) from the 2011 PARM guideline.			
PARM recommends the use of mental practice as an adjunct to standard care for enhancement of upper limb sensorimotor recovery.			

6.2.3 ELECTROMECHANICAL / ROBOTIC DEVICES / ROBOT-ASSISTED THERAPY / MECHANICAL-ASSISTED TRAINING

Table 49. Electromechanical assisted therapy in the improvement of upper limb motor function in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is strong evidence for the effectiveness of electromechanical / robotic devices / robot-assisted therapy / mechanical assisted training in improving upper limb function in patients with stroke.	CSS	GPP	-
	NSF	B	Kwakkel et al, 2008 Mehrholz et al, 2007, 2008 Mirelman et al, 2009
	SIGN 2010	1++, 1+ A	Fazekas et al, 2007 Kwakkel et al, 2008 Mehrholz et al, 2007, 2008 Prange et al, 2006
	USVA/ DoD	B	Daly et al, 2006 Hesse et al, 2005 Lum et al, 2002 Masiero et al, 2007 Volpe et al, 2008
Consistent level of evidence – High volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that robot-assisted training improves	AHA-ASA 2016	Class IIa, Level A	Klamroth et al, 2014 Lo et al, 2009, 2010

<p>arm function and provides more intensive practice to individuals with moderate to severe upper limb paresis.</p> <p>However, there is uncertain utility when compared with dose-matched conventional upper limb exercise therapies, and more studies are warranted to determine the effect on various stroke recovery stages.</p>			<p>Maseiro, 2011 Mehrholz et al, 2012 Kwakkel 2008 Kutner, 2010 Hsieh et al, 2011 Conroy, 2011 Abdullah, 2011 Lo et al, 2010</p>
<p>Consistent level of evidence – High volume – Noncurrent – Uniform thought</p> <p>ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.</p> <p>PARM strongly endorses electromechanical / robotic devices / robot-assisted therapy / mechanical assisted training for improving upper limb function of patients with stroke, especially in patients with moderate to severe paresis. However, there is uncertain utility when compared with dose-matched conventional upper limb exercise therapies.</p>			

2017 Recommendation Statement			
There is some evidence to the benefits of extracorporeal shockwave therapy on upper limb spasticity.	EBRSR 2016	Level 1b Level 4	Santamato et al, 2013
Solitary level of evidence - Current			
PARM recommends the use of shockwave therapy as a promising new treatment for upper limb spasticity.			

2017 Recommendation Statement			
There is some evidence for the use of ozonated autohemotherapy for improving post-stroke upper limb motor function is currently limited. Technical cautions should be strictly implemented.	EBRSR 2016	Level 2	Wu et al, 2013
Solitary high level of evidence – Current			
PARM recommends the use of ozonated autohemotherapy for improvement of general motor disability. Since this is a novel intervention, technical cautions should be strictly implemented.			

2017 Recommendation Statement			
There is some evidence regarding the effect of computer brain interference technology on upper limb motor function post-stroke.	EBRSR 2016	Level 1a	Ramos-Murguialday et al, 2013 Ang et al, 2014 Kasashima-Shindo et al, 2015
Low volume – Current			
PARM recommends the use of computer-brain-interface technology on upper limb impairments.			

2017 Recommendation Statement			
There is evidence that (invasive) motor cortex stimulation via implanted electrodes improves upper limb function but not grip strength following stroke.	EBRSR 2016	Level 1b Level 2	Brown et al, 2006 Huang et al, 2008 Levy et al, 2008
Low volume – Noncurrent			
PARM endorses cautious use of motor cortex stimulation via implanted electrodes for improvement of upper limb function in patients post-stroke.			

2017 Recommendation Statement			
There is evidence that repetitive Transcranial Magnetic Stimulation (rTMS) may improve upper extremity function, either alone or combined with other therapies, but not spasticity following stroke.	EBRSR 2016	Level 1a Level 1b Level 2	Wang et al, 2014 Ludemann-Podubecka et al, 2015 Seniow et al, 2012 Khedr et al, 2009, 2005 Sasaki et al, 2013, 2014 Barros-Galvao et al, 2014 Pomeroy et al, 2007 Ji et al, 2014 Higgins et al, 2013 Emara et al, 2010 Takeuchi et al, 2008 Liepart et al, 2007 Fregni et al, 2006 Zheng et al, 2015
Low frequency (1Hz) rTMS delivered on the contralesional hemisphere may improve upper limb motor function but not manual dexterity or grip strength compared with sham stimulation. Ten hertz rTMS may not be superior to 3Hz rTMS delivered on the lesional			

hemisphere at improving grip strength.			Kim et al, 2014 Sung et al, 2013 Conforto et al, 2012 Malcolm et al, 2007 Takeuchi et al, 2009, 2005 Hummel et al, 2005 Khedr et al, 2005 Chang et al, 2010 Rose et al, 2014 Lindenberg et al, 2010 Mansur et al, 2005
High volume – Noncurrent			
PARM endorses the use of repetitive transcranial magnetic stimulation for the improvement of upper extremity function but not spasticity. Low frequency (1Hz) rTMS delivered on the contralesional hemisphere may improve upper limb motor function but not manual dexterity or grip strength compared with sham stimulation			

2017 Recommendation Statement			
There is evidence that upper limb function may be improved by using intermittent, but not continuous, theta burst stimulation.	EBRSR 2016	Level 1a Level 2	Sung et al, 2013 Talelli et al, 2012 Hsu et al, 2013 Di Lazzaro et al, 2013 Lai et al, 2015 Kim et al, 2015
Moderate volume - Current			
PARM endorses the use of intermittent, (and not continuous type of), theta burst stimulation.			

2017 Recommendation Statement			
There is evidence that Transcranial Direct Current Stimulation (TDCS) may improve general upper limb motor function. However, it may not improve dynamometric measures, unless dual (cathodal + anodal) stimulation is delivered.	EBRSR 2016	Level 1a, 1b	Hesse et al, 2011 Viana et al, 2014 Wu et al, 2013 Khedr et al, 2013 Au-Yeung et al, 2014 Lefebvre et al, 2013, 2014 Fusco et al, 2013 Kim et al, 2010, 2009 Fregni et al, 2005 Lee et al, 2014 Wang et al, 2014 Hendy et al, 2014 Cha et al, 2014 Zimerman et al, 2012 Stagg et al, 2012 Tarrka et al, 2011 Boggio et al, 2007 Hummel et al, 2005 Fusco et al, 2014

			Lindenberg et al, 2010 Kasashima-Shindo et al, 2015
High volume – Noncurrent			
PARM endorses the use of transcranial direct current stimulation (TDCS) to facilitate general upper motor limb function.			

2017 Recommendation Statement			
There is some evidence that repetitive peripheral magnetic stimulation may not improve upper limb motor function; however, it may improve spasticity.	EBRSP 2016	Level 1b	Krewer et al, 2014 Heldmann et al, 2000
Low volume - Current			
PARM currently does not recommend the use of peripheral magnetic stimulation on upper limb impairments.			

2017 Recommendation Statement			
There is some evidence that intermittent pneumatic compression does not appear to reduce hand edema or improve upper limb strength post-stroke.	EBRSP 2016	Level 1b	Roper et al, 1999
High level solitary evidence – Noncurrent			
PARM does not recommend the use of intermittent pneumatic compression for reduction of hand edema or recruitment of strength in the upper extremity following stroke.			

6.2.4 REPETITIVE TASK TRAINING

Table 50. Repetitive task training in the improvement of upper limb motor function in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence on the effectiveness of repetitive task training for improving upper limb function of patients with stroke.	CSS	Early – Level A Late – Level A	Cauraugh & Kim, 2003 French et al, 2010 Harris et al, 2009
	NSF	B	Kirton et al, 2008 French et al, 2007, 2008
	SIGN 2010	1++, A	French et al, 2007
	USVA/ DoD	B	French et al, 2008 Volpe et al, 2008 Woldag et al, 2003
	AHA 2010	Level IIB	Wolf et al, 2006

		Carey et al, 2002	
Inconsistent level of evidence – High volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence on the effectiveness of repetitive task training for improving upper limb function of patients with stroke. A combination of variation and sufficient repetition on a range of relevant tasks is advised. However, careful appraisal is still advised due to presence of variation in some treatment protocols.	CAMEROON 2013	Level A	SCORE 2007
	AHA-ASA 2016	Class I, Level A	AHA-ASA 2016
	CANADIAN 2013	Level A	CANADIAN 2013
	EBRSR 2016	Level 1a Level 1b Level 2, limited	Page et al, 2003 Whitall et al, 2000 Butefisch et al, 1995 Dickenstein et al, 1997 French et all 2007 Timmermans et al, 2010
Consistent level of evidence – High volume – Noncurrent – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM strongly endorses repetitive task training for improving upper limb function of patients with stroke.			

2011 Recommendation Statement			
There is some evidence that varied repetitive task practice (e.g., CIMT, robot-assisted therapy) to improve UE motor coordination in individuals with some voluntary finger extension. No recommendations are made for one type of varied repetitive task practice over another. Moderate volume – Current	AHA 2010	Class II A Level A Class I Level A	Kahn et al, 2006 Page et al, 2008 Taub et al, 2006 Volpe et al, 2008 Wolf et al, 2006 Wu et al, 2007
2017: No new evidence			
PARM recommends that varied repetitive task practice (e.g., CIMT, robot-assisted therapy) to improve UE motor coordination in individuals with some voluntary finger extension. No recommendations are made for one type of varied repetitive task practice over another.			

2017 Recommendation Statement			
There is insufficient evidence for the appropriation of range of motion exercises and positioning to be facilitated within the patient's visual field. Solitary low level evidence – Current	CANADIAN 2013	Early – Level C, Late – Level C	CANADIAN 2013
PARM Clinical Practice Guideline for Stroke Rehabilitation 2017 203			

PARM suggests placement of upper limb in a variety of appropriate and safe positions within the patient's visual field.

6.2.5 ELECTRICAL STIMULATION AND ELECTROMYOGRAPHIC BIOFEEDBACK

Table 51. Electrical stimulation and electromyographic biofeedback in the improvement of upper limb impairment in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that functional electrical stimulation should be used on the wrist and forearm to reduce motor impairment and improve functional motor recovery of patients with stroke.	CSS	Early – Level A Late – Level A	Ada & Foongchomcheay, 2002 Baker & Parker 1986 Bolton et al, 2004 Cauraugh & Kim, 2003 Chae et al, 1998 Chan et al, 2009 Church et al, 2006 Faghri & Rodgers, 1997 Faghri et al, 1994 Hara et al, 2008 Kobayashi et al, 1999 Koyuncu et al, 2010 Linn et al, 1999 Mangold et al, 2009
	NSF	B, C	Powell et al, 1999 Wang et al, 2000 Ada & Foongchomcheay, 2002 Bakhtiar & Fatany, 2008 Church et al, 2006 Faghri & Rodgers, 1997 Glinsky et al, 2007 Hara et al, 2006 Johnson et al, 2004 Koyuncu et al, 2010 Mangold et al, 2009 Pandyan et al, 1997
	SIGN 2010	1++, 1+ 1- 1++, 1+	Peurala et al, 2002 Price & Pandyan, 1999 Van Deusen-Fox 1964 Yan & Hui-Chan, 2009 Ada & Foongchomcheay, 2002 Alon et al, 2007 Chae et al, 2005 Church et al, 2006

			De Kroon et al, 2002, 2005 Glanz et al, 1996 Glinsky et al, 2007 Handy et al, 2003 Hara et al, 2006, 2008 Mangold et al, 2009 Pomeroy et al, 2006 Price & Pandyan, 2000 Ring & Rosenthal, 2005 Yu et al, 2004
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that electrical stimulation and functional electrical stimulation should be used on the wrist and forearm to reduce motor impairment and improve functional motor recovery.	AHA-ASA 2016	Class IIa, Level A	Pomeroy et al, 2006 Alon et al, 2007, 2008 Hara et al, 2008
	CANADIAN 2013	Early – Level B Late – Level B	Meilink et al, 2008 Page et al, 2012 Stein et al, 2015 Boyaci et al, 2013
	EBRSR 2016	Level 1a Level 1b Level 2	De Kroon et al, 2004, 2008 Hesse et al, 1998 Kim & Lee, 2014 Mangold et al, 2009 Barker et al, 2008 Karakus et al, 2013 Shimodozo et al, 2014 Kojima et al, 2014 Powell et al, 1999 Manigandan et al, 2014 Sihndo et al, 2011 Knutson et al, 2012 Lin & Yan, 2011 Hsu et al, 2010 Kowalczewski et al, 2007 Popovic et al, 2004, 2003 Chae et al, 1998 Thrasher et al, 2008 Alon et al, 2007 Francisco et al, 1998 Malhotra et al, 2013 Faghri et al, 1997, 1994 Heckermann et al, 1997 Bowman et al, 1979 Gharib et al, 2015 Chae et al, 2009

			Chan et al, 2009 Weber et al, 20120 Kimberley et al, 2004 Ring & Rosenthal, 2005 Cauraugh et al, 2003, 2000 Kim et al, 2015 Baygutalp et al, 2014 Doucet and Griffin, 2013 Hara et al, 2008, 2006 Gabr et al, 2005 Bhatt et al, 2007 Inobe, 2013
Consistent level of evidence – High volume – Noncurrent – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM strongly endorses the use of functional electrical stimulation on the wrist and forearm to reduce motor impairment and improve functional motor recovery of stroke survivors with evidence of muscle contraction but unable to move their arm against resistance, provided it is be guided by a qualified rehabilitation professional.			

2011 Recommendation Statement			
There is strong evidence that subluxation can be reduced and pain decreased using functional electrical stimulation applied to the shoulder girdle.	USVA/DoD	B, I	Alon et al, 2007 Cauraugh & Kim, 2003a,b Cauraugh & Sangbum, 2002 Chae et al, 2005 Daly et al, 2006 Hara et al, 2006, 2008 Pomeroy et al, 2006
Functional electrical stimulation can be administered within two months of stroke onset, to induce contraction of the supraspinatus and/or posterior deltoid muscles	AHA 2010	Class IIb Level B	Price-Pandayan, 2001 Van Peppen et al, 2004 Barker et al, 2008 Chae et al, 2007 Church et al, 2006 Hara et al, 2006, 2008 Meilink et al, 2008 Page & Levine, 2006 Sullivan & Hedman, 2007
Consistent level of evidence – High volume – Current –Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that neuromuscular electrostimulation (NMS) is beneficial to paretic shoulder muscles in reducing glenohumeral subluxation.	AHA-ASA 2016	Class IIa, Level A	Price et al, 2001 Chae et al, 2005 Van Peppen et al, 2004
Low volume – Noncurrent			

ADAPTE 1: The recommendation is unchanged from the PARM 2011 guideline but the strength of evidence changed (lower level of evidence yet consistent thought).

PARM endorses the use of electrostimulation and / or functional electrical stimulation on the shoulder girdle for reducing shoulder subluxation and pain of patients with stroke. It can be administered within two months of stroke onset, to induce contraction of the supraspinatus and/or posterior deltoid muscles.

2011 Recommendation Statement			
There is evidence that EMG biofeedback systems do not improve upper limb outcomes over conventional therapy and should not be used on a routine basis.	CSS	A	Basmajian et al, 1982 Hurd et al, 1980
	SIGN 2010	1++	Moreland et al, 1998 Woodford & Price, 2007
	NSF	C	Heckman et al, 1997 Meilink et al, 2008 Woodford & Price, 2007
	USVA/ DoD	C	Glanz et al, 1995 Moreland et al, 1998
Inconsistent level of evidence – High volume – Non-current – Consistent thought			
2017 Updated Recommendations and Evidence Sources			
There is conflicting evidence of modest improvements in arm function after the use of EMG biofeedback (EMG-BF) in conjunction with physiotherapy. Its use in routine clinical practice is still subject to ongoing debate.	CANADIAN 2013	Level A	Langhorne 2009 (for)
	EBRSR 2016	Level 1a Level 2	FOR: Crow et al, 1989 Meilink et al, 2007 Armagan et al, 2003 You et al, 2013 Cordo et al, 2013 Inglis et al, 1984 Kim et al, 2015 Greenberg & Fowler, 1980 Mroczeck et al, 1978 Rayegani et al, 2014 AGAINST: Dorsch et al, 2014 Lee et al, 1976 Prevo et al, 1982
Consistent level of evidence – High volume – Noncurrent – Variable thoughts			
ADAPTE 3: The recommendation and the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM suggests the prudent use of EMG biofeedback systems in combination with conventional therapy for improving upper limb function after stroke. It should NOT be used in routine basis.			

2017 Recommendation Statement			
There is conflicting evidence whether feedback therapy improves upper limb motor function.	EBRSP 2016	Level 1a, 1b	Piron et al, 2010 Abdollahi et al, 2014 Durham et al, 2014 Mukherjee et al, 2013 Van Delden et al, 2013 Whitall et al, 2011 Cruz et al, 2014 Kim et al, 2014
High volume - Current			
PARM suggests the use rehabilitation programs with feedback therapy.			

2017 Recommendation Statement			
There is evidence of improvement in impaired hand function after treatment with transcutaneous nerve stimulation (TENS), but the improvement does not translate to functional independence or the entire upper extremity.	EBRSP 2016	Level 1b Level 2	Zhao et al, 2015 Au-Yeung and Hui-Chan 2014 Johansson et al, 2001 Kim et al, 2013 Tekeoglu et al, 1998 Sonde et al, 1998 Butefisch et al, 1995
Moderate volume – Noncurrent			
PARM endorses the use of transcutaneous nerve stimulation for stimulating hand dexterity and function.			

6.2.6 VIRTUAL REALITY AND TELEREHABILITATION

Table 52. Virtual reality and telerehabilitation in the recovery of upper limb function in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence on the effects of virtual reality in conjunction with the interventions.	SIGN 2010	2-3	Crosbie et al, 2007 Henderson et al, 2007
	USVA/DoD	C	Henderson et al, 2007
Consistent level of evidence – Low volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is conflicting evidence on the benefits of virtual reality as a rehabilitation adjunct. This type of training may have an adverse effect on resistance against passive movements, so monitoring is encouraged.	AHA-ASA 2016	Level B	FOR: Kowalczewski et al, 2011 Laver et al, 2011 Kiper et al, 2011 Da Silva et al, 2011 Saposnik 2011 AGAINST: Van Vliet et al, 2006 Laver et al, 2011

	EBRSR 2016	Level 1a	<p>FOR: Saposnik et al, 2010 Fan et al, 2014 (provided with motivation) Lee et al, 2014 Lee and Chun 2014 Kiper et al, 2014 Thielbar et al, 2014 Lee et al, 2013 Fluet et al, 2015 Shin et al, 2015 Jang et al, 2005 Duff et al, 2013 Lam et al, 2006 Broeren et al, 2008 (but not detectable in real-life activities)</p> <p>AGAINST: Crosbie et al, 2012 Choi et al, 2014 Hyeon Hui et al, 2013 Yin et al, 2014</p>
Consistent level of evidence – High volume – Noncurrent – Variable thoughts			
ADAPTE 3: The recommendation and the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM suggests virtual reality as an adjunct to regular exercise therapy as a means of providing additional opportunities for repetition, intensity and task-oriented training, especially on activities of daily living. Cautious monitoring on increase in muscle tone is advised throughout the rehabilitation phase.			

2017 Recommendation Statement			
There is some evidence to determine the benefits of using telerehabilitation services on recovering upper limb motor function post-stroke.	EBRSR 2016	Level 2	Wolf et al, 2015 Benvenuti et al, 2014
Low volume – Current			
PARM recommends telerehabilitation for the upper extremity in underserved populations. Further exploration of this intervention is warranted.			

6.2.7 BILATERAL PRACTICE

Table 53. Bilateral practice therapy in the improvement of upper limb function in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that bilateral training improves upper extremity function, but may not be better than unilateral practice.	USVA/DoD	B	-
	SIGN 2010	1++, 1+	Coupar et al, 2010
	NSF	C	Cauraugh et al, 2009 Desrosiers et al, 2005 Lin et al, 2009 Morris et al, 2008 Stewart et al, 2006 Summers et al, 2007 Van Peppen et al, 2006
Inconsistent level of evidence – High volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that bilateral training improves upper extremity function, but still may not better than unilateral practice.	AHA-ASA 2016	Class IIb, Level A	Coupar et al, 2010 Latimer et al, 2010 Cauraugh et al, 2011 Morris et al, 2012 Whitall et al, 2011 Wu 2011 Hayner 2010 Brunner 2012
	EGRSR 2016	Level 1a Level 2	Whitall et al, 2011 Morris et al, 2008 Luft et al, 2004 Van Delden et al, 2013, 2015 Coupar et al, 2010 Brunner et al, 2012 Wu et al, 2011 Cauraugh & Kim, 2002 Desrosiers et al, 2005 Dispa et al, 2013 Mc Combe et al, 2014 Lin et al, 2009 Stinear et al, 2008, 2014 Lee et al, 2013 Shim et al, 2015 Simkins et al, 2013 Stoykoy et al, 2009 Summers et al, 2007 Byl et al, 2013 Singer et al, 2013 Anandabai et al, 2013

<p>Consistent level of evidence – High volume – Noncurrent – Uniform thought</p> <p>ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.</p> <p>PARM strongly endorses bilateral practice to improve upper extremity function of patients with difficulty in using their upper limb. Although improvement in upper extremity function may not be better than unilateral practice.</p>
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6.2.8 NEURODEVELOPMENTAL TECHNIQUE

Table 54. Neurodevelopmental technique for the improvement of upper limb function in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence to recommend for or against neurodevelopmental treatment in comparison to other treatment approaches.	CSS	B	Ottawa Panel et al, 2006
	USVA/DoD	I	Brunham & Snow, 1992 Mulder et al, 1986 Wagenaar et al, 1990
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that neurodevelopmental techniques are neither superior nor inferior compared with other therapeutic approaches in treatment of the hemiparetic upper extremity. Motor relearning program, when compared to Bobath approach, may be associated with short-term motor functioning, and better movement quality.	EBRSPR 2016	Level 1a Level 1b	Walker et al, 2012 Platz et al, 2005, 2009 Langhammer & Stanghelle, 2000, 2003, 2011 Van Vliet et al, 2005 Timmerman et al, 2013 Van der Lee et al, 1999 Basmajian et al, 1987 Gelber et al, 1995 Dickstein et al, 1986 Logigian et al, 1983
High volume - Noncurrent			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends the use of neurodevelopmental treatment for motor retraining following stroke. No treatment concept is proven to be superior or inferior over another. Motor relearning program, when compared to Bobath approach, may be associated with short-term motor functioning, and better movement quality.			

2017 Recommendation statement			
There is conflicting evidence on the improvement / benefits on sensory discrimination by somatosensory retraining.	AHA-ASA 2016	Class IIb, Level B	FOR: Celnik et al, 2007 Klaiput et al, 2009 Sullivan et al, 2012 Bowen et al, 2011 (insufficient) AGAINST: Hunter et al, 2011
	CANADIAN 2013	Level A	FOR: CANADIAN 2013
	EBRSP 2016	Level 1a Level 1b Level 2	FOR: Byl et al, 2003 Byl et al, 2009 Carey et al, 2011 Hayward et al, 2013 Schabrun & Hillier, 2009 (ambiguous) Doyle et al, 2010 (insufficient) AGAINST: Barreca et al, 2003 Steultjens et al, 2003 Hunter et al, 2011 Jongbloed et al, 1989
Inconsistent level of evidence – High volume – Noncurrent – Variable thoughts			
PARM suggests the use of somatosensory retraining, in combination with upper extremity exercise therapy, for improvement of sensory discrimination.			

2017 Recommendation Statement			
There is some evidence that both functional and neuropsychological approaches to improve dressing performance may be effective.	EBRSP 2016	Level 1b	Walker 2012
Solitary high level evidence – Current			
PARM recommends the incorporation of either functional or neuropsychological approaches in improving dressing performance and motor ability.			

6.2.9 UPPER EXTREMITY STRENGTHENING EXERCISES

Table 55. Strengthening exercises to facilitate improvement of upper limb function in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is strong evidence that progressive upper extremity strengthening is effective in improving upper limb function. There is evidence that strength training does not increase spasticity, hence should not be avoided in those with spasticity.	CSS	A	Pak & Pattern, 2008
	NSF	B	Ada et al, 2006 Pak & Pattern, 2008
	USVA/DoD	B	Ada et al, 2006 Pak & Pattern, 2008 Stein et al, 2004 Winstein et al, 2004
Consistent level of evidence – Moderate volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that progressive upper extremity strengthening is effective in improving upper limb function. Presence of spasticity should not limit the use of strength training in the arm.	CAMEROON 2013	Level B	SCORE 2007
	AHA/ASA 2016	Class IIa Level B	Corti et al, 2012 Harris et al, 2010
	CANADIAN 2013	Early – Level A Late – Level C	Harris et al, 2009
Inconsistent level of evidence – Moderate volume – Noncurrent – Uniform thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline			
PARM strongly endorses progressive upper extremity strengthening exercises of the arm and hand.			

2017 Recommendation statement			
There is evidence that stretching, combined with joint stabilization exercises, improves arm function. Stretching alone may not improve motor function or contracture.	EBRSSR 2016	Level 1a, 1b Level 2 (limited)	Tseng et al, 2007 Kim et al, 2013 You et al, 2014 Triandafilou & Kamper, 2014
Moderate volume - Current			
PARM endorses stretching to be combined with joint stabilization exercises for improvement of arm function. Stretching alone may not improve motor function or contracture.			

6.2.10 MIRROR THERAPY

Table 56. Mirror therapy in the improvement of upper limb function in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence on the effects of mirror therapy in conjunction with the interventions.	NSF	C	Altschuler et al, 1999 Dohle et al, 2009
	USVA/DoD	I	Yavuzer et al, 2008 Altschuler et al, 1999 Yavuzer et al, 2008
Inconsistent level of evidence – Low volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that mirror therapy, in conjunction with UE interventions, may be appropriate for select patients to improve ADLs, reduce pain, and improve visual spatial neglect.	CANADIAN 2013	Level A	Thierne et al, 2012
	EBRSR 2016	Level 1a	Cho & Cha, 2015 Ji et al, 2014 Kim et al, 2014 Kojima et al, 2014 Cristina et al, 2015 Yun et al, 2011 Wu et al, 2013 Yoon, 2014
Consistent level of evidence – High volume – Current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends the use of mirror therapy for upper limb treatment for select patients to improve ADLs and visual spatial neglect, as well as reduce pain.			

2017 Recommendation Statement			
There is conflicting evidence on the use of action observation for upper limb rehabilitation.	EBRSR 2016	Level 1a, 1b	Franceschini et al, 2012 Cowles et al, 2013 Sale et al, 2014 Kim and Kim 2015 Lee et al, 2013 Ertelt et al, 2007
Moderate volume – Current			
PARM suggests a combination of action observation and action practice for improvement of upper extremity motor function compared to action observation alone.			

6.3 UPPER EXTREMITY SPLINTING

Table 57. Splinting as management for upper limb contractures in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			

There is strong evidence that splinting the wrist in either in neutral or extended wrist position does not reduce wrist contracture after stroke.	SIGN 2010	1+, 2+	Lannin et al, 2007
	NSF	B	Burge et al, 2008 Turton & Britton, 2005
Consistent level of evidence – Low volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is conflicting evidence to recommend for or against splinting the hemiplegic wrist and fingers to prevent contractures.	CANADIAN 2013	Early – Level A Late – Level B	AGAINST: Horsley et al, 2007 Harvey et al, 2006
	AHA-ASA 2016	Class IIb, Level C	FOR: Veterans Affairs 2010 AGAINST: Harvey et al, 2006 Lannin et al, 2007 De Jong et al, 2006
	EBRSR 2016	Level 1a Level 2	FOR: Bartolo et al, 2014 (for) Jung et al, 2011 (for) AGAINST: Barry et al, 2012 Lannin 2003, 2007 Page et al, 2013 Poole et al, 1990 Basaran et al, 2012 Suat et al, 2011 Langlois et al, 1991 Rose et al, 1987 (insufficient)
Inconsistent level of evidence – High volume – Noncurrent – Variable thoughts			
ADAPTE 3: The recommendation and the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM suggests judicious use of upper extremity splints for prevention of wrist and finger contractures.			

2011 Recommendation Statement			
There is conflicting evidence that splinting has no significant effects on upper limb function, spasticity or activity limitations.	SIGN 2010	1+	Lannin et al, 2007
	USVA/ DoD	III	Gresham et al, 1995 Intercollegiate Working Party for Stroke 2000 USVA/Dod 2010
Inconsistent level of evidence – Low volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			

There is conflicting evidence on the effects of splinting on upper limb function, spasticity or activity limitations in stroke patients.	CAMEROON 2013	Level A	CMAJ-Lindsay et al, 2010
	CANADIAN 2013	Early – Level A Late – Level B	Horsley et al, 2007 Harvey et al, 2006 Lannin et al, 2007 Basaran et al, 2012
	AHA-ASA 2016	Class III, Level B	Hesse et al, 2012
	CANADIAN 2013	Class IIb, Level C	CANADIAN 2013 (functional dynamic orthoses)
	EBRSR 2016	Level 2	Bartolo et al, 2014

Inconsistent level of evidence – High volume – Noncurrent – Variable thoughts
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.
PARM suggests splinting for the management of spasticity and improving hand function, along with conventional therapy.

6.4 PHARMACOLOGIC INTERVENTIONS

Table 58. Pharmacologic approaches for the improvement of upper limb function in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is evidence that chemodenervation using botulinum toxin to localized upper limb muscles reduces spasticity, increases range of motion, and improves limb positioning, dressing and hygiene. Cost-effectiveness is still an ongoing debate.	AHA-ASA 2016	Class I, Level A	Duncan et al, 2005 Veterans Affairs 2010 Brainin et al, 2011 Olvey et al, 2010 Teasell et al, 2012 Shackley et al, 2012 Gadidi et al, 2011 Foley et al, 2012 Shaw et al, 2011 Wolf 2012 Doan et al, 2013 Cousins et al, 2010 Rosales et al, 2012
	CANADIAN 2013	Early – Level C Late – Level A	Shaw et al, 2011 McCrory et al, 2009 Brashear et al, 2002, 2004 Foley et al, 2012

	EBRSR 2016	Level 1a	Seo et al, 2015 Kaji et al, 2010 McCrory et al, 2009 Wolf et al, 2012 Gracies et al, 2014 Picelli et al, 2014 Shaw et al, 2011 Bakheit et al, 2000, 2001 Simpson et al, 1996 Hesse et al, 2012 Bhakta et al, 2000, 2008 Brashear et al, 2002, 2004 Smith et al, 2000 Francisco et al, 2002 Santamato et al, 2015 Meythaler et al, 2009 Sun et al, 2010 Jahangir et al, 2007 Suputtitada et al, 2005 Ward et al, 2014 Werner et al, 2013 Santamato et al, 2014
Inconsistent level of evidence – High volume – Noncurrent – Uniform thought			
PARM endorses targeted injection of botulinum toxin into localized upper limb muscles of qualified patients as an important tool for management of post-stroke hypertonicity.			

2017 Recommendation Statement

There is some evidence that tizanidine can be used to treat more generalized, disabling spasticity.	CANADIAN 2013	Early – Level C Late – Level B	Gelber et al, 2001
Solitary evidence – Noncurrent			
PARM recommends the use of tizanidine to treat more generalized, disabling spasticity.			

2017 Recommendation Statement

There is insufficient evidence that baclofen can be used as a lower cost alternative.	CANADIAN 2013	Early – Level C Late – Level C	CANADIAN 2013
Solitary low level evidence – Current			
PARM currently does not suggest the use of baclofen in treatment of spasticity.			

2017 Recommendation Statement

There is insufficient evidence that benzodiazepines should be	CANADIAN 2013	Early – Level C	CANADIAN 2013
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avoided due to sedating side effects, which may impair recovery.		Late – Level C	
Solitary low level evidence – Current			
PARM currently does not suggest the use of benzodiazepines due to its sedating side effects, which may impair recovery.			

2017 Recommendation Statement			
There is some evidence on the reduction of spasticity in the upper limb by administration of daily doses of Tolperisone.	EBRSR 2016	Level 1b	Stamenova et al, 2005
Solitary high level evidence – Noncurrent			
PARM recommends daily doses of Tolperisone to reduce spasticity in the upper limb.			

2017 Recommendation Statement			
There is evidence that stimulants, such as amphetamines, may provide (only) short term improvement in upper extremity function, except grip strength.	EBRSR 2016	Level 1a Level 1b	Platz et al, 2005 Tardy et al, 2006 Schuster et al, 2011 Wang et al, 2014
Moderate volume – Noncurrent			
PARM endorses the short-term use of stimulants for improvement of upper extremity function, except on grip strength.			

2017 Recommendation Statement			
There is evidence that Levodopa may not improve arm and hand function, except possibly reaction time.	EBRSR 2016	Level 1b Level 2	Restermeyer et al, 2007 Rosser et al, 2008
Low volume - Noncurrent			
PARM endorses against the use of Levodopa for arm and hand function, except possibly on reaction time.			

2017 Recommendation Statement			
There is evidence that antidepressants (e.g. fluoxetine, nortriptyline, citalopram, reboxetine, lithium carbonate) may help facilitate over-all upper extremity motor function following a stroke.	EBRSR 2016	Level 1a, Level 1a/1b for citalopram	Chollet et al, 2011 Robinson et al, 2000 Zittel et al, 2008 Mikami et al, 2011 Zittel et al, 2007 Mohammadianinejad et al, 2014
Moderate volume - Noncurrent			
PARM endorses the use of antidepressants as an adjunct to help facilitate over-all upper extremity motor function following a stroke.			

2017 Recommendation Statement			
There is some evidence that D-cycloserine, an antibiotic, delivered	EBRSR 2016	Level 1b	Nadeau et al, 2014

in combination with CIMT, may not improve upper extremity motor function.			
Solitary high level evidence – Current			
PARM does not recommend the use of D-cycloserine for motor function.			

2017 Recommendation Statement			
There is conflicting evidence on the benefits of steroid injections at reducing upper limb pain and improving range of motion following a stroke.	EBRSR 2016	Level 1b Level 2	FOR: Yasar et al, 2011 Dogan et al, 2013 (conflicting)
Low volume - Current			
PARM suggests the use of steroid injections for pain-relief or improvement of range of motion in post-stroke patients. Further research is warranted.			

2017 Recommendation Statement			
There is insufficient evidence on usefulness of nerve block treatment in the spasticity of upper extremity.	EBRSR 2016	Level 4	Kong and Chua 1999, 2002
Low volume – Noncurrent			
PARM suggests the use of nerve blocks with ethyl alcohol for decreasing spasticity in the upper extremity. More research is needed to determine its usefulness.			

2017 Recommendation Statement			
There is some evidence that Astralagus Membranaceus may help improve upper extremity following hemorrhagic stroke.	EBRSR 2016	Level 1b	Chen et al, 2012
Solitary high level evidence – Noncurrent			
PARM recommends the use of Astralagus Membranaceus to help improve upper extremity following hemorrhagic stroke.			

2017 Recommendation Statement			
There is some evidence that NeuroAid may not improve upper extremity motor function or general functional recovery.	EBRSR 2016	Level 1b	Kong et al, 2009
Solitary high level evidence – Noncurrent			
PARM does not recommend the use of NeuroAid for upper extremity motor function or general functional recovery.			

2017 Recommendation Statement			
There is some evidence that Tokishakuyakusan may improve functional independence in the chronic stage of stroke.	EBRSR 2016	Level 1b	Goto et al, 2009
Solitary high level evidence – Noncurrent			

PARM recommends the use of Tokishakuyakusan for improvement of functional independence in the chronic stage of stroke

6.5 ALTERNATIVE APPROACHES

Table 59. Alternative interventions for the improvement of upper limb function in post-stroke patients

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is conflicting evidence on whether acupuncture or electroacupuncture improve upper limb outcomes.	AHA-ASA 2016	Level A	<p>FOR: Hsieh et al, 2007</p> <p>AGAINST: Zhuangl et al, 2012</p>
	EBRSR 2016	Level 1a Level 1b Level 2 Class III,	<p>FOR: Wayne et al, 2005 Hsing et al, 2012 Alexander et al, 2004 Kjendhal et al, 1997 Naeser et al, 1992 Li et al, 2012 Zhao et al, 2009 Sallstrom et al, 1996 Moon et al, 2003 Mukheriee et al, 2007 Hu et al, 1993 Si et al, 1998 (on rats)</p> <p>AGAINST: Bai et al, 2013 Gosman-Hedstrom et al, 1998 Sze et al, 2002 Hopwood et al, 2008 Fragoso & Ferreira, 2012</p>
Inconsistent level of evidence – High volume – Noncurrent –Variable thoughts			
PARM suggests the use of acupuncture in adjunct with other therapy for improvement of motor function and functional independence within the upper extremity.			

2017 Recommendation Statement			
There is insufficient evidence that indicates a potential benefit of meridian acupressure on upper limb function, performance of activities of daily living, and pain post-stroke. Further research is required to assess the efficacy of	EBRSR 2016	Level 1a Level 2	<p>Yue et al, 2013 Kang et al, 2009</p>

acupressure and to investigate the potential hormonal reactions in order to bring clarity to the mechanisms underlying this intervention.			
Low volume – Current			
PARM suggests meridian acupressure for improvement of upper limb function. Further research is required to assess its efficacy.			

2017 Recommendation Statement			
There is evidence that massage therapy may not improve spasticity, or quality of life after stroke.	EBRSR 2016	Level 1b, Level 2	Shin & Lee, 2007 Thanakiatpinyo et al, 2014 Fox et al, 2006
Low volume - Noncurrent			
PARM does not endorse massage therapy for improvement of spasticity, nor quality of life after stroke.			

2017 Recommendation Statement			
There is evidence that music therapy may improve upper limb motor function, but not muscle strength when compared to conventional therapy.	EBRSR 2016	Level 1b Level 2	Thielbar et al, 2014 Altemuller et al, 2009 Van Vugt et al, 2014 Jun et al, 2013
Moderate volume – Current			
PARM endorses music therapy as a promising rehabilitation technique for improving function of the hemiparetic arm following stroke.			

6.6 PARM CONTEXT POINTS

Table 60. Context points for minimum and additional standard care of practice for upper extremity interventions post-stroke

	Minimum standard care of practice	Additional standard care of practice
Practice method	Assessment of upper extremity range of motion, motor strength, finger dexterity and functional capacity Pain assessment Physical and occupational therapy program for upper limb motor recovery	EMG or musculoskeletal ultrasound assessment of muscle tone and possible neuropathies Screening for depression Screening for suitability for alternative interventions
Equipment	Rehabilitation unit Occupational therapy equipment for hand and shoulder functional activities	Occupational therapy room Robotics Virtual reality system

	Electrical stimulation and assistive devices Oral medications for spasticity and pain management Upper extremity splints	Botulinum toxin and ultrasound machine EMG biofeedback system Intrathecal administration system for baclofen (OR setting)
Workforce	Physiatrist Occupational therapist Physical therapist Orthotist (under the guidance of the available health care provider) Pharmacist	Pain management specialist and/or neurosurgeon Psychologist (post-stroke pain)
Training	Within competency	Within competency Use of robotics, virtual reality and EMG biofeedback systems Use and techniques of botulinum toxin injection and intrathecal baclofen administration
When is it done	Upon hospital admission up to optimal functional independence in use of upper extremity	Upon hospital admission up to optimal functional independence use of upper extremity
Reassessment using at least one standard outcome measure	Monthly Assessment tools such as Frenchay Activities Index and Canadian Occupational Performance Measure	Monthly Assessment tools such as Frenchay Activities Index and Canadian Occupational Performance Measure

6.7 SUMMARY OF PARM RECOMMENDATION STATEMENTS

INTENSITY OF TRAINING

PARM recommends assessing IADLs, leisure, and participation using such tools as the Frenchay Activities Index and Canadian Occupational Performance Measure for maintained functional independence and optimal participation.

PARM recommends increasing the intensity of rehabilitation which can improve the upper limb function in patients with stroke.

PARM suggests training-specific ADLs and IADLs in inpatient, outpatient and chronic care settings. However, training should encourage the use of patients' affected limb during functional tasks and be designed to simulate partial or whole skills required in activities of daily living.

PARM endorses that rehabilitation should be structured to provide much practice as much as possible within the first six (6) months of stroke to improve upper limb function.

THERAPEUTIC APPROACHES

CONSTRAINT INDUCED MOVEMENT THERAPY

PARM strongly endorses the use of constraint induced movement therapy (CIMT) to improve dexterity, perceived use and quality of arm and hand movements. Both original and modified version is reasonable to consider in eligible stroke survivors. MCIMT combined with mental practice may also improve upper limb function.

PARM endorses the use of constraint induced movement therapy (CIMT) in post-stroke patients who have at least 10 degrees of active finger extension and at least 20 degrees of active wrist extension. Patient should also have limited sensory and balance problems, and intact cognition.

PARM suggests that CIMT may provide some benefits in the long term.

PARM recommends modified constraint induced movement therapy (CIMT), but not traditional CIMT, in the first month of stroke as long as the patient meets the inclusion criteria.

PARM does not suggest the use of trunk restraint for promoting upper limb motor function.

IMAGERY / MENTAL PRACTICE / MENTAL IMAGERY

PARM recommends the use of mental practice as an adjunct to standard care for enhancement of upper limb sensorimotor recovery.

ELECTROMECHANICAL / ROBOTIC DEVICES / ROBOT-ASSISTED THERAPY / MECHANICAL-ASSISTED TRAINING

PARM strongly endorses electromechanical / robotic devices / robot-assisted therapy / mechanical assisted training for improving upper limb function of patients with stroke, especially in patients with moderate to severe paresis. However, there is uncertain utility when compared with dose-matched conventional upper limb exercise therapies.

PARM recommends the use of shockwave therapy as a promising new treatment for upper limb spasticity.

PARM recommends the use of ozonated autohemotherapy for improvement of general motor disability. Since this is a novel intervention, technical cautions should be strictly implemented.

PARM recommends the use of computer-brain-interface technology on upper limb impairments.

PARM endorses cautious use of motor cortex stimulation via implanted electrodes for improvement of upper limb function in patients post-stroke.

PARM endorses the use of repetitive transcranial magnetic stimulation for the improvement of upper extremity function but not spasticity. Low frequency (1Hz) rTMS delivered on the

contralesional hemisphere may improve upper limb motor function but not manual dexterity or grip strength compared with sham stimulation.

PARM endorses the use of intermittent, (and not continuous type of), theta burst stimulation.

PARM endorses the use of transcranial direct current stimulation (TDCS) to facilitate general upper motor limb function.

PARM currently does not recommend the use of peripheral magnetic stimulation on upper limb impairments.

PARM does not recommend the use of intermittent pneumatic compression for reduction of hand edema or recruitment of strength in the upper extremity following stroke.

REPETITIVE TASK TRAINING

PARM strongly endorses repetitive task training for improving upper limb function of patients with stroke.

PARM recommends that varied repetitive task practice (e.g., CIMT, robot-assisted therapy) to improve UE motor coordination in individuals with some voluntary finger extension. No recommendations are made for one type of varied repetitive task practice over another.

PARM suggests placement of upper limb in a variety of appropriate and safe positions within the patient's visual field.

ELECTRICAL STIMULATION AND ELECTROMYOGRAPHIC BIOFEEDBACK

PARM strongly endorses the use of functional electrical stimulation on the wrist and forearm to reduce motor impairment and improve functional motor recovery of stroke survivors with evidence of muscle contraction but unable to move their arm against resistance, provided it is be guided by a qualified rehabilitation professional.

PARM endorses the use of electrostimulation and / or functional electrical stimulation on the shoulder girdle for reducing shoulder subluxation and pain of patients with stroke. It can be administered within two months of stroke onset, to induce contraction of the supraspinatus and/or posterior deltoid muscles.

PARM suggests the prudent use of EMG biofeedback systems in combination with conventional therapy for improving upper limb function after stroke. It should NOT be used in routine basis.

PARM suggests the use rehabilitation programs with feedback therapy.

PARM endorses the use of transcutaneous nerve stimulation for stimulating hand dexterity and function.

VIRTUAL REALITY AND TELEREHABILITATION

PARM suggests virtual reality as an adjunct to regular exercise therapy as a means of providing additional opportunities for repetition, intensity and task-oriented training, especially on activities of daily living. Cautious monitoring on increase in muscle tone is advised throughout the rehabilitation phase.

PARM recommends telerehabilitation for the upper extremity in underserved populations. Further exploration of this intervention is warranted.

BILATERAL PRACTICE

PARM strongly endorses bilateral practice to improve upper extremity function of patients with difficulty in using their upper limb. Although improvement in upper extremity function may not be better than unilateral practice.

NEURODEVELOPMENTAL TECHNIQUE

PARM recommends the use of neurodevelopmental treatment for motor retraining following stroke. No treatment concept is proven to be superior or inferior over another. Motor relearning program, when compared to Bobath approach, may be associated with short-term motor functioning, and better movement quality.

PARM suggests the use of somatosensory retraining, in combination with upper extremity exercise therapy, for improvement of sensory discrimination.

PARM recommends the incorporation of either functional or neuropsychological approaches in improving dressing performance and motor ability.

UPPER EXTREMITY STRENGTHENING EXERCISES

PARM strongly endorses progressive upper extremity strengthening exercises of the arm and hand.

PARM endorses stretching to be combined with joint stabilization exercises for improvement of arm function. Stretching alone may not improve motor function or contracture.

MIRROR THERAPY

PARM recommends the use of mirror therapy for upper limb treatment for select patients to improve ADLs and visual spatial neglect, as well as reduce pain.

PARM suggests a combination of action observation and action practice for improvement of upper extremity motor function compared to action observation alone.

UPPER EXTREMITY SPLINTING

PARM suggests judicious use of upper extremity splints for prevention of wrist and finger contractures.

PARM suggests splinting for the management of spasticity and improving hand function, along with conventional therapy.

PHARMACOLOGIC INTERVENTIONS

PARM endorses targeted injection of botulinum toxin into localized upper limb muscles of qualified patients as an important tool for management of post-stroke hypertonicity.

PARM recommends the use of tizanidine to treat more generalized, disabling spasticity.

PARM currently does not suggest the use of baclofen in treatment of spasticity.

PARM currently does not suggest the use of benzodiazepines due to its sedating side effects, which may impair recovery.

PARM recommends daily doses of Tolperisone to reduce spasticity in the upper limb.

PARM endorses the short-term use of stimulants for improvement of upper extremity function, except on grip strength.

PARM endorses against the use of Levodopa for arm and hand function, except possibly on reaction time.

PARM endorses the use of antidepressants as an adjunct to help facilitate over-all upper extremity motor function following a stroke.

PARM does not recommend the use of D-cycloserine for motor function.

PARM suggests the use of steroid injections for pain-relief or improvement of range of motion in post-stroke patients. Further research is warranted.

PARM suggests the use of nerve blocks with ethyl alcohol for decreasing spasticity in the upper extremity. More research is needed to determine its usefulness.

PARM recommends the use of Astragalus Membranaceus to help improve upper extremity following hemorrhagic stroke.

PARM does not recommend the use of NeuroAid for upper extremity motor function or general functional recovery.

PARM recommends the use of Tokishakuyakusan for improvement of functional independence in the chronic stage of stroke.

ALTERNATIVE APPROACHES

PARM suggests the use of acupuncture in adjunct with other therapy for improvement of motor function and functional independence within the upper extremity.

PARM suggests meridian acupressure for improvement of upper limb function. Further research is required to assess its efficacy.

PARM does not endorse massage therapy for improvement of spasticity, nor quality of life after stroke.

PARM endorses music therapy as a promising rehabilitation technique for improving function of the hemiparetic arm following stroke.

7. Post-stroke shoulder pain

Shoulder pain is common among patients with stroke. The reported incidence of post stroke shoulder pain varies from 9% to 73%. The reported prevalence of shoulder pain varies between 5% and 84% depending on the acuity and definition of shoulder pain used. The development of shoulder pain after stroke is associated with shoulder subluxation and motor weakness. Post-stroke shoulder pain may contribute to poor upper limb recovery, prolonged hospital stay, depression, sleeplessness and poor quality of life.

Prevention and treatment of post-stroke shoulder pain are important goals during stroke rehabilitation to avoid delays in recovery. Treatment is composed of pharmacologic and non-pharmacologic modalities. Pharmacologic agents aim to decrease pain while non-pharmacologic approaches address contributing factors such as limb weakness, abnormal shoulder girdle muscle tone (flaccid or spastic), impaired sensation, disuse secondary to neglect, shoulder subluxation and adhesive capsulitis through the use of physical modalities and physical therapeutic strategies.

This chapter will discuss the evidence on assessment of post-stroke shoulder pain and effectiveness of preventive measures and treatment.

7.1 ASSESSMENT AND MONITORING

Table 61. Approaches to assessment of post-stroke shoulder pain

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence for the use of algorithms or an integrated care pathway in the diagnosis and management of post-stroke shoulder pain, due to its complexity.	SIGN 2010	GPP	Jackson et al, 2003
Low volume- non-current			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that all stroke patients should be assessed for shoulder pain and, when symptoms present, have strategies implemented to minimize shoulder joint pain and trauma.	CAMEROON 2013	A	Ottawa Panel 2006 CMAJ 2010 SCORE 2007
Low volume- Non-Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM recommends using an algorithm or an integrated care pathway for the diagnosis and management of post-stroke shoulder pain.			

2011 Recommendation Statement			
There is evidence that a pain scale should be used in assessing pain intensity.	USVA/DoD	II	Australian Acute Musculoskeletal Pain Guidelines Group 2003 Moulin et al, 2007
	CSS	C	McLean 2004
Inconsistent level of evidence – Low volume – Non-current – Uniform thought			
2017: No new evidence			
PARM endorses that a pain scale should be used in assessing shoulder pain intensity.			

2011 Recommendation Statement			
There is evidence that the presence, nature and location of pain should be assessed early and treated appropriately in stroke patients with shoulder pain.	USVA/DoD	II	Australian Acute Musculoskeletal Pain Guidelines Group 2003 Moulin et al, 2007
	CSS	C	McLean, 2004
Inconsistent level of evidence - Low volume - Non-current - Uniform thought			
2017: No new evidence			
PARM endorses assessing the nature and location of pain, as well as its intensity using a pain scale in post-stroke shoulder pain assessment and monitoring.			

2017 Recommendation Statement			
There is some evidence that a clinical assessment can be useful, including musculoskeletal evaluation.	AHA-ASA 2016	Level C	Niessen et al, 2009 Yi et al, 2013 Shah et al, 2008 Koog, 2010
Moderate volume – Non-current			
PARM recommends a clinical assessment of post-stroke shoulder pain, which should include musculoskeletal evaluation.			

2017 Recommendation Statement			
There is some evidence that a clinical assessment can be useful, including evaluation of spasticity.	AHA-ASA 2016	Level C	Dromerick et al, 2008 Lindgren et al, 2012 Niessen et al, 2009 Rajaratnam et al, 2007 Roosink et al, 2011
Moderate volume – Non-current			
PARM recommends clinical assessment of post-stroke shoulder pain, which should include evaluation of spasticity.			

2017 Recommendation Statement			
There is insufficient evidence that a clinical assessment can be useful, including identification of any subluxation.	AHA-ASA 2016	Level C	Huang et al, 2010 Pong et al, 2009
Low volume – Non-current			
PARM suggests clinical assessment of post-stroke shoulder pain, which should include identification of any subluxation.			

2017 Recommendation Statement			
There is some evidence that a clinical assessment can be useful, including testing for regional sensory changes.	AHA-ASA 2016	Level C	Roosink et al, 2012 Jones et al, 2013 Roosink et al, 2012 Roosink et al, 2011 Gamble et al, 2002 Roosink et al, 2011 Zeilig, 2013 Roosink et al, 2011
High volume – Non-current			
PARM recommends clinical assessment of post-stroke shoulder pain, which should include testing for regional sensory changes.			

2017 Recommendation Statement			
There is some evidence that ultrasound may be considered as a diagnostic tool for shoulder soft tissue injury.	EBRSR 2016	Level B	Huang et al, 2010 Pong et al, 2009 Lee et al, 2009 Shah et al, 2008
Moderate volume – Non-current			
PARM recommends the use of ultrasound as a diagnostic tool for shoulder soft tissue injury.			

7.2 PREVENTION

Table 62. Prevention of post-stroke shoulder pain

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that EMG-biofeedback and Bobath exercises with behavioral methods are no more effective than conventional physiotherapy in preventing post-stroke shoulder pain.	SIGN 2010	1++	Page & Lockwood, 2003
Low volume – Non-current			
2017: No new evidence			
PARM endorses the use of EMG-biofeedback and Bobath exercises with behavioral methods in addition to conventional physiotherapy in preventing shoulder pain post-stroke.			

2011 Recommendation Statement			
There is some evidence that device-delivered continuous passive motion did not prevent shoulder pain when compared to therapist-supervised self-range of motion exercises.	SIGN 2010	1+	Lynch et al, 2005
Low volume – Non-current			
2017: No new evidence			
PARM does not endorse device-delivered continuous passive motion for the prevention of shoulder pain.			

2017 Recommendation Statement			
There is some evidence that continuous passive range-of-motion exercises are not superior over self-range of motion exercises at improving joint stability, spasticity, or pain.	EBRSR 2016	Level 1B	Lynch et al, 2005
Low volume – Non-current			
PARM recommends the use of continuous passive range-of-motion exercises in addition to self-range of motion exercises for improving joint stability, spasticity and/or pain, if available.			

2011 Recommendation Statement			
There is evidence that strapping does not prevent post-stroke shoulder pain.	USVA/DoD	GPP	Ada et al, 2005a
	SIGN 2010	1++ 1+	Griffin & Bernhardt, 2006
	SIGN 2010	1++	Ada et al, 2005a Page & Lockwood, 2003
	NSF	B GPP	Ada et al, 2005a Griffin & Bernhardt, 2006
	AHA 2010	Class IIb Level C	Ada et al, 2005b De Jong et al, 2006 Dean et al, 2000b Griffin & Bernhardt, 2006 Hanger et al, 2000 Lannin et al, 2003, 2007

Inconsistent level of evidence – High volume – Non-current – Variable thought

2017 Updated Recommendations and Evidence Sources

There is evidence that shoulder strapping/taping may reduce hemiplegic shoulder pain; however, it may not improve range of motion, spasticity, disability, or upper limb motor function.	EBRSR 2016	Level 1a	Pandian et al, 2013 Hanger et al, 2000 Griffin & Bernhardt, 2006 Appel et al, 2011 Ancliff et al, 1992
Moderate volume – Non-current			
ADAPTE 3: The recommendation changed but the strength of evidence remains unchanged from the 2011 PARM guideline.			
PARM endorses shoulder strapping/taping to reduce hemiplegic shoulder pain; however, it may not improve range of motion, spasticity, disability, or upper limb motor function.			

2011 Recommendation Statement			
There is evidence that overhead pulley does not prevent shoulder pain.	SIGN 2010	1++	Page & Lockwood, 2003
	NSF	C	Kumar et al, 1990
	CSS	A	Kumar et al, 1990
Inconsistent level of evidence – Low volume – Non-current – Variable Thought			
2017 Updated Recommendation and Evidence Sources			

There is evidence that aggressive range of motion therapies, using overhead pulleys may result in increased rates of shoulder pain.	AHA-ASA 2016	Class III, Level C	Royal College of Physicians Intercollegiate Stroke Working Party 2008 Scottish Intercollegiate Guideline National 2010
	CAMEROON 2013	A	Ottawa Panel 2006
	EBRSR 2016	Level 2	Kumar et al, 1990
Inconsistent level of evidence – Moderate volume – Non-current – Uniform Thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM does not endorse the use of overhead pulley for the prevention of post-stroke shoulder pain.			

2011 Recommendation Statement			
There is evidence that educating staff, carers and stroke survivors on the proper manual handling, safe transfer and correct positioning of the hemiplegic arm will prevent post-stroke shoulder pain.	USVA/DoD	GPP	Australian Acute Musculoskeletal Pain Guidelines Group 2003
	NSF	GPP	Australian Acute Musculoskeletal Pain Guidelines Group 2003
	CSS	A	Moodie & Morgan, 1986 Williams et al, 1988 Zorowitz et al, 1995
Inconsistent level of evidence – Low volume – Non-current – Uniform Thought			
2017 Updated Recommendation and Evidence Sources			
There is evidence that patient and family education (i.e., range of motion, positioning) is recommended for shoulder pain and shoulder care after stroke, particularly before discharge or transitions in care.	AHA-ASA 2016	Class 1	Royal College of Physician Intercollegiate Stroke Working Party 2008 Scottish Intercollegiate Guideline National 2010
	CAMEROON 2013	Level B	CMAJ 2010 SCORE 2007
Consistent level of evidence – Moderate volume – Non-current – Uniform Thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM endorses educating staff, carers and stroke survivors on the proper manual handling, safe transfer, and correct positioning of the hemiplegic arm will prevent post-stroke shoulder pain.			

2011 Recommendation Statement			
There is strong evidence that functional electrical stimulation does not prevent shoulder pain in	NSF	A	Church et al, 2006 Jackson et al, 2008 Koyoncu et al, 2010

patients with upper limb weakness post-stroke.			Marigold et al, 2009
	SIGN 2010	1++ 1+	Ada & Foongchomcheay, 2002 Church et al, 2006 Mangold et al, 2009 Price & Pandyan, 2000

Consistent level of evidence – Moderate volume – Current - Variable Thought

2017 Updated Recommendation and Evidence Sources

There is conflicting evidence on the use of electrical stimulation in the prevention of the development of hemiplegic shoulder or shoulder pain.	CANADIAN 2013	A	FOR: Ada et al, 2002 Koyuncu et al, 2010 AGAINST: Church et al, 2006
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Low volume – Non-current

ADAPTE 3: The recommendation and the strength of evidence changed (decreased) from the 2011 PARM guideline.

PARM does not endorse functional electrical stimulation in preventing shoulder pain in patients with upper limb weakness post-stroke.

2017 Recommendation Statement

There is evidence that surface neuromuscular electrical stimulation (NMES) delivered prior to 6 months post-stroke may be more effective than conventional therapy at preventing/reducing shoulder subluxation but not shoulder pain.	EBRSR 2016	Level 1a Level 2	Linn et al, 1999 Kobayashi et al, 1999 Baker & Parker, 1986 Church et al, 2006 De Jong et al, 2013
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Moderate volume - Non-current

PARM endorses the use of surface neuromuscular electrical stimulation (NMES) prior to 6 months post-stroke for preventing and/or reducing shoulder subluxation but not for preventing shoulder pain.

2011 Recommendation Statement

There is conflicting evidence that positioning and supporting the limb can reduce post-stroke shoulder pain.	CSS	B	Ada et al, 2005a Borisova & Bohannon, 2009 De Jong et al, 2006 Dean et al, 2000b Gustafsson & McKenna, 2006
	SIGN 2010	1++ 1+	Borisova & Bohannon, 2009 Gustafsson & McKenna, 2006 Page & Lockwood, 2003

Consistent level of evidence – Moderate volume – Current –Variable Thought

2017 Updated Recommendation and Evidence Sources			
There is evidence that positioning and supporting the limb does not reduce post-stroke shoulder pain.	CANADIAN 2013	Level B	Borisova et al, 2009 (-) ROM
	EBRSR 2016	Level 1A	Ada et al, 2005 (-) pain Gustaffsson & McKenna, 2006 (-) pain/passive ROM/MAS/mBarthel Index De Jong et al, 2006 (-) pain/passive ROM/ MAS/ Fugl-Meyer Dean et al, 2000 (-) pain/ ROM-P & A Borisova & Bohannan, 2009 (-) ROM
Consistent level of evidence – Moderate volume – Non-current – Uniform Thought			
ADAPTE 4: The recommendation and the strength of evidence changed (increased) from the 2011 PARM Guideline.			
PARM does not endorse positioning and supporting the limb to reduce post-stroke shoulder pain. However, this should not be a reason against proper shoulder positioning.			

2017 Recommendation Statement			
There is insufficient evidence that positioning and use of supportive devices and slings can prevent shoulder subluxation.	AHA-ASA 2016	Class 1a Level C	Royal College of Physician Intercollegiate Stroke Working Party 2008 Scottish Intercollegiate Guideline National 2010
Low volume – Non-Current			
PARM suggests positioning and use of supportive devices and slings to prevent post-stroke shoulder subluxation.			

2017 Recommendation Statement			
There is evidence that shoulder positioning may not reduce motor function, range of motion, or spasticity.	EBRSR 2016	Level 1A	AGAINST: Ada et al, 2005 (-) pain Gustaffsson & McKenna, 2006 (-) pain/passive ROM/MAS/mBarthel Index De Jong et al, 2006 (-) pain/passive ROM/ MAS/ Fugl-Meyer Dean et al, 2000 (-) pain/ ROM-P & A Borisova & Bohannan, 2009 (-) ROM

Moderate volume – Non-current
PARM does not endorse shoulder positioning for the reduction of pain, motor function, range of motion, or spasticity. However, this should not be a reason against proper shoulder positioning.

7.3 TREATMENT APPROACH

Table 63. Approach to treatment of post-stroke shoulder pain

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that a tailored pain management plan that meets a patient's needs is effective in decreasing shoulder pain.	USVA/DoD	II	Australian Acute Musculoskeletal Pain Guidelines Group 2003 Dworkin et al, 2003, 2007 Jensen, 2002 Kerns & Habib, 2004 Moulin et al, 2007 Turk & Winter, 2006
Moderate volume – Non-current			
2017: No new evidence			
PARM recommends a tailored pain management plan that meets the patient's needs in decreasing shoulder pain.			

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that treatment of shoulder pain should be evidence-based, and its benefits and side effects should be balanced.	USVA/DoD	II	Australian Acute Musculoskeletal Pain Guidelines Group, 2003 Dworkin et al, 2003, 2007 Jensen, 2002 Moulin et al, 2007
	NSF	GPP	Australian Acute Musculoskeletal Pain Guidelines Group 2003
Inconsistent level of evidence – Moderate volume – Non-current – Uniform Thought			
2017: No new evidence			
PARM recommends an evidence-based treatment plan for post-stroke shoulder pain with balanced benefits and side effects.			

7.3.1 NON-PHARMACOLOGIC MANAGEMENT

Table 64. Non-pharmacologic management strategies for post-stroke shoulder pain

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			

There is evidence that non-pharmacological agents may be used in the management of post-stroke shoulder pain.	USVA/DoD	II	Australian Acute Musculoskeletal Pain Guidelines Group 2003 Kerns & Habib, 2004 Moulin et al, 2007 Turk & Winter, 2006
Moderate volume – Current			
2017: No new evidence			
PARM endorses the use of non-pharmacological agents in the management of post-stroke shoulder pain.			

2011 Recommendation Statement			
There is insufficient evidence that modified nursing and therapy sessions could be used in the treatment of post- stroke shoulder pain.	USVA/DoD	C	USVA/Dod 2010
Modified nursing and therapy sessions involve cueing attention to the impaired side in patients with impaired spatial awareness.			
Low volume – Current			
2017: No new evidence			
PARM suggests the use of modified nursing and therapy session in the treatment of post-stroke shoulder pain. These involve cueing attention to the impaired side in patients with impaired spatial awareness.			

2011 Recommendation Statement			
There is some evidence that static positioning of the affected shoulder does not decrease pain.	SIGN 2010	1++ 1+	Gustafsson & McKenna, 2006
Static positioning of the affected shoulder is done by placing the shoulder at 90 degrees abduction for 20 minutes, once daily while sitting or lying down.			
Low volume – Current			
2017: No new evidence			
PARM does not recommend the use of static positioning in the treatment of shoulder pain.			

2011 Recommendation Statement			
There is strong evidence that electrical stimulation could be used in the treatment of post-stroke shoulder pain.	USVA/ DoD	II	Chae et al, 2005 Price & Pandyan, 2001 Van Peppen et al, 2004
	NSF	1++	Church et al, 2006 Koyuncu et al, 2010 Mangold et al, 2009
Consistent level of evidence – Moderate volume – Non-current – Uniform Thought			

2017 Updated Recommendation and Evidence Sources			
There is strong evidence that NMES may be considered for shoulder pain.	AHA-ASA 2016	Class IIb, Level A	Price CI et al, 2006 Church C et al, 2006 Malhotra et al, 2013 Yu DT et al, 2001 Razenbrink et al, 2004 Yu DT et al, 2004 Chae J et al, 2007 Chae J et al, 2005 Yu DT et al, 2010
	EBRSR 2016	Level 1a Level 2	Linn et al, (1999) Kobayashi et al, (1999) Baker & Parker et al, (1986) Church et al, (2006) Lee D. de Jong et al, (2013)
Consistent level of evidence – High volume – Non-current – Uniform Thought			
ADAPTE 1: The recommendation and strength of evidence remains unchanged from 2011 PARM guideline.			
PARM strongly endorses the use of electrical stimulation in improving shoulder pain-free range of motion and reducing pain intensity. Benefits limited to at least one year after cessation of electrical stimulation.			

2011 Recommendation Statement			
There is insufficient evidence that therapeutic ultrasound is not effective in reducing shoulder pain in post-stroke patients with shoulder subluxation.	USVA/ DoD NSF	GPP	Inaba & Piorkowski, 1972 Inaba & Piorkowski, 1972
Consistent level of evidence – Low volume – Non-current – Uniform Thought			
2017: No new evidence			
PARM suggests the use of therapeutic ultrasound for post-stroke patients who have shoulder subluxation with shoulder pain.			

2011 Recommendation Statement			
There is some evidence that referral to health psychologist/s is effective in reducing shoulder pain.	USVA/Dod	II	Kerns & Habib, 2004 Turk & Winter, 2006
Low volume-Non-current			
2017: No new evidence			
PARM recommends a referral to a health psychologist in the treatment of post-stroke shoulder pain.			

2017 Recommendation Statement			
There is some evidence that Bobath therapy for the hemiplegic shoulder may be associated with greater pain reduction than passive	EBRSR 2016	Level 2	Partridge et al, 1990

cryotherapy (application of local cold therapy).			
Low volume- Non-current			
PARM recommends Bobath therapy over passive cryotherapy for the reduction of pain in the hemiplegic shoulder.			

2017 Recommendation Statement			
There is some evidence that supplementing range of motion activities with ultrasound or positioning exercises may not be more effective than when performing range of motion exercises alone.	EBRSP 2016	Level 1b	Inaba & Piorkowski, 1972
Low volume – Non-current			
PARM recommends self-range of motion exercises for post-stroke shoulder pain. Therapeutic ultrasound and/or positioning exercises may also be supplemented depending on patient's symptoms.			

2017 Recommendation Statement			
There is some evidence that interferential electrical stimulation (IES) is beneficial at reducing pain during range of motion and at rest in patients suffering from shoulder hemiplegia.	EBRSP 2016	Level 1b	Suriya-amit et al, 2014
Low volume- Current			
PARM recommends interferential electrical stimulation (IES) as beneficial for reducing pain during range of motion and at rest in patients suffering from shoulder hemiplegia.			

2017 Recommendation Statement			
There is some evidence that high voltage pulsed galvanic stimulation (HVPGS) is superior to conventional therapy at reducing subluxation and improving shoulder joint displacement.	EBRSP 2016	Level 2	Fil et al, 2011
Low volume- Non-current			
PARM recommends high voltage pulsed galvanic stimulation (HVPGS) for reducing subluxation and improving shoulder joint displacement post-stroke.			

2017 Recommendation Statement			
There is some evidence that transcutaneous electrical nerve stimulation (TENS) may only improve passive range of motion when delivered at a high intensity.	EBRSP 2016	Level 2	Leandri et al, 1990
Low volume- Non-current			
PARM recommends the use of transcutaneous electrical nerve stimulation (TENS) delivered at a high intensity in improving passive shoulder range of motion.			

2017 Recommendation Statement			
There is some evidence that aromatherapy combined with acupressure may reduce pain associated with painful hemiplegic shoulder.	EBRSR 2016	Level 1b	Shin & Lee, 2007
Low volume- Non-current			
PARM recommends that aromatherapy combined with acupressure may reduce pain associated with painful hemiplegic shoulder.			

2017 Recommendation Statement			
There is some evidence that massage therapy by itself or in combination with acupuncture may reduce hemiplegic shoulder pain. Evidence also suggests improvements in anxiety, heart rate, blood pressure and general motor functions. Further research is still warranted.	EBRSR 2016	Level 1B Level 2	Li et al, 2012 Mok & Woo, 2004
Low volume- Non-current			
PARM recommends massage therapy solely or in combination with acupuncture in the reduction of hemiplegic shoulder pain. Further research is still warranted.			

2017 Recommendation Statement			
There is some evidence for the usefulness of acupuncture as an adjuvant treatment for hemiplegic shoulder pain.	AHA-ASA 2016	Class IIb Level B	Lee JA et al, 2012
Low volume- Current			
PARM recommends the use of acupuncture as an adjuvant treatment for hemiplegic shoulder pain.			

2017 Recommendation Statement			
There is insufficient evidence that surgically resecting the subscapularis and pectoralis muscle tendons improves range of motion in stroke patients with a painful hemiplegic shoulder. Further research is needed to confirm these findings.	EBRSR 2016	Level 4	Braun et al, 1971
Low volume – Non-current			
PARM suggests surgical resection of the subscapularis and pectoralis muscle tendons to improve range of motion in suitable stroke patients with a painful hemiplegic shoulder. Further research is still needed.			

2017 Recommendation Statement			
There is some evidence that surgical tenotomy of pectoralis	AHA-ASA 2016	Class IIb Level C	Namdari et al, 2011

major, latissimus dorsi, teres major, or subscapularis may be considered for patients with severe hemiplegia and restrictions in shoulder range of motion.			
Low volume – Non-current			
PARM recommends consideration of surgical tenotomy of pectoralis major, latissimus dorsi, teres major, or subscapularis muscles for patients with severe hemiplegia and restrictions in shoulder range of motion.			

2017 Recommendation Statement			
There is some evidence that segmental neuromyopathy may improve hemiplegic upper limb motor function. However, it might not be more efficient than oral pain medication at reducing hemiplegic shoulder pain.	EBRSR 2016	Level 1B	Ratmansky et al, 2012
Low Volume - Current			
PARM recommends the consideration of segmental neuromyopathy in improving hemiplegic upper limb motor function.			

7.3.2 PHARMACOLOGIC MANAGEMENT

Table 65. Pharmacologic approaches for the management of post-stroke shoulder pain

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that intra-articular corticosteroid injections significantly improve shoulder pain.	USAV/Dod NSF	GPP GPP	Snels et al, 2000 Snels et al, 2000
Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017 Updated Recommendation and Evidence Sources			
There is conflicting evidence regarding the effect of intra-articular triamcinolone acetonide injections on hemiplegic shoulder pain.	EBRSR 2016	Level 1a Level 2	FOR: Rah et al, 2012 (+) pain/flexion/ER/IR/SDQ Lakse et al, 2009 (+) pain/ ROM; (-) Brunnstrom AGAINST: Lim et al, 2008 (-) pain, ROM, Fugl-Meyer/MAS Snels et al, 2000 (-) Pain/ActionReachArm Test/Fugl-Meyer Yasar et al, 2011

			(-) pain Baykal et al, 2011 (-) FIM/Brunnstrom/MAS/ Rotation ER/ IR/ Flexion/ Abduction
AHA-ASA 2016	Class IIb Level B		FOR: Chae et al, 2009 (decrease pain/temporary) Dekker et al, 1997 (decrease pain/-ROM) Lakse et al, 2009 (decrease pain/increase ROM) Snels et al, 2000 (decrease pain; no stat sig) Rah et al, 2012 (decrease pain up to 8 wks)
CANADIAN 2013	Level A		FOR: Rah et al, 2012 (decrease pain up to 8 wks) Snels et al, 2002 (decrease pain; no stat sig)
Consistent level of evidence – High volume – Non-current – Variable thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM suggests intraarticular corticosteroid injections to decrease shoulder pain in stroke patients.			

2011 Recommendation Statement			
There is some evidence that centrally acting analgesics (i.e. opioids) could improve shoulder pain, but these should be used with caution, due to adverse effects such as impaired cognition, confusion and interference with the rehabilitation process.	USVA/DoD	II	Australian Acute Musculoskeletal Pain Guidelines Group 2003 Dworkin et al, 2003, 2007 Jensen, 2002 Moulin et al, 2007
Moderate volume – Non-current			
2017: No new recommendation			
PARM recommends the use of centrally acting analgesics (i.e. opioids) in the treatment of post-stroke shoulder pain. However, potential adverse effects should also be considered prior to prescription based on the patient's background.			

2011 Recommendation Statement			
There is insufficient evidence that non-steroidal anti-inflammatory drugs (NSAIDS) could decrease shoulder pain.	SIGN 2010	GPP	
Low volume – Non-current			
2017: No new recommendation			

PARM suggests the use of NSAIDS to decrease shoulder pain in stroke patients.

2011 Recommendation Statement

There is some evidence that phenol injection improves shoulder passive range of movement.	SIGN 2010	3	Van Kuijk et al, 2002
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Low volume – Non-current

2017: No New Recommendation

PARM recommends the use of phenol injection to improve passive range of movement of the shoulder in stroke patients.

2017 Recommendation Statement

There is conflicting evidence regarding the effectiveness of low-dose botulinum toxin (100-500u) injections for the improvement of post-stroke shoulder pain, range of motion and/or spasticity.	EBRSR 2016	Level IB Level 1A	FOR: Yelnik et al, 2007 (+pain/+ROM) AGAINST: Marcliniak et al, 2012 (100-150u) (-pain/ROM/spasticity) De Boer et al, 2008 (100u) (-pain/ROM)
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CANADIAN 2013	Level B	FOR: Singh et al, 2010 (+pain/ROM/function) AGAINST: De Boer et al, 2008 (-pain/ROM)
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AHA-ASA 2016	Class IIa Class IIa Level A	FOR: Yelnik et al, 2007 (500u)/(+pain/+ROM) Lim et al, 2008 (100u)/(+pain/ROM) AGAINST: De Boers KS et al, 2008 (100u)/(-pain/-ROM)
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Consistent level of evidence - Moderate volume – Non-current – Variable thought

PARM suggests the use of low dose botulinum toxin (100-500u) injections as an adjunct treatment for the improvement of pain and range of motion of the hemiplegic shoulder.

2017 Recommendation Statement

There is conflicting evidence regarding the usefulness of botulinum toxin (100-500u) injection to reduce spasticity and severe hypertonicity in hemiplegic shoulder muscles.	AHA-ASA 2016	Class IIa Level A	FOR: Kong et al, 2007 (-pain;MAS;ROM) Marco et al, 2007 (-MAS/+ROM) *(all 500u)
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		Class IIa Level A	AGAINST: Kong et al, 2007 (500u) (-pain;MAS;ROM) Marciniak et al, 2012 (100-150u) (-pain/Rom/MAS) Marco et al, 2007 (500u +tens) (-MAS)
Moderate volume – Non-current – Variable Thought			
PARM suggests the use of botulinum toxin injection to reduce spasticity/severe hypertonicity in hemiplegic shoulder muscles.			

2017 Recommendation Statement			
There is some evidence that 500u of botulinum toxin injection in combination with TENS may not reduce shoulder spasticity.	EBRSR 2016	Level 1B	Kong et al, 2007 (-pain;MAS;ROM) Marco et al, 2007 (-MAS/+ROM) *(all 500u)
Low volume – Non-Current			
PARM does not recommend the use of 500u of botulinum toxin injection in combination with TENS in reducing post-stroke shoulder spasticity.			

2017 Recommendation Statement			
There is some evidence that a trial of neuromodulating pain medications is reasonable for patients with hemiplegic shoulder pain who have clinical signs and symptoms of neuropathic pain manifested as sensory change in the shoulder region, allodynia, or hyperpathia.	AHA/AXA 2016	Class 11a Level A	Royal College of Physicians Intercollegiate Stroke Working Party 2008 Scottish Intercollegiate Guidelines Network 2011 Duncan et al, 2010
Low volume – Non-current			
PARM recommends a trial of neuromodulating pain medications for patients with hemiplegic shoulder pain who have clinical signs and symptoms of neuropathic pain.			

2017 Recommendation Statement			
There is some evidence that nerve blocks, relative to saline injections or ultrasound therapy, may improve shoulder pain but not range of motion.	EBRSR 2016	Level IB Level 2	Adey-Wakeling et al, 2013 Boonsong et al, 2009
Low volume –current			
PARM recommends the use of nerve blocks over saline injections or ultrasound therapy for the improvement of post-stroke shoulder pain only.			

2017 Recommendation Statement			
There is some evidence that nerve block therapy may not be superior	EBRSR 2016	Level 2	Yasar et al, 2011

over intra-articular steroid injections at reducing shoulder pain.			
Low volume – Non-current			
PARM recommends nerve block therapy and/or intra-articular steroid injection for the reduction of post-stroke shoulder pain.			

2017 Recommendation Statement			
There is some evidence that suprascapular nerve block may be considered as an adjunctive treatment for hemiplegic shoulder pain.	AHA/ASA 2016	Class IIb Level B	Adey-Wakelin Z et al, 2013 Allen ZA et al, 2010 Yasar E et al, 2011
Low volume – Non-current			
PARM recommends suprascapular nerve block as an adjunctive treatment for hemiplegic shoulder pain.			

7.4 PARM CONTEXT POINTS

Table 66. Context points for minimum and additional standard care of practice for assessment and management of post-stroke shoulder pain.

	Minimum standard care of practice	Additional standard care of practice
Practice method	<p>Pain assessment</p> <ul style="list-style-type: none"> - Location and nature - Intensity and severity - Shoulder subluxation - Spasticity - Sensory changes <p>Prevention</p> <ul style="list-style-type: none"> - Continuous passive ROM and self-ROM - Education on handling, positioning and transfers - NMES within 6 months <p>Treatment</p> <ul style="list-style-type: none"> - Cueing to affected side - Electrical stimulation - Therapeutic ultrasound - Bobath therapy - Interferential ES 	<p>Musculoskeletal ultrasound assessment</p> <p>Prevention</p> <ul style="list-style-type: none"> - Shoulder strapping and taping - Shoulder slings and support <p>Treatment</p> <ul style="list-style-type: none"> - High voltage pulsed galvanic stimulation (HVPGS) - Aromatherapy with acupressure - Massage and acupuncture - Referral to psychologist - Phenol or BTx injection - Nerve block - Surgical tendon resection or tenotomy <p>Pharmacologic</p>

		<ul style="list-style-type: none"> - Intraarticular steroid - Centrally acting analgesics - NSAIDs
Equipment	VAS pain scale Modalities Therapeutic exercise equipment	Ultrasound machine Galvanic stimulator BTx or phenol Shoulder orthotics
Workforce	Attending physician Physiatrist Physical therapist	Occupational therapist Orthotist Psychologist Surgeon (Ortho/Neuro)
Training	Within competency	Within competency Training in MSK ultrasound Ultrasound techniques for botulinum toxin or phenol intramuscular injection Surgical training
When is it done	Upon admission/initial consultation and/or during hospital stay	Upon admission/initial consultation and/or during hospital stay, if without significant improvements
Reassessment using at least one standard outcome measure	Monthly	Monthly

7.5 SUMMARY OF PARM RECOMMENDATION STATEMENTS

ASSESSMENT AND MONITORING

PARM recommends using an algorithm or an integrated care pathway for the diagnosis and management of post-stroke shoulder pain.

PARM endorses that a pain scale should be used in assessing shoulder pain intensity.

PARM endorses assessing the nature and location of pain, as well as its intensity using a pain scale in post-stroke shoulder pain assessment and monitoring.

PARM recommends clinical assessment of post-stroke shoulder pain, which should include evaluation of spasticity.

PARM suggests clinical assessment of post-stroke shoulder pain, which should include identification of any subluxation.

PARM recommends clinical assessment of post-stroke shoulder pain, which should include testing for regional sensory changes.

PARM recommends the use of ultrasound as a diagnostic tool for shoulder soft tissue injury.

PREVENTION

PARM endorses the use of EMG-biofeedback and Bobath exercises with behavioral methods in addition to conventional physiotherapy in preventing shoulder pain post-stroke.

PARM does not endorse device-delivered continuous passive motion for the prevention of shoulder pain.

PARM recommends the use of continuous passive range-of-motion exercises in addition to self-range of motion exercises for improving joint stability, spasticity and/or pain, if available.

PARM endorses shoulder strapping/taping to reduce hemiplegic shoulder pain; however, it may not improve range of motion, spasticity, disability, or upper limb motor function.

PARM does not endorse the use of overhead pulley for the prevention of post-stroke shoulder pain.

PARM endorses educating staff, carers and stroke survivors on the proper manual handling, safe transfer, and correct positioning of the hemiplegic arm will prevent post-stroke shoulder pain.

PARM does not endorse functional electrical stimulation in preventing shoulder pain in patients with upper limb weakness post-stroke.

PARM endorses the use of surface neuromuscular electrical stimulation (NMES) prior to 6 months post-stroke for preventing and/or reducing shoulder subluxation but not for preventing shoulder pain.

PARM does not endorse positioning and supporting the limb to reduce post-stroke shoulder pain. However, this should not be a reason against proper shoulder positioning.

PARM suggests positioning and use of supportive devices and slings to prevent post-stroke shoulder subluxation.

PARM does not endorse shoulder positioning for the reduction of pain, motor function, range of motion, or spasticity. However, this should not be a reason against proper shoulder positioning.

TREATMENT APPROACH

PARM recommends a tailored pain management plan that meets the patient's needs in decreasing shoulder pain.

PARM recommends an evidence-based treatment plan for post-stroke shoulder pain with balanced benefits and side effects.

NON-PHARMACOLOGIC MANAGEMENT

PARM endorses the use of non-pharmacological agents in the management of post-stroke shoulder pain.

PARM suggests the use of modified nursing and therapy session in the treatment of post-stroke shoulder pain. These involve cueing attention to the impaired side in patients with impaired spatial awareness.

PARM does not recommend the use of static positioning in the treatment of shoulder pain.

PARM strongly endorses the use of electrical stimulation in improving shoulder pain-free range of motion and reducing pain intensity. Benefits limited to at least one year after cessation of electrical stimulation.

PARM suggests the use of therapeutic ultrasound for post-stroke patients who have shoulder subluxation with shoulder pain.

PARM recommends a referral to a health psychologist in the treatment of post-stroke shoulder pain.

PARM recommends Bobath therapy over passive cryotherapy for the reduction of pain in the hemiplegic shoulder.

PARM recommends self-range of motion exercises for post-stroke shoulder pain. Therapeutic ultrasound and/or positioning exercises may also be supplemented depending on patient's symptoms.

PARM recommends interferential electrical stimulation (IES) as beneficial for reducing pain during range of motion and at rest in patients suffering from shoulder hemiplegia.

PARM recommends high voltage pulsed galvanic stimulation (HVPGS) for reducing subluxation and improving shoulder joint displacement post-stroke.

PARM recommends the use of transcutaneous electrical nerve stimulation (TENS) delivered at a high intensity in improving passive shoulder range of motion.

PARM recommends that aromatherapy combined with acupressure may reduce pain associated with painful hemiplegic shoulder.

PARM recommends massage therapy solely or in combination with acupuncture in the reduction of hemiplegic shoulder pain. Further research is still warranted.

PARM recommends the use of acupuncture as an adjuvant treatment for hemiplegic shoulder pain.

PARM suggests surgical resection of the subscapularis and pectoralis muscle tendons to improve range of motion in suitable stroke patients with a painful hemiplegic shoulder. Further research is still needed.

PARM recommends consideration of surgical tenotomy of pectoralis major, lattisimus dorsi, teres major, or subscapularis muscles for patients with severe hemiplegia and restrictions in shoulder range of motion.

PARM recommends the consideration of segmental neuromyopathy in improving hemiplegic upper limb motor function.

PHARMACOLOGIC MANAGEMENT

PARM suggests intraarticular corticosteroid injections to decrease shoulder pain in stroke patients.

PARM recommends the use of centrally acting analgesics (i.e. opioids) in the treatment of post-stroke shoulder pain. However, potential adverse effects should also be considered prior to prescription based on the patient's background.

PARM suggests the use of NSAIDS to decrease shoulder pain in stroke patients.

PARM recommends the use of phenol injection to improve passive range of movement of the shoulder in stroke patients.

PARM suggests the use of low dose botulinum toxin (100-500u) injections as an adjunct treatment for the improvement of pain and range of motion of the hemiplegic shoulder.

PARM suggests the use of botulinum toxin injection to reduce spasticity/severe hypertonicity in hemiplegic shoulder muscles.

PARM does not recommend the use of 500u of botulinum toxin injection in combination with TENS in reducing post-stroke shoulder spasticity.

PARM recommends a trial of neuromodulating pain medications for patients with hemiplegic shoulder pain who have clinical signs and symptoms of neuropathic pain.

PARM recommends the use of nerve blocks over saline injections or ultrasound therapy for the improvement of post-stroke shoulder pain only.

PARM recommends nerve block therapy and/or intra-articular steroid injection for the reduction of post-stroke shoulder pain.

PARM recommends suprascapular nerve block as an adjunctive treatment for hemiplegic shoulder pain.

8. Cognitive, perceptual disorders and apraxia

Cognitive impairment is the decline in an individual's cognitive abilities that allows him to think, remember and perform activities. About 60 percent or almost two-thirds of post-stroke patients become cognitively impaired which is associated with poorer recovery and decreased capacity to perform activities of daily living and instrumental activities of daily living (Teasel et al, 2009; Madureira et al, 2001). The deficits are seen among patients in both the acute phase and rehabilitation phases of stroke.

Cognitive impairment can be chronic and progressive after stroke. Post-stroke dementia occurs in 26 percent of stroke patients by three months which adversely affects their recovery, increases long-term dependence and mortality (CANADIAN, 2013).

In recent studies, there has also been an increase in the frequency of cognitive impairment due to covert strokes, usually lacunes, especially among elderly patients. It is being theorized that for every clinical stroke, there may be up to ten covert strokes. Intracerebral small-vessel disease is another disorder associated with cognitive impairment which is increasing in frequency along with the aging of the population, leading to an increase in the need for long-term care (CANADIAN, 2013).

Cognitive impairment commonly involves one or more of the cognitive domains such as executive function, attention and memory. It may also be associated with neglect, apraxia, agnosia and language deficits (Teasel et al, 2009; Madureira et al, 2001). Visual perceptual disorders such as unilateral neglect are a common clinical consequence of stroke estimated at 23 percent. Limb apraxias are also common especially in those with left hemisphere involvement (28 – 57%) than right hemisphere damage (0 – 34%). While apraxia may improve with early recovery, up to 20 percent of affected patients will continue to demonstrate persistent problems (Donkervoort et al, 2000).

The need for early screening of cognitive impairment is, thus, important although no gold standard currently exists. If cognitive or perceptual deficits are suspected or found upon screening of a post-stroke patient, a more detailed assessment is recommended to clarify the types of impairments and guide the multidisciplinary team in formulating and implementing the most appropriate rehabilitation interventions.

8.1 COGNITIVE IMPAIRMENT

8.1.1 ASSESSMENT OF COGNITIVE IMPAIRMENT

Table 67. Assessment of post-stroke patients with cognitive impairment

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that comprehensive cognition-communication assessment (i.e., collect case history, observe in multiple contexts, screen motor, perceptual, and psychiatric conditions that may confound cognitive or communicative test performance; use formal communicative and cognitive tests; assess caregivers' communicative style and use of adaptive cognitive and communicative strategies) by the appropriate health care provider is needed to determine cognition and communication disorder.	AHA 2010	Class I Level B	Bertheir, 2005 Hoit & Hixon, 1992 Turkstra et al, 2005
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that a comprehensive and detailed neuropsychological evaluation for functional impairment is needed to identify areas of cognitive strength and weakness.	CAMEROON 2013	A	Lindsay et al, 2010
	AHA-ASA 2016	GPP	Winstein et al, 2016
Inconsistent level of evidence – Low volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM recommends that comprehensive cognition- communication assessment (i.e., collect case history, observe in multiple contexts, screen motor, perceptual, and psychiatric conditions that may confound cognitive or communicative test performance; use formal communicative and cognitive tests; assess caregivers' communicative style and use of adaptive cognitive and communicative strategies) by the appropriate health care provider is needed to determine cognition and communication disorder.			

2011 Recommendation Statement
There is some evidence that cognitive evaluations should assess all cognitive domains, and if stroke patients have communication disorders, there

should be direct and/or indirect speech language pathologist involvement in the evaluation.			
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that screening to investigate a person's cognitive status should address arousal, alertness, attention, orientation, memory, language, agnosia, visual-spatial/perceptual function, praxis, and executive function.	CANADIAN 2013	GPP	Lindsay et al, 2013
Low volume - Current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM recommends that cognitive evaluations should assess all cognitive domains (such as arousal, alertness, attention, orientation, memory, language, agnosia, visual-spatial/perceptual function, praxis, and executive function). If stroke patients have communication disorders, there should be direct and/or indirect speech language pathologist involvement in the evaluation.			

2011 Recommendation Statement			
There is some evidence of the use of standardized, valid, and reliable test procedures to document the presence and qualify the nature of communication and cognitive disorders.	AHA 2010	Class I Level B	Turkstra et al, 2005
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that screening for vascular cognitive impairment (VCI) should be conducted using a validated screening tool, such as: <ul style="list-style-type: none"> • Montreal Cognitive Assessment Tool (MoCA) • NINDS-CSN Harmonization VCI Neuropsychology Protocols • Functional Independence Measure (Cognitive- FIM) • Cambridge Cognition Examination (CAMCOG) • Frontal Assessment Battery • Kettle Test • Mini-Mental State Exam (MMSE) 	CANADIAN 2013	C	Hachinski et al, 2006

<ul style="list-style-type: none"> • Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) 			
Low volume – Non-current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM recommends the use of standardized, valid, and reliable test procedures to document the presence and qualify the nature of communication and cognitive disorders.			

2011 Recommendation Statement			
There is some evidence in the use of Montreal screening tool for assessment of cognitive impairment performed periodically. It would address the level of consciousness, attention, orientation, memory, language, visuospatial/ perceptual function, praxis and executive functions, including the presence of depression.	CSS 2010	B	Blake et al, 2002 Lincoln et al, 2000 Srikanth et al, 2006
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that screening for VCI should be conducted using a validated screening tool, such as the Montreal Cognitive Assessment test.	CANADIAN 2013	C	Hachinski et al, 2006
Low volume – Non-current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM recommends the use of the Montreal Cognitive Assessment screening tool for periodic assessment of cognitive impairment in terms of level of consciousness, attention, orientation, memory, language, visuospatial/perceptual function, praxis and executive functions, including the presence of depression (see Appendix 7).			

2017 Recommendation Statement			
There is insufficient evidence that all patients considered at high risk for cognitive impairment should be assessed periodically throughout the stages of care as indicated by the severity of clinical presentation, history and/or imaging abnormalities to identify cognitive, perceptual deficits, depression,	CANADIAN 2013	GPP	Lindsay et al, 2013

<p>delirium and/or changes in function.</p> <p>Stages of care across the continuum may include:</p> <ul style="list-style-type: none"> a. during presentation to emergency when cognitive, perceptual or functional concerns are noted; b. during acute care stay, particularly if cognitive, perceptual or functional concerns, or evidence of delirium is noted; c. throughout rehabilitation within inpatient, outpatient, and home-based settings, according to client progress; d. following hospital discharge from the emergency department or inpatient setting to an outpatient or community-based healthcare setting. 			
Low volume – Current			
<p>PARM suggests that all patients considered at high risk for cognitive impairment should be assessed periodically throughout the stages of care to identify cognitive, perceptual deficits, depression, delirium and/or changes in function. Stages of care across the continuum may include:</p> <ul style="list-style-type: none"> a. during presentation to emergency room b. during acute care stay c. throughout rehabilitation d. following hospital discharge from the emergency department or inpatient setting 			

2017 Recommendation Statement			
There is insufficient evidence that post-stroke patients with suspected cognitive impairment should also be screened for depression using a validated screening tool, given that depression has been found to contribute to vascular cognitive impairment.	CANADIAN 2013	GPP	Lindsay et al, 2013
Low volume – Current			
<p>PARM suggests that post-stroke patients with suspected cognitive impairment should also be screened for depression using a validated screening tool.</p>			

8.1.2 MANAGEMENT APPROACH FOR COGNITIVE IMPAIRMENT

Table 68. Management approaches for patients with post-stroke cognitive impairment

Recommendation	Guideline	Body of Evidence	References
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2011 Recommendation Statement			
There is insufficient evidence that a team approach is recommended in the management of cognitive impairment. Healthcare professionals may include an occupational therapist, neuropsychologist, psychiatrist, neurologist, geriatrician, speech-language pathologist or social worker.	CSS 2010	C	Chertkow, 2007 Teasell et al, 2009
Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that patients who demonstrate cognitive impairments should be managed by healthcare professionals with expertise in the assessment and management of neurocognitive functioning (i.e. neuropsychologist, psychologist, occupational therapist, speech-language pathologist, clinical nurse specialist, psychiatrist, physiatrist, geriatrician, neurologist, and developmental pediatricians) or referred to an appropriate cognitive specialist.	CANADIAN 2013	GPP	Lindsay et al, 2013
Low volume – Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM suggests a team approach in the management of cognitive impairment. Healthcare professionals may include a neuropsychologist, neurologist, psychiatrist, physiatrist, geriatrician, developmental pediatrician, occupational therapist, speech-language pathologist, clinical nurse specialist or social worker.			
2011 Recommendation Statement			
There is evidence that treatment of communication and/or cognitive disorders to facilitate restoration of impaired abilities and to teach compensatory strategies is effective. The procedures selected should be a case-by-case basis to address each patient's specific deficits and needs. These include right hemisphere brain damage cognitive-communicative disorders,	AHA 2010	Class I Level B,C	Klonoff et al, 1990 Von Cramon et al, 1991 Paolucci et al, 1996 Wiart et al, 1997 Cicerone et al, 2000 Majid et al, 2000 Stablim et al, 2000 Bowen et al, 2002 Pohjasvaara et al, 2002 Johannsen et al, 2003 Sohlbert et al, 2003 Cappa et al, 2005

neglect, attention disorders, memory disorders, awareness disorders and other executive function disorders.			Odell et al, 2005 Olsson et al, 2006 Lundgren et al, 2006 Arene & Hillis, 2007 Blake & Tompkins, 2007 Kennedy et al, 2008
High volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is evidence that the use of cognitive rehabilitation to improve attention, memory, visual neglect, and executive functioning is reasonable.	AHA-ASA 2016	Level B, Class IIa	Loetscher & Lincoln, 2013 Winkens et al, 2009 Poulin et al, 2012 Salter et al, 2012
Moderate volume – Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM endorses the treatment of communication and/or cognitive disorders to facilitate restoration of impaired abilities and to teach compensatory strategies. The procedures should be selected on a case-by-case basis to address each patient's specific needs and deficits which may include right hemisphere brain damage, cognitive-communicative disorders, neglect, attention disorders, memory disorders, awareness disorders and other executive function disorders.			

2011 Recommendation Statement			
There is insufficient evidence that an individualized, patient-centered approach should be considered to facilitate resumption of desired activities, return to work, leisure, driving, financial management, and other instrumental ADLs.	CSS 2010	C	Chertkow 2007 Teasell et al. 2009
Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that treatment goals should be patient-centered and developed in the context of both the cognitive impairments as well as the patients' intact cognitive abilities, with the aim of facilitating resumption of desired activities and participation (i.e. self-care, home management, leisure, social roles, driving, volunteer participation, financial management, return to work).	CANADIAN 2013	GPP	Lindsay et al, 2013
	AHA-ASA 2016	GPP	Winstein et al, 2016
Consistent level of evidence – Low volume – Current – Uniform thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			

PARM suggests that an individualized, patient-centered approach should be considered to facilitate resumption of desired activities, return to work, leisure, driving, financial management, and other instrumental ADLs.

2011 Recommendation Statement			
There is evidence that treatment should be provided at as intensive a schedule as the patient can tolerate.	AHA 2010	Class I Level B	Basso 2005 Robey 1998 Bhogal et al, 2003b Blake & Tompkins, 2007 Cherney et al, 2008 Odell et al, 2005
Moderate volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is evidence that intensive treatment is indicated. There is no definitive agreement on the optimum amount, timing, intensity, distribution, or duration of treatment.	AHA-ASA 2016	Level A, Class IIa	Bakheit et al, 2007 Cherney et al, 2008 Cherney et al, 2011 Brady et al, 2012 Cherney & van Vuuren, 2012 Sickert et al, 2014
Moderate volume – Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM endorses that treatment should be provided at an intensive schedule as the patient can tolerate.			

2011 Recommendation Statement			
There is some evidence that patients with depression or anxiety on screening should be referred and managed by an appropriate health professional for better management.	CSS 2010	B	Chertkow, 2007
Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that patients with cognitive impairment and evidence of changes in mood (i.e., depression, anxiety), or behavioural changes on screening should be referred and managed by an appropriate mental healthcare professional.	CANADIAN 2013	Level B	Zinn et al, 2004
Low volume – Non-current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM recommends that patients with depression or anxiety on screening should be referred and managed by an appropriate mental healthcare professional for better management.			

2011 Recommendation Statement			
There is some evidence that aggressive management of vascular risk factor (hypertension) is required to reduce the risk of cognitive decline after stroke.	CSS 2010	A	Chertkow, 2007 Teasell et al, 2009
Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that vascular risk factors (i.e., hypertension) should be managed aggressively to achieve optimal control of the pathology underlying cognitive impairment following a stroke or TIA.	CANADIAN 2013 EBRSR 2016	A Level 1a, 1b	Gorelick, 1997 Gorelick, 2004 Pendlebury & Rothwell, 2009 Applegate et al, 1994 Prince et al, 1996 Starr et al, 1996 Forette et al, 1998 Tzourio et al, 1999 Richards et al, 2000 Di Bari et al, 2001 Murray et al, 2002 Forette et al, 2002 Lithell et al, 2003 Tzourio et al, 2003 Fogari et al, 2004 Schrader et al, 2005 Skoog et al, 2005 Feigin et al, 2005 Peila et al, 2006 Shlyakhto, 2007 Starchina et al, 2007 Vinyoles et al, 2008 Diener et al, 2008 Ihle-Hansen et al, 2014 Parsons et al, 2016
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM endorses aggressive management of vascular risk factors (i.e hypertension) to reduce the risk of cognitive decline after stroke.			

2017 Recommendation Statement			
There is strong evidence that vascular risk factors (i.e. atrial fibrillation) should be managed aggressively to achieve optimal control of the pathology underlying cognitive impairment following a stroke or TIA.	CANADIAN 2013	A	Gorelick, 1997 Gorelick, 2004 Pendlebury & Rothwell, 2009
	EBRSR 2016	Level 1a, 1b	Applegate et al, 1994 Prince et al, 1996 Starr et al, 1996

			Forette et al, 1998 Tzourio et al, 1999 Richards et al, 2000 Di Bari et al, 2001 Murray et al, 2002 Forette et al, 2002 Lithell et al, 2003 Tzourio et al, 2003 Fogari et al, 2004 Schrader et al, 2005 Skoog et al, 2005 Feigin et al, 2005 Peila et al, 2006 Shlyakhto, 2007 Starchina et al, 2007 Vinyoles et al, 2008 Diener et al, 2008 Ihle-Hansen et al, 2014 Parsons et al, 2016
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses aggressive management of vascular risk factors (i.e atrial fibrillation) to achieve optimal control of the pathology underlying cognitive impairment following a stroke or TIA.			

8.1.3 TREATMENT STRATEGIES FOR COGNITIVE IMPAIRMENT

8.1.3.1 NON-PHARMACOLOGIC TREATMENT

Table 69. Non-pharmacologic treatment strategies for patients with cognitive impairment

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that attention training may have a positive effect on specific, targeted outcomes.	CSS	C	Cicerone et al, 2005
	NSF	C	Gray et al, 1992
	USVA/Dod	I-II	Niemann et al, 1990 Sohlberg & Mateer, 1987 Strache, 1987
Inconsistent level of evidence – Moderate volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that attention training may have a positive effect on specific, targeted outcomes.	EBRSR 2016	Level 1a, 1b, 2	Sturm & Willmes, 1991 Gauggel & Niemann, 1996 Sturm et al, 1997 Niemeier, 1998 Cicerone et al, 2000 Wilson et al, 2001 Kaschel et al, 2002 Giaquinto & Fraioli, 2003 Mazer et al, 2003 Vallat et al, 2005

			Cappa et al, 2005 Cicerone et al, 2005 Westerberg et al, 2007 Fish et al, 2008 Barker-Collow et al, 2009 Cicerone et al, 2011 Loetscher & Lincoln, 2013
High volume – Non-current			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM Guideline.			
PARM endorses that attention training may have a positive effect on specific, targeted outcomes.			

2011 Recommendation Statement			
There is some evidence that compensatory strategies can be used to improve memory outcomes.	CSS 2010	B	Cicerone et al, 2005
	NSF 2010	GPP	Ryan & Ruff, 1988
	USVA/Dod 2010	I	Sohlberg & Mateer, 1987 Strache, 1987
Inconsistent levels of evidence – Moderate volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that cognitive training strategies that consider practice, compensation, and adaptive techniques for increasing independence is reasonable and can be used to improve memory, attention, language, praxis and executive function outcomes post stroke.	CANADIAN 2013	Level B	Cicerone et al, 2000 Cicerone et al, 2011
	AHA-ASA 2016	Level A, Class IIb Level B, Class IIa	Cappa et al, 2005 Fish et al, 2008
	EBRSP 2016	Level 1a, 1b, 2	Gasparrini & Satz, 1979 Doornhein & Haan, 1998 Rose et al, 1999 Cicerone et al, 2000 Wilson et al, 2001 Liu et al, 2004 Cicerone et al, 2005 Cappa et al, 2005 Hildebrandt et al, 2006 Mount et al, 2007 Fish et al, 2008 Liu et al, 2009 Cicerone et al, 2011 Chen et al, 2012 Das Nair & Lincoln, 2012 Aben et al, 2014 Miller et al, 2014 Ostwald et al, 2014
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM Guideline.			

PARM endorses the use of compensatory strategies to improve memory outcomes as well as attention, language, praxis and executive function in post stroke patients with cognitive impairment.

2017 Recommendation Statement			
There is evidence that specific memory training strategies (i.e. errorless learning techniques, global processing for visual-spatial memory, and semantic framework construction for language-based memory) may be reasonable for individuals with memory impairments.	AHA-ASA 2016	Level B, Class IIb	Doornhein & De Haan, 1998 Cappa et al, 2005 Hildebrandt et al, 2006 Westerberg et al, 2007 Lemoncello et al, 2011 Cicerone et al, 2011 Chen et al, 2012 Aben et al, 2013
High volume – Non-current			
PARM endorses that specific memory training strategies (i.e. errorless learning techniques, global processing and semantic framework construction) may be reasonable for individuals with memory impairments.			

2017 Recommendation Statement			
There is evidence that music therapy may be reasonable for improving cognitive function in terms of verbal memory and focused attention especially in individuals with left hemisphere stroke.	AHA-ASA 2016	Level B, Class IIb	Sarkamo et al. 2008
	EBRSR 2016	Level 1b	Sarkamo et al. 2008
Consistent level of evidence – Low volume – Non-current – Uniform thought			
PARM endorses the use of music therapy for improving cognitive function in terms of verbal memory and focused attention in post-stroke patients with cognitive impairment, especially those with left hemisphere stroke.			

2017 Recommendation Statement			
There is strong evidence that computer-based direct remediation cognitive skill training may improve attention, working memory and language impairments in post-stroke patients with cognitive impairment.	CANADIAN 2013	Level B	Cicerone et al, 2000 Cicerone et al, 2005 Cicerone et al, 2011
	EBRSR 2016	Level 1b	Pyun et al, 2009 Rasquin et al, 2010 Prokopenko et al, 2013
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
PARM strongly endorses the use of computer-based direct remediation cognitive skill training to improve attention, working memory and language impairments in post-stroke patients with cognitive impairment.			

2017 Recommendation Statement			
There is evidence that the use of virtual reality training in combination with computerized	AHA-ASA 2016	Level C, Class IIb	Cappa et al, 2005 Kim et al, 2011
	EBRSR 2016	Level 2	Kim et al, 2011

training may improve verbal, visual and spatial cognitive performance.			
Consistent level of evidence – Low volume – Non-current – Uniform thought			
PARM endorses the use of virtual reality training in combination with computerized training to improve verbal, visual and spatial cognitive performance in post-stroke patients with cognitive impairment.			

2017 Recommendation Statement			
There is some evidence that provision of enriched environments may increase engagement with cognitive activities.	AHA-ASA 2016	Level A, Class I	Janssen et al, 2014
Low volume – Current			
PARM recommends the provision of enriched environments to increase engagement with cognitive activities among post-stroke patients with cognitive impairment.			

2017 Recommendation Statement			
There is strong evidence that exercise with focus on resistance, balance and aerobics may be considered as adjunctive therapy to improve cognition and memory after stroke.	AHA-ASA 2016	Level C, Class IIb	Devine et al, 2009 Sofi et al, 2011 McDonnell et al, 2011 Cumming et al, 2012
EBRSR 2016			
Level 1a, 1b, 2			
Colcombe & Kramer, 2003 Ploughman et al, 2008 Quaney et al, 2009 Rand et al, 2010 Kluding et al, 2011 Cumming et al, 2011 Cicerone et al, 2011 Marzolini et al, 2013 Liu-Ambrose & Eng, 2015			
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses the use of exercise as adjunctive therapy to improve cognition and memory after stroke.			

2017 Recommendation Statement			
There is conflicting evidence that anodal tDCS over the left dorsolateral prefrontal cortex may help improve language-based complex attention and working memory.	AHA-ASA 2016	Level B, Class III	AGAINST: Hamilton et al, 2011 Monti et al, 2013
EBRSR 2016			
Level 1a			
FOR: Nitsche et al, 2003 Antal et al, 2004 Kincses et al, 2004 Fregni et al, 2005 Jo et al, 2009 Kang et al, 2009			
Consistent level of evidence - High volume – Non-current – Variable thought			
PARM suggests that anodal tDCS over the left dorsolateral prefrontal cortex may help improve language-based complex attention and working memory in post-stroke patients with			

cognitive impairment. However, the procedure still requires further research and remains experimental.

8.1.3.2 PHARMACOLOGIC TREATMENT

Table 70. Pharmacologic treatment for patients with post-stroke cognitive impairment

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is strong evidence that donepezil (taken for 24 weeks) may improve cognitive and global functional outcomes among post-stroke patients with cognitive impairments and vascular dementia.	CANADIAN 2013	Level B	Black et al, 2003 Wilkinson et al, 2003 Passmore et al, 2005 Roman et al, 2010
	AHA-ASA 2016	Level B, Class IIb	Chang et al, 2011 Narasimhalu et al, 2010
	EBRSR 2016	Level 1a	Black et al. 2003 Wilkinson et al. 2003 Malouf & Birks 2004 Passmore et al. 2005 Whyte et al. 2008 Roman et al. 2010 Rockwood et al. 2013
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses the use of donepezil (taken for 24 weeks) to improve cognitive and global functional outcomes among post-stroke patients with cognitive impairments and vascular dementia.			

2017 Recommendation Statement			
There is strong evidence that galantamine may improve cognitive, behavioral and global functional outcomes among post patients with mixed dementia and cerebrovascular disease.	CANADIAN 2013	Level B	Erkinjuntti et al, 2002 Erkinjuntti et al, 2003
	EBRSR 2016	Level 1a	Erkinjuntti et al, 2002 Olin & Schneider, 2002 Erkinjuntti et al, 2003 Birks and Craig, 2006 Auchus et al, 2007 Whyte et al, 2008
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
PARM strongly endorses the use of galantamine to improve cognitive, behavioral and global functional outcomes among patients with mixed dementia and cerebrovascular disease.			

2017 Recommendation Statement			
There is strong evidence that rivastigmine may stabilize cognitive performance and improve behavior in post-stroke patients with cognitive deficits.	AHA-ASA 2016	Level B, Class IIb	Chang et al, 2011 Narasimhalu et al, 2010
	EBRSR 2016	Level 1a, 2	Kumar et al, 2000 Moretti et al, 2001 Moretti et al, 2002 Moretti et al, 2003 Erkinjuntti et al, 2003 Moretti et al, 2004

			Ballard et al, 2008 Birks et al, 2013
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses the use of rivastigmine to stabilize cognitive performance and improve behavioral outcomes among post-stroke patients with cognitive impairments.			

2017 Recommendation Statement			
There is evidence that the use of psychostimulants (i.e. dextroamphetamine, methylphenidate, modafinil and atomoxetine) may improve post-stroke cognitive deficits.	AHA-ASA 2016	Level C, Class IIb	Berkowitz, 2005 Gladstone et al, 2006 Tardy et al, 2006 Brioschi et al, 2009
Moderate volume – Non-current			
PARM endorses the use of psychostimulants (i.e. dextroamphetamine, methylphenidate, modafinil, and atomoxetine) to improve post-stroke cognitive deficits.			

2017 Recommendation Statement			
There is some evidence that the use of memantine may stabilize or improve cognitive function in patients with vascular dementia.	EBRSR 2016	Level 1a	Orgogozo et al, 2002 Wilcock et al, 2002 McShane et al, 2006
Low volume – Non-current			
PARM recommends the use of memantine to stabilize and/or improve cognitive function in patients with vascular dementia.			

2017 Recommendation Statement			
There is evidence that the use of pentoxifylline may improve cognitive function in patients with multi-infarct dementia.	EBRSR 2016	Level 1a	Ghose, 1987 Black et al, 1992 Blume et al, 1992 EPMID Study Group, 1996 Sha & Callahan, 2003
Moderate volume – Non-current			
PARM endorses the use of pentoxifylline to improve cognitive function in patients with multi-infarct dementia.			

2017 Recommendation Statement			
There is some evidence that the use of citicoline may be effective in improving post-stroke cognitive function.	EBRSR 2016	Level 1a	Alvarez et al, 1997 Cohen et al, 2003 Alvarez-Sabin et al, 2013
Low volume – Non-current			
PARM recommends the use of citicholine to improve cognitive function in post-stroke patients.			

2017 Recommendation Statement			
There is evidence that antidepressants (i.e. selegiline) may be effective in improving	EBRSR 2016	Level 1a, 1b, 2	Freedman et al, 1998 Kimura et al, 2000 Sivenius et al, 2001

cognitive impairments in patients without post-stroke depression.			Sato et al, 2006 Jorge et al, 2010 Bartolo et al, 2015
Moderate volume – Non-current			
PARM endorses the use of antidepressants to improve cognitive impairments in patients without post-stroke depression.			

8.2 LIMB APRAXIA

8.2.1 ASSESSMENT OF LIMB APRAXIA

Table 71. Assessment of post-stroke limb apraxia

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that people with suspected difficulties executing tasks but who have adequate limb movement should be screened for apraxia and, if indicated, complete a comprehensive assessment using a standardized approach such as the Naturalistic Action Test.	NSF 2010	GPP	Donkervoort et al, 2001 Schwartz et al, 2002 Smania et al, 2006
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that patients with suspected perceptual impairments (visual neglect, non-lateralized visuo-spatial impairment, agnosias, prosopagnosia, body schema disorders and apraxias) should be assessed using validated tools.	CANADIAN 2013	GPP	Lindsay et al, 2013
Low volume – Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM suggests that people with suspected difficulties executing tasks but who have adequate limb movement should be screened for apraxia and, if indicated, complete a comprehensive assessment using a standardized approach such as the Naturalistic Action Test*.			
*For more information regarding the test, visit the Moss Rehabilitation Research Institute website at http://mrri.org/naturalistic-action-test/			

8.2.2 TREATMENT FOR POST-STROKE LIMB APRAXIA

Table 72. Treatment for post-stroke limb apraxia

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that for people with confirmed apraxia, tailored interventions (i.e. strategy training) can be used to improve ADL.	NSF 2010	C	Lincoln et al, 2000 Smania et al, 2006
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that graded strategy or compensatory training may be effective in treating post-stroke limb apraxia.	CANADIAN 2013	Level B	West et al, 2008
	AHA-ASA 2016	Level B, Class IIb	Cicerone et al, 2005 Geusgens et al, 2007 West et al, 2008 Wu et al, 2011 Dovern et al, 2012
	EBSR 2016	Level 1a	Van Heugten et al, 1998 Donkervoort et al, 2001 Cicerone et al, 2005 Cappa et al, 2005 Geusgens et al, 2006
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends that tailored interventions (i.e. strategy training) may be used to improve activities of daily living of post-stroke patients with limb apraxia.			

2017 Recommendation Statement			
There is strong evidence that gesture training may be effective in treating post-stroke limb apraxia.	CANADIAN 2013	Level B	West et al, 2008
	AHA-ASA 2016	Level B, Class IIb	Cicerone et al, 2005 Geusgens et al, 2007 West et al, 2008 Wu et al, 2011 Dovern et al, 2012
	EBSR 2016	Level 1b	Smania et al, 2000 Smania et al, 2006 West et al, 2008
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
PARM strongly endorses the use of gesture training to improve post-stroke limb apraxia.			

8.3 NEGLECT

8.3.1 ASSESSMENT OF POST-STROKE NEGLECT

Table 73. Assessment of post-stroke neglect

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that any patient with suspected or actual neglect or impairment of spatial awareness should have a full assessment using validated assessment tools.	NSF 2010	C	Jehkonen et al, 2006 Luauté et al, 2006 Bowen & Lincoln, 2007 Polanowska et al. 2009 Tsang et al, 2009
Moderate volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that patients with suspected perceptual impairments (visual neglect, non-lateralized visuo-spatial impairment, agnosias, prosopagnosia, body schema disorders and apraxias) should be assessed using validated tools.	CANADIAN 2013	GPP	Lindsay et al, 2013
Low volume – Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM suggests a full assessment of any patient with suspected or actual neglect or impairment of spatial awareness using validated assessment tools.			

8.3.2 TREATMENT FOR POST-STROKE NEGLECT

8.3.2.1 NON-PHARMACOLOGIC TREATMENT

Table 74. Non-pharmacologic treatment strategies for post-stroke neglect

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that patients with unilateral neglect can be trialled with the appropriate intervention, such as simple cues and feedback.	NSF 2010	GPP D	Bowen & Lincoln, 2007 Luauté et al, 2006 Polanowska et al, 2009
Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that cueing and visuomotor feedback may be beneficial in the treatment of neglect.	CANADIAN 2013	Level B	Bowen & Lincoln, 2007 Bowen et al, 2011 Pollock et al, 2011
	EBRSR 2016	Level 1b	Soderback et al, 1992 Robertson et al, 1995 Fanthome et al, 1995 Tham & Tegner, 1997 Ramachandran et al, 1999

			Harvey et al, 2003 Pandian et al, 2014
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends the use of simple cues and feedback strategies in the treatment of post-stroke patients with unilateral neglect.			

2011 Recommendation Statement			
There is insufficient evidence that patients with unilateral neglect can be trialled with the appropriate intervention, such as visual scanning, sensory stimulation, eye patching and mental imagery training.	NSF 2010	C	Jehkonen et al, 2006 Luauté et al, 2006 Bowen & Lincoln, 2007 Polanowska et al, 2009 Tsang et al, 2009
Moderate volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that visual scanning, sensory stimulation, eye patching and mental imagery training may be beneficial in improving post-stroke neglect.	CANADIAN 2013	Level A, B	Bowen & Lincoln, 2007 Bowen et al, 2011 Pollock et al, 2011 Ferreira et al, 2011
	AHA-ASA 2016	Level A, Class IIa	Luauté et al, 2006 Bowen & Lincoln, 2007 Fong et al, 2007 Tsang et al, 2009 Polanowska et al, 2009 Yang et al, 2012 Fong et al, 2013
	EBRSR 2016	Level 1a, 1b, 2	Weinberg et al, 1977 Weinberg et al, 1979 Carter et al, 1983 Young et al, 1983 Gordon et al, 1985 Carter et al, 1988 Pizzamiglio et al, 1992 Antonucci et al, 1995 Paolucci et al, 1996 Wiart et al, 1997 Niemeier et al, 1998 Cicerone et al, 2000 Niemeier et al, 2001 Steultjens et al, 2003 Cicerone et al, 2005 Piccardi et al, 2006 Ferreira et al, 2011 Chan & Man, 2013 van Kessel et al, 2013 Priftis et al, 2013 van Wyk et al, 2014

			<p>Robertson et al, 1990 Fanthome et al, 1995 Webster et al, 2001 Castiello et al, 2004 Kim et al, 2004 Katz et al, 2005 Baheux et al, 2005 Edmans et al, 2006 Ansuini et al, 2006 Thimm et al, 2006 Kim et al, 2007 Jannink et al, 2009 Tsirlin et al, 2009 Degutis & Van Vleet, 2010 Kim et al, 2011 Modden et al, 2012 Jo et al, 2012 Funk et al, 2013 Van Vleet et al, 2014 Hommel et al, 1990 Butter et al, 1990 Prada & Tallis, 1995 Yates et al, 2000 Polanowska et al, 2009 Fong et al, 2013 Seron et al, 1989 Butter & Kirsch, 1992 Soroker et al, 1994 Serfaty et al, 1995 Walker et al, 1996 Arai et al, 1997 Beis et al, 1999 Zeloni et al, 2002 Fong et al, 2007 Tsang et al, 2009 Ianes et al, 2012 Wu et al, 2013 Smania et al, 2013b Machner et al, 2014 Aparicio-Lopez et al, 2015</p>
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends the use of visual scanning, sensory stimulation, eye patching and mental imagery training in the treatment of post-stroke patients with unilateral neglect.			

2017 Recommendation Statement			
There is strong evidence that limb activation may have a positive effect on neglect and motor function.	CANADIAN 2013 EBRSR 2016	Level B Level 1a, 2	Bowen & Lincoln, 2007 Bowen et al, 2011 Pollock et al, 2011 Robertson & North, 1992 Kalra et al, 1997 Cubellia et al, 1999 Frassinetti et al, 2001 Robertson et al, 2002 Eskes et al, 2003 Eskes & Butler, 2006 Luukkainen-Markkula et al, 2009 Keller et al, 2009 Reinhart et al, 2012 Priftis et al, 2013 Wu et al, 2013
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses the use of limb activation for the management of post-stroke neglect.			

2017 Recommendation Statement			
There is strong evidence that optokinetic stimulation may have a positive effect on neglect.	AHA-ASA 2016 EBRSR 2016	Level A Class IIa Level 1a, 2	FOR: Pizzamiglio et al, 2004 Luaute et al, 2006 Bowen & Lincoln, 2007 Kerkhoff et al, 2012 Yang et al, 2012 UNCERTAIN: Vallar et al, 1993 Karnath, 1996 Pizzamiglio et al, 2004 Schroder et al, 2008 Thimm et al, 2009 Keller et al, 2009 Reinhart et al, 2011 Kerkhoff et al, 2012 Sturm et al, 2013 Kerkhoff et al, 2013 Machner et al, 2014 Kerkhoff et al, 2014 Kim et al, 2015 Pitteri et al, 2015
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses the use of optokinetic stimulation for the management of post-stroke neglect.			

2017 Recommendation Statement			
There is conflicting evidence for the use of trunk rotation in the	CANADIAN 2013	Level B (FOR)	FOR: Bowen & Lincoln, 2007

management of unilateral spatial neglect post-stroke.			Bowen et al, 2011 Pollock et al, 2011
	EBRSR 2016	Level 1b, 2	AGAINST: Karnath et al, 1991 Karnath et al, 1993 Spinelli & DiRusso, 1996 Wiart et al, 1997 Fong et al, 2007
Consistent level of evidence – High volume – Non-current –Variable thought			
PARM suggests the use of trunk rotation for the management of unilateral post-stroke spatial neglect. However, there is limited and conflicting evidence for its use. Further research is recommended.			

2017 Recommendation Statement			
There is strong evidence that neck muscle vibration therapy in combination with visual exploration/scanning training may result in a reduction in the symptoms of neglect and increased performance of activities of daily living.	CANADIAN 2013	Level A	Bowen & Lincoln, 2007 Bowen et al, 2011 Pollock et al, 2011
	AHA-ASA 2016	Level A, Class IIa	Luaute et al, 2006 Bowen & Lincoln, 2007 Saevarsson et al, 2010 Yang et al, 2012
	EBRSR 2016	Level 1b	Schindler et al.,2002 Johannsen et al, 2003 Kamada et al, 2011
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses the use of neck muscle vibration therapy in combination with visual exploration/scanning training for the management of post-stroke neglect.			

2017 Recommendation Statement			
There is evidence that transcutaneous electrical nerve stimulation of the affected side may improve neglect, reading and writing post-stroke.	EBRSR 2016	Level 2	Vallar et al, 1993 Vallar et al, 1995 Guariglia et al, 1998 Perennou et al, 2001 Rusconi et al, 2002 Schroder et al, 2008
Moderate volume – Non-current			
PARM endorses the use of transcutaneous electrical nerve stimulation for the management of post-stroke neglect.			

2017 Recommendation Statement			
There is strong evidence that virtual reality training may improve neglect symptoms post-stroke.	CANADIAN 2013	Level B	Bowen & Lincoln, 2007 Bowen et al, 2011 Pollock et al, 2011
	AHA-ASA 2016	Level A, Class IIa	Luaute et al, 2006 Bowen & Lincoln, 2007 Yang et al, 2012
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
PARM strongly endorses the use of virtual reality training for the management of post-stroke neglect.			

2017 Recommendation Statement			
There is strong evidence that prismatic adaptation with a significant rightward shift may be beneficial for neglect.	CANADIAN 2013	Level A	Bowen & Lincoln, 2007 Bowen et al, 2011 Pollock et al, 2011 Mancuso et al, 2012
	AHA-ASA 2016	Level A, Class IIa	Luaute et al, 2006 Bowen & Lincoln, 2007 Tsang et al, 2009 Saevarsson et al, 2010 Vangkilde et al, 2010 Fortis et al, 2010 Yang et al, 2012
	EBRSR 2016	Level 1a, 1b, 2	Rossi et al, 1990 Rossetti et al, 1998 Peli, 2000 Rode et al, 2003 Frassinetti et al, 2002 Farne et al, 2002 Maravita et al, 2003 Berberovic et al, 2004 Angeli et al, 2004 Serino et al, 2006 Rousseaux et al, 2006 Rode et al, 2006 Shiraishi et al, 2008 Nys et al, 2008 Serino et al, 2009 Saevarsson et al, 2009 Padula et al, 2009 Keller et al, 2009 Turton et al, 2010 Jacquin-Courtois et al, 2010 Shiraishi et al, 2010 Vangkilde et al, 2010 Mizuno et al, 2011 Ladavas et al, 2011 Mancuso et al, 2012 Barrett et al, 2012 Newport & Schenk, 2012 Gossmann et al, 2013 Priftis et al, 2013 Smit et al, 2013 Chen et al, 2014 Schaadt et al, 2014
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses the use of prismatic adaptation with a rightward shift for the management of post-stroke neglect.			

2017 Recommendation Statement			
There is strong evidence that repetitive transcranial magnetic stimulation of various forms may be considered to ameliorate neglect symptoms. The inhibition and excitation of the lesioned hemisphere through rTMS may improve neglect and functional ability.	CANADIAN 2013	Level A	Bowen & Lincoln, 2007 Bowen et al, 2011 Pollock et al, 2011
	AHA-ASA 2016	Level B, Class IIb	Song et al, 2009 Lim et al, 2010 Cazzoli et al, 2012 Kim et al, 2013
	EBRSR 2016	Level 1a, 1b, 2	Fierro et al, 2000 Oliveri et al, 2001 Brighina et al, 2003 Shindo et al, 2006 Nyffeler et al, 2009 Lim et al, 2010 Koch et al, 2012 Cazzoli et al, 2012 Kim et al, 2013 Agosta et al, 2014 Fu et al, 2015
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses the use of repetitive transcranial magnetic stimulation for the management of post-stroke neglect.			

2017 Recommendation Statement			
There is some evidence that transcranial direct current stimulation may be beneficial in the treatment of neglect.	EBRSR 2016	Level 1b	Ko et al, 2008 Sparing et al, 2009 Smit et al, 2015
Low volume – Non-current			
PARM recommends the use of transcranial direct current stimulation for the management of post-stroke neglect.			

2017 Recommendation Statement			
There is evidence that vestibular galvanic stimulation may have a positive effect on visuospatial neglect.	EBRSR 2016	Level 1a	Rorsman et al, 1999 Utz et al, 2011 Schmidt et al, 2013 Ruet et al, 2014 Wilkinson et al, 2014 Nakamura et al, 2015 Oppenländer et al, 2015
Moderate volume – Current			
PARM endorses the use of vestibular galvanic stimulation for the management of post-stroke neglect.			

8.3.2.2 PHARMACOLOGIC TREATMENT

Table 75. Pharmacologic treatment for post-stroke neglect

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is evidence that dopamine agonists (i.e rotigotine) may not improve perceptual impairment or motor function.	EBRSR 2016	Level 1b	Fleet et al, 1987 Geminiani et al, 1998 Hurford et al, 1998 Mukand et al, 2001 Buxbaum et al, 2007 Gorgoraptis et al, 2012
Moderate volume – Non-current			
PARM does not endorse the use of dopamine agonists in the management of post-stroke neglect.			

2017 Recommendation Statement	Guideline	Body of Evidence	References
There is some evidence that the use of rivastigmine in conjunction with cognitive training may accelerate the rate of improvement of unilateral spatial neglect.	EBRSR 2016	Level 1b	Whyte et al, 2008 Paolucci et al, 2010 Narasimhalu et al, 2010
Low volume – Non-current			
PARM recommends the use of rivastigmine in conjunction with cognitive training for the management of post-stroke neglect.			

2017 Recommendation Statement	Guideline	Body of Evidence	References
There is some evidence that nicotine (gum or patch) may improve unilateral neglect.	EBRSR 2016	Level 1b	Vossel et al, 2010 Lucas et al, 2013
Low volume – Non-current			
PARM recommends the use of nicotine in the management of post-stroke neglect.			

8.4 EXECUTIVE FUNCTIONING

8.4.1 ASSESSMENT OF EXECUTIVE FUNCTION

Table 76. Assessment of executive function

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is insufficient evidence that executive function screening should be administered to post-stroke patients with activity limitation. This may include assessment of initiation, insight, planning and organization, judgment, problem solving, abstract reasoning, and social cognition.	CANADIAN 2013	GPP	Lindsay et al, 2013
Low volume – Current			

PARM suggests the screening of executive function of post-stroke patients with activity limitation through assessment of initiation, insight, planning and organization, judgment, problem solving, abstract reasoning, and social cognition.

8.4.2 TREATMENT FOR POST-STROKE EXECUTIVE DYSFUNCTION

Table 77. Treatment for post-stroke executive dysfunction

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that any person with an executive disorder and activity limitation should be taught compensatory techniques (eg. use of electronic organisers or pagers, or use of written checklists).	USVA/Dod	III	Cicerone et al, 2005
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that compensatory strategies are effective for improving attention, memory, language, praxis and executive function domains. This can include learning to use external devices (e.g., memory notebooks or alarms), adapting the external environment (e.g., additional social supports or reorganization of living space), and/or learning to use internal mental operations or processes (e.g., problem-solving techniques) that enhance the impaired cognitive domain.	CANADIAN 2013	Level B	Cicerone et al. 2000 Cicerone et al. 2011
Low volume – Non-current			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends that persons with an executive disorder and activity limitation should be taught compensatory techniques (eg. use of external devices, adaptation of external environment and learning internal mental operations) to improve attention, memory, language, praxis and executive function.			

2017 Recommendation Statement
There is evidence that analogical problem-solving skills training may improve problem solving abilities and performance of instrumental activities of daily living.

			Tham et al, 2001 Cicerone et al, 2005 Man et al, 2006 Rand et al, 2009 Cicerone et al, 2011 Levine et al, 2011 Poulin et al, 2012 Liu et al, 2014
High volume – Non-current			
PARM endorses the use of analogical problem-solving skills training to improve executive function and performance of instrumental activities of daily living among post-stroke patients.			

2017 Recommendation Statement			
There is insufficient evidence that transcranial magnetic stimulation may improve post-stroke executive function.	EBRSR 2016	Level 4	Moser et al, 2002 Rektorova et al, 2005 Sole-Padulles et al, 2006 Kim et al, 2010
Moderate volume – Non-current			
PARM suggests the use of transcranial magnetic stimulation in the management of executive function post-stroke.			

8.5 PARM CONTEXT POINTS

Table 78. Context points for minimum and additional standard care of practice for assessment of post-stroke cognitive impairment, limb apraxia, neglect and executive function

	Minimum standard care of practice	Additional standard care of practice
Practice method	Comprehensive cognitive and communication assessment <ul style="list-style-type: none"> - Review of medical history and risk factors - Physical examination - Cognitive tests and use of standardized assessment scales - Screen for impairment of spatial awareness, task execution - Screen for depression 	Referrals and/or consultations with specialists when applicable
Equipment	Assessment room At least one assessment scale for cognitive impairment, apraxia, neglect and depression and their required equipment/tools	Assessment room ADL assessment area All available assessment scales for cognitive impairment, apraxia, neglect

		and depression and their required equipment/tools
Workforce	Attending physician Neurologist Physiatrist Occupational therapist Psychologist Nurse/Aide (in the absence of occupational therapist)	Multidisciplinary team: Standard care workforce + Psychiatrist Geriatrician Speech pathologist Social worker Developmental pediatrician (for pediatric patients)
Training	Within competency Administration and interpretation of one assessment tool for cognitive impairment, apraxia, neglect and depression	Within competency Administration and interpretation of available assessment tools for cognitive impairment, apraxia, neglect and depression
When is it done	1. During acute care stay 2. After discharge 3. During follow up	Periodic assessment: a. During presentation to emergency room b. During acute care stay c. Throughout rehabilitation d. Following discharge
Reassessment using at least one standard outcome measure	Monthly	Monthly After 6 months to 1 year from completion of treatment plans

Table 79. Context points for minimum and additional standard care of practice for management and treatment of post-stroke cognitive impairment, limb apraxia and executive function

	Minimum standard care of practice	Additional standard care of practice
Practice method	Management of medical risk factors Pharmacologic management <ul style="list-style-type: none"> - Donepezil - Galantamine - Rivastigmine - Memantine - Psychostimulants - Pentylenetetrazole - Citicholine Individualized cognitive rehabilitation <ul style="list-style-type: none"> - Attention training 	Referrals and/or consultations with specialists when applicable Pharmacologic management <ul style="list-style-type: none"> - Antidepressants Individualized cognitive rehabilitation <ul style="list-style-type: none"> - Computer-based direct remediation cognitive skill training with/without virtual reality training - Music therapy

	<ul style="list-style-type: none"> - Compensatory strategies - Specific memory training strategies (i.e. errorless learning techniques, global processing and semantic framework construction) - Gesture training - Analogical problem-solving <p>Other forms of management</p> <ul style="list-style-type: none"> - Exercise training 	<ul style="list-style-type: none"> - Enriched environment setting <p>Other forms of management</p> <ul style="list-style-type: none"> - Anodal tDCS - Transcranial magnetic stimulation
Equipment	<p>Physical and Occupational Therapy Rooms</p> <p>Basic ADL equipment/tools</p> <p>Memory notebooks</p>	<p>ADL/instrumental ADL assessment area</p> <p>Music/Enriched Environment Room</p> <p>Computer with cognitive rehabilitation software</p> <p>Virtual reality equipment (VR glasses and controllers)</p> <p>tDCS/tRMS equipment and treatment room with emergency kit</p> <p>Electronic organizer or tablet</p>
Workforce	<p>Attending physician</p> <p>Neurologist</p> <p>Psychiatrist</p> <p>Physical and Occupational therapist</p> <p>Psychologist</p> <p>Nurse/Aide</p>	<p>Multidisciplinary team:</p> <p>Standard care workforce + Psychiatrist</p> <p>Anesthesiologist</p> <p>Speech pathologist</p> <p>Developmental pediatrician (for pediatric patients)</p> <p>Technician (for special equipment/treatment)</p>
Training	Within competency	<p>Within competency</p> <p>Administration and progression of computer-based/virtual reality training programs</p> <p>Proper technique and administration of tDCS/rTMS</p>
When is it done	<p>Upon consultation</p> <p>Upon appointment with therapists</p>	<p>Upon consultation</p> <p>Upon appointment with therapists and other specialists</p>
Reassessment using at least one standard outcome measure	<p>Every 1-2 months</p> <p>Assess status of cognitive impairment every consult</p>	<p>Monthly</p> <p>Assess status of cognitive impairment every consult</p>

Table 80. Context points for minimum and additional standard care of practice for management and treatment of post-stroke neglect

	Minimum standard care of practice	Additional standard care of practice
Practice method	Pharmacologic management <ul style="list-style-type: none"> - Rivastigmine - Nicotine Individualized neglect rehabilitation <ul style="list-style-type: none"> - Cueing and feedback - Visual scanning - Sensory stimulation - Eye patching - Mental imagery training - Hemispheric/Limb activation - Optokinetic stimulation - Neck muscle vibration therapy + visual exploration/scanning training - Transcutaneous electrical nerve stimulation (TENS) 	Referrals and/or consultations with specialists when applicable Individualized neglect rehabilitation <ul style="list-style-type: none"> - Virtual reality training Other forms of management <ul style="list-style-type: none"> - Prismatic adaptation - tDCS - rTMS - Vestibular galvanic stimulation
Equipment	Physical and Occupational Therapy Rooms TENS machine Eye patch Basic ADL equipment/tools	ADL/instrumental ADL assessment area Computer with virtual reality training software + equipment (VR glasses and controllers) tDCS/rTMS/galvanic stimulation equipment and treatment room with emergency kit
Workforce	Attending physician Neurologist Psychiatrist Physical and Occupational therapist Nurse/Aide	Ophthalmologist/Optometrist Anesthesiologist Technician (for special equipment/treatment) Developmental pediatrician (for pediatric patients)
Training	Within competency	Within competency Administration and progression of computer-based/virtual reality training programs Proper technique and administration of tDCS/rTMS/galvanic stimulation

		Prescription, measurement and proper use of prism eyeglasses
When is it done	Upon consultation Upon appointment with therapists	Upon consultation Upon appointment with therapists and other specialists
Reassessment using at least one standard outcome measure	Every 1-2 months Assess status of neglect every consult	Monthly Assess status of neglect every consult

8.6 SUMMARY OF PARM RECOMMENDATION STATEMENTS

ASSESSMENT OF COGNITIVE IMPAIRMENT

PARM recommends that comprehensive cognition- communication assessment (i.e., collect case history, observe in multiple contexts, screen motor, perceptual, and psychiatric conditions that may confound cognitive or communicative test performance; use formal communicative and cognitive tests; assess caregivers' communicative style and use of adaptive cognitive and communicative strategies) by the appropriate health care provider is needed to determine cognition and communication disorder.

PARM recommends that cognitive evaluations should assess all cognitive domains (such as arousal, alertness, attention, orientation, memory, language, agnosia, visual-spatial/perceptual function, praxis, and executive function). If stroke patients have communication disorders, there should be direct and/or indirect speech language pathologist involvement in the evaluation.

PARM recommends the use of standardized, valid, and reliable test procedures to document the presence and qualify the nature of communication and cognitive disorders.

PARM recommends the use of the Montreal Cognitive Assessment screening tool for periodic assessment of cognitive impairment in terms of level of consciousness, attention, orientation, memory, language, visuospatial/perceptual function, praxis and executive functions, including the presence of depression.

PARM suggests that all patients considered at high risk for cognitive impairment should be assessed periodically throughout the stages of care to identify cognitive, perceptual deficits, depression, delirium and/or changes in function. Stages of care across the continuum may include:

- a. during presentation to emergency room
- b. during acute care stay
- c. throughout rehabilitation
- d. following hospital discharge from the emergency department or inpatient setting

PARM suggests that post-stroke patients with suspected cognitive impairment should also be screened for depression using a validated screening tool.

MANAGEMENT APPROACH FOR COGNITIVE IMPAIRMENT

PARM suggests a team approach in the management of cognitive impairment. Healthcare professionals may include a neuropsychologist, neurologist, psychiatrist, physiatrist, geriatrician, developmental pediatrician, occupational therapist, speech-language pathologist, clinical nurse specialist or social worker.

PARM endorses the treatment of communication and/or cognitive disorders to facilitate restoration of impaired abilities and to teach compensatory strategies. The procedures should be selected on a case-by-case basis to address each patient's specific needs and deficits which may include right hemisphere brain damage, cognitive-communicative disorders, neglect, attention disorders, memory disorders, awareness disorders and other executive function disorders.

PARM suggests that an individualized, patient-centered approach should be considered to facilitate resumption of desired activities, return to work, leisure, driving, financial management, and other instrumental ADLs.

PARM endorses that treatment should be provided at an intensive schedule as the patient can tolerate.

PARM recommends that patients with depression or anxiety on screening should be referred and managed by an appropriate mental healthcare professional for better management.

PARM endorses aggressive management of vascular risk factors (i.e hypertension) to reduce the risk of cognitive decline after stroke.

PARM strongly endorses aggressive management of vascular risk factors (i.e atrial fibrillation) to achieve optimal control of the pathology underlying cognitive impairment following a stroke or TIA.

TREATMENT STRATEGIES FOR COGNITIVE IMPAIRMENT

NON-PHARMACOLOGIC TREATMENT

PARM endorses that attention training may have a positive effect on specific, targeted outcomes.

PARM endorses the use of compensatory strategies to improve memory outcomes as well as attention, language, praxis and executive function in post stroke patients with cognitive impairment.

PARM endorses that specific memory training strategies (i.e. errorless learning techniques, global processing and semantic framework construction) may be reasonable for individuals with memory impairments.

PARM endorses the use of music therapy for improving cognitive function in terms of verbal memory and focused attention in post-stroke patients with cognitive impairment, especially those with left hemisphere stroke.

PARM strongly endorses the use of computer-based direct remediation cognitive skill training to improve attention, working memory and language impairments in post-stroke patients with cognitive impairment.

PARM endorses the use of virtual reality training in combination with computerized training to improve verbal, visual and spatial cognitive performance in post-stroke patients with cognitive impairment.

PARM recommends the provision of enriched environments to increase engagement with cognitive activities among post-stroke patients with cognitive impairment.

PARM strongly endorses the use of exercise as adjunctive therapy to improve cognition and memory after stroke.

PARM suggests that anodal tDCS over the left dorsolateral prefrontal cortex may help improve language-based complex attention and working memory in post-stroke patients with cognitive impairment. However, the procedure still requires further research and remains experimental.

PHARMACOLOGIC TREATMENT

PARM strongly endorses the use of donepezil (taken for 24 weeks) to improve cognitive and global functional outcomes among post-stroke patients with cognitive impairments and vascular dementia.

PARM strongly endorses the use of galantamine to improve cognitive, behavioral and global functional outcomes among patients with mixed dementia and cerebrovascular disease.

PARM strongly endorses the use of rivastigmine to stabilize cognitive performance and improve behavioral outcomes among post-stroke patients with cognitive impairments.

PARM endorses the use of psychostimulants (i.e. dextroamphetamine, methylphenidate, modafinil, and atomoxetine) to improve post-stroke cognitive deficits.

PARM recommends the use of memantine to stabilize and/or improve cognitive function in patients with vascular dementia.

PARM endorses the use of pentoxifylline to improve cognitive function in patients with multi-infarct dementia.

PARM recommends the use of citicholine to improve cognitive function in post-stroke patients.

PARM endorses the use of antidepressants to improve cognitive impairments in patients without post-stroke depression.

LIMB APRAXIA

ASSESSMENT OF LIMB APRAXIA

PARM suggests that people with suspected difficulties executing tasks but who have adequate limb movement should be screened for apraxia and, if indicated, complete a comprehensive assessment using a standardized approach such as the Naturalistic Action Test*.

TREATMENT FOR POST-STROKE LIMB APRAXIA

PARM recommends that tailored interventions (i.e. strategy training) may be used to improve activities of daily living of post-stroke patients with limb apraxia.

PARM strongly endorses the use of gesture training to improve post-stroke limb apraxia.

NEGLECT

ASSESSMENT OF POST-STROKE NEGLECT

PARM suggests a full assessment of any patient with suspected or actual neglect or impairment of spatial awareness using validated assessment tools.

TREATMENT FOR POST-STROKE NEGLECT

NON-PHARMACOLOGIC TREATMENT

PARM recommends the use of simple cues and feedback strategies in the treatment of post-stroke patients with unilateral neglect.

PARM recommends the use of visual scanning, sensory stimulation, eye patching and mental imagery training in the treatment of post-stroke patients with unilateral neglect.

PARM strongly endorses the use of limb activation for the management of post-stroke neglect.

PARM strongly endorses the use of optokinetic stimulation for the management of post-stroke neglect.

PARM suggests the use of trunk rotation for the management of unilateral post-stroke spatial neglect. However, there is limited and conflicting evidence for its use. Further research is recommended.

PARM strongly endorses the use of neck muscle vibration therapy in combination with visual exploration/scanning training for the management of post-stroke neglect.

PARM endorses the use of transcutaneous electrical nerve stimulation for the management of post-stroke neglect.

PARM strongly endorses the use of virtual reality training for the management of post-stroke neglect.

PARM strongly endorses the use of prismatic adaptation with a rightward shift for the management of post-stroke neglect.

PARM strongly endorses the use of repetitive transcranial magnetic stimulation for the management of post-stroke neglect.

PARM recommends the use of transcranial direct current stimulation for the management of post-stroke neglect.

PARM endorses the use of vestibular galvanic stimulation for the management of post-stroke neglect.

PHARMACOLOGIC TREATMENT

PARM does not endorse the use of dopamine agonists in the management of post-stroke neglect.

PARM recommends the use of rivastigmine in conjunction with cognitive training for the management of post-stroke neglect.

PARM recommends the use of nicotine in the management of post-stroke neglect.

EXECUTIVE FUNCTIONING

ASSESSMENT OF EXECUTIVE FUNCTION

PARM suggests the screening of executive function of post-stroke patients with activity limitation through assessment of initiation, insight, planning and organization, judgment, problem solving, abstract reasoning, and social cognition.

TREATMENT FOR POST-STROKE EXECUTIVE DYSFUNCTION

PARM recommends that persons with an executive disorder and activity limitation should be taught compensatory techniques (e.g. use of external devices, adaptation of external environment and learning internal mental operations) to improve attention, memory, language, praxis and executive function.

PARM endorses the use of analogical problem-solving skills training to improve executive function and performance of instrumental activities of daily living among post-stroke patients.

PARM suggests the use of transcranial magnetic stimulation in the management of executive function post-strok

9. Aphasia

Communication encompasses all of the behaviors, including speech, which human beings use to transmit information. Thus, disruptions in the ability to communicate may affect an individual's daily life in important ways. Aphasia, as straightforwardly defined by Chapey, is an acquired communication disorder caused by brain damage, characterized by an impairment of language modalities: speaking, listening, reading, and writing. Aphasia and dysarthria, a motor-speech disorder, are one of the complications of stroke that compromises an aspect of human behavior that is closely associated with one's personhood and may negatively affect all aspects of life.

One of our primary goals in aphasia rehabilitation is to help the patient and his/her family adjust to the alterations and limitations imposed by the disability. Treatment by the speech-language pathologist is based on a careful assessment of all communication modalities. The patient's deficit areas and relative strengths and weaknesses are determined. Literally hundreds of specific techniques are cited in the aphasia rehabilitation literature. The focus of treatment in the acute and subacute recovery period is restoration of speech and language abilities. Aphasia therapy is rarely the same in any two treatment settings. The following section reviews the effectiveness of the different approaches to the treatment and management of patients diagnosed with aphasia.

9.1 APHASIA SCREENING

Table 81. Aphasia screening

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that communication, cognitive function and the capacity for decision making should be routinely assessed in patients with aphasia.	SIGN 2010	D	Scottish Parliament 2000
Low volume – Current			
2017: No new evidence			
PARM suggests that communication, cognitive function, and the capacity for decision making should be routinely assessed in patients with aphasia.			
2011 Recommendation Statement			
There is some evidence that all patients should be screened for communication deficits using a screening tool that is valid and reliable. Motor speech evaluations include acoustic, auditory-perceptual, and physiological measures to assess respiration, phonation, resonance, articulation, prosody, and intelligibility.	NSF AHA 2010	C	Salter et al. 2006

Low volume – Non-current			
2017 Updated Recommendations and evidence sources			
There is insufficient evidence that all stroke patients should be screened for communication deficits using a simple, reliable, validated tool.	CANADIAN 2013	Level C	Crary et al, 1989 Enderby et al, 1987 Nakase-Thompson et al, 2005 Reitan and Wolfson, 1985 Doesborgh et al, 2003 Thommessen et al, 1999 Salter K et al, 2006
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation remains unchanged, but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM recommends that all patients should be screened for communication deficits using a screening tool that is valid and reliable. PARM recommends motor speech evaluations, which include acoustic, auditory-perceptual, and physiological measures to assess respiration, phonation, resonance, articulation, prosody, and intelligibility.			

2011 Recommendation Statement			
There is some evidence that aphasia evaluations that assess all communication modalities, including listening, speaking, reading, writing, and, in severe cases, alternate modes such as gesturing, and drawing should be performed.	AHA 2010	Class I Level B	Bertheir 2005 Raymer et al. 1995
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that patients with suspected communication deficits should be referred to a Speech-Language Pathologist (SLP) for assessment of communication ability in the following areas: listening, speaking, reading, writing, gesturing, use of technology, pragmatics (e.g. social cues, turn-taking, body language, etc.) and conversation.	CANADIAN 2013	Level C GPP	Brady et al, 2012
Inconsistent level of evidence – Low volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation remains unchanged, but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM recommends all patients with suspected communication deficits should be referred to a Speech-Language Pathologist (SLP) for assessment of communication ability in the following areas: listening, speaking, reading, writing, gesturing, use of technology, pragmatics (e.g. social cues, turn-taking, body language, etc.) and conversation.			

2011 Recommendation Statement			
There is insufficient evidence that patients with suspected communication difficulties should receive formal, comprehensive assessment by a specialist clinician.	NSF	GPP	None
None			
2017: No new evidence			
PARM suggests that patients with suspected communication difficulties should receive formal, comprehensive assessment by a specialist clinician.			

2011 Recommendation Statement			
There is some evidence that aphasia in stroke patient should be referred for speech and language therapy.	SIGN 2010	B	Robey 1998
Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that speech and language therapy is recommended for individuals with aphasia.	AHA-ASA 2016	Class I Level A	Godekeet al, 2012
Consistent level of evidence – Low volume – Non-current – Uniform thought			
ADAPTE I: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM recommends that aphasia in stroke patient should be referred for speech and language therapy.			

2011 Recommendation Statement			
There is insufficient evidence that those with right-hemisphere cognitive communicative disorders evaluations should be assessed higher-level language and pragmatic abilities in a variety of communication modalities.	AHA 2010	Class I Level C	Murray & Clark, 2006 Turkstra et al, 2005
Low volume – Non-current			
2017: No new evidence			
PARM suggests that patients with right-hemisphere cognitive communicative disorders evaluations should be assessed higher-level language and pragmatic abilities in a variety of communication modalities.			

2017 Recommendation Statement			
There is evidence that all health care providers working with persons with stroke across the continuum of care should be trained about aphasia, including the	CANADIAN 2013	Level II, C	Dickey et al, 2010 Bersano et al, 2009; Gianella & Prometti, 2009 Pedersen et al, 2004

recognition of the impact of aphasia and methods to support communication.			Ferro et al, 1999 Paolucci et al, 2005 Davidson et al, 2008 Wade et al, 1986
High volume – Non-current			
PARM recommends that all health care providers working with persons with stroke across the continuum of care should be trained about aphasia, including the recognition of the impact of aphasia and methods to support communication.			

9.2 APHASIA MANAGEMENT

9.2.1 MANAGEMENT APPROACHES

Table 82. Management approaches for aphasia

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that the treatment of communication and/or cognitive disorders to facilitate restoration of impaired abilities and to teach compensatory strategies is effective, with procedures selected on a case-by-case basis to address each patient's specific deficits and needs. These include aphasia and motor speech disorders.	AHA 2010	I A, B	Cappa et al, 2005 Cherney et al, 2008 Duncan et al, 2005 Hanson et al, 2004 Holland et al, 1996 Katz & Wertz, 1997 Robey 1994, 1998 Spencer & Yorkston, 2002 Wambaugh, 2002 Whurr et al, 1992 Yorkston et al, 2001
High volume – Non-current			
2017: No new evidence			
PARM endorses that treatment of communication and/or cognitive disorders to facilitate restoration of impaired abilities and to teach compensatory strategies is effective. The procedures selected should be a case-by-case basis to address each patient's specific deficits and needs. These include right hemisphere brain damage cognitive-communicative disorders, neglect, attention disorders, neglect, attention disorders, memory disorders, awareness disorders and other executive function disorders.			
2011 Recommendation Statement			
There is insufficient evidence that all written information on health, aphasia, social and community supports should be available in an aphasia-friendly format.	NSF	D	Brennan et al, 2005 Rose et al, 2003
Low volume –noncurrent			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that all information intended for patient use should be available in aphasia-friendly formats (e.g.,	CANADIAN 2013	C	Dawson et al, 2013

patient education material should be available in audio/visual format). This includes materials such as educational information, consent forms and information regarding participation in stroke rehabilitation research, and assessment tools.			
Low volume – Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM suggests that all written information on health, aphasia, social and community supports should be available in an aphasia-friendly format.			

2011 Recommendation Statement			
There is some evidence that aphasic stroke patients should undergo speech therapy for a minimum of two hours per week.	SIGN 2010	B	Robey 1998
Low volume – non-current			
2017: No new evidence			
PARM recommends that aphasic stroke patients should undergo speech therapy for a minimum of two hours per week.			

2017 Recommendation Statement			
There is some evidence that a mean total of 19.3 hours of speech therapy program may improve performance on comprehensive language assessments compared to standard therapy with a mean total of 6.9 hours.	CANADIAN 2013	Level A	Bakheit et al, 2007 Martins et al, 2013
Low volume – Non-current			
PARM endorses 19.3 hours of speech therapy program to improve performance on comprehensive language assessments instead of the standard speech therapy of 6.9 hours.			

2017 Recommendation Statement			
There is some evidence that aphasia therapy in patients at >6 months after stroke continued to be efficacious in the chronic stages whereas there was no significant relationship between time after onset and response to treatment.	AHA-ASA 2016	IIA, A	Allen et al, 2012 Moss et al, 2006
Low volume – non-current			
PARM recommends that aphasia therapy in patients at >6 months after stroke should be continued because it can still be efficacious even in the chronic stages.			

2017 Recommendation Statement			
There is some evidence that persons with aphasia should have access to a combination of intensive language therapy and communication therapy according their needs, goals and impairment severity.	CANADIAN 2013	Level B	Bhogal et al, 2003 Brady et al, 2012
Low volume – Non-current			
PARM recommends that all persons with aphasia should have access to a combination of intensive language therapy and communication therapy according their needs, goals and impairment severity.			

2017 Recommendation Statement			
There is evidence that intensive language therapy may not improve performance on comprehensive language assessments or communicative ability when compared to standard language therapy.	CANADIAN 2013	Level A	Bakheit et al, 2007 Martins et al, 2013
Low volume – noncurrent			
PARM does not recommend intensive language therapy over standard language therapy to improve performance on comprehensive language assessments or communicative ability.			

2017 Recommendation Statement			
There is evidence that intensive therapy should be provided as tolerated and feasible	AHA-ASA 2016	IIA, A	Brady et al, 2012 Cherney et al, 2008 Cherney et al, 2011 Cherney &van Vuuren, 2012 Sickertet al, 2014
Moderate volume – noncurrent			
PARM endorses intensive therapy for patients with aphasia who can tolerate it and if resources permit it.			

2017 Recommendation Statement			
There is evidence that intensity, distribution, or duration of treatment should be provided as tolerated and feasible.	AHA-ASA 2016	Level C	Brady et al, 2012 Cherney et al, 2008 Cherney et al, 2011 Cherney et al, 2012 van Vuuren, 2012 Sickertet al, 2014 Bakheitet al, 2007
High volume – Current			
PARM endorses that speech therapy intensity, distribution, or duration for patients with aphasia should be provided as tolerated and feasible.			

2017 Recommendation Statement			
There is insufficient evidence that families of persons with aphasia should be engaged in the entire process from screening through intervention, including family education and training in supported communication.	CANADIAN 2013	Level C	Duncan et al, 2005 Brady et al, 2012 Meinzer et al, 2007 Simmons-Mackie et al, 2010
Moderate volume – Non-current			
PARM suggests that families of persons with aphasia should be engaged in the entire process from screening through intervention, including family education and training in supported communication.			

9.2.2 THERAPEUTIC STRATEGIES

Table 83. Therapeutic strategies for aphasia

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence for the use of alternative means of communication (gesture, drawing, writing, use of augmentive and alternative communication devices) for aphasia.	NSF	GPP	None
None			
2017: No new evidence			
PARM suggests the use of alternative means of communication such as gesture, drawing, writing, use of augmentive and alternative communication devices for aphasia.			

2011 Recommendation Statement			
There is insufficient evidence for the treatment of aspects of language (including phonological and semantic deficits, sentence level processing, reading and writing) following models derived from cognitive neuropsychology for aphasia.	NSF	C	Doesborgh et al. 2004
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that treatment to improve functional communication can include language therapy focusing on production and/or comprehension of words, sentences and discourse, (including reading and writing) for aphasia.			
CANADIAN 2013			
Level C			
Brady et al, 2012 Bowen et al. 2012			

Consistent Level of Evidence – Low volume – Non-current – Uniform Thought

ADAPTE I: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.

PARM suggests that aspects of language (including phonological and semantic deficits, sentence level processing, reading and writing) should be treated using the models derived from cognitive neuropsychology as an intervention for aphasia.

2011 Recommendation Statement

There is insufficient evidence for the use of gesture for aphasia.	NSF	D	Rose et al. 2002
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Low volume – Non-current

2017: No New Evidence

PARM suggests the use of gesture as an intervention for aphasia.

2011 Recommendation Statement

There is insufficient evidence for the use of supported conversation techniques for aphasia.	NSF	C	Kagan et al. 2001 Wertz et al. 1986
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Low volume – noncurrent

2017 Updated Recommendations and Evidence Sources

There is insufficient evidence that all team members should be trained in supported conversation to be able to interact with patients with communication limitations such as aphasia.	CANADIAN 2013	Level C	Kagan et al, 2001
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Consistent level of evidence – Low volume – Non-current – Uniform thought

ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.

PARM suggests the use of supported conversation techniques as an intervention for aphasia.

2017 Recommendation Statement

There is evidence that treatment to improve functional communication should include supported conversation techniques for potential communication partners of the person with aphasia.	AHA-ASA 2016	I, B	Simmons-Mackie et al, 2010
	CANADIAN 2013	Level A	Simmons-Mackie et al, 2010 Hoen et al, 1997 Kagan et al, 2001

Low volume – Non-current

PARM endorses supported conversation techniques including communication partner training as an intervention for aphasia.

2011 Recommendation Statement

There is insufficient evidence for the delivery of therapy programs	NSF	C	Katz & Wertz 1997
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via computer for the treatment of aphasia.			
Low volume – noncurrent			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that computer-based aphasia therapy results in improved language skills and may improve functional communication.	EBRSR 2016	A	Doesborgh et al, 2004 Katz & Wertz, 1997
CANADIAN 2013			
C			
Stroke: Clinical Practice Guideline Catalan Agency for Health Technology Assessment and Research, Spain, 2007 Royal College of Physicians, National Clinical Guidelines for Stroke Intercollegiate Stroke Working Party, United Kingdom, 2012 Hinckley et al, 1998 Brady et al, 2012 Doesborgh et al, 2004 Cherney, 2010 Palmer et al, 2012			
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged, but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends delivery of therapy programs via computer with the addition of newer assistive devices and technology such as i-Pads, tablets and other computer-guided therapies to improve communication.			

2017 Recommendation Statement			
There is some evidence that computerized treatment may be considered to supplement treatment provided by a speech language pathologist.	AHA-ASA 2016	IIb A	Cherney LR et al, 2010 Nobis-Bosch R et al, 2011 Palmer R et al, 2012
Moderate volume – Non-current			
PARM recommends the use of computerized treatment, if available, to supplement treatment provided by a speech language pathologist.			

2017 Recommendation Statement			
There is insufficient evidence that therapy benefits can be enhanced with computerized language therapy.	CANADIAN 2013	C	Stroke: Clinical Practice Guideline Catalan Agency for Health Technology Assessment and Research, Spain, 2007 Royal College of Physicians, National

			Clinical Guidelines for Stroke Intercollegiate Stroke Working Part, United Kingdom, 2012 Hinckley et al, 1998 Brady et al, 2012 Doesborgh et al, 2004 Cherney, 2010 Palmer et al, 2012
Moderate volume – Non-current			
PARM suggests the use of computerized language therapy to enhance therapy benefits.			

2017 Recommendation Statement			
There is some evidence that treatment with rTMS may improve performance on comprehensive language assessment as well as on test of naming abilities.	EBRSR 2016	A	Martin et al, 2004
Low volume – Non-current			
PARM recommends rTMS to improve performance on comprehensive language assessment as well as on naming abilities.			

2017 Recommendation Statement			
There is some evidence that brain stimulation techniques as adjuncts to behavioral speech and language therapy are considered experimental and therefore are not currently recommended for routine use.	AHA-ASA 2016	III, B	Cherney LR, 2010 Barwood CH, 2012 Barwood CH, 2011 Holland R, 2012 Hamilton et al, 2011 Monti et al, 2013
Moderate volume – Current			
PARM does not suggest the routine use of brain stimulation techniques as adjuncts to behavioral speech and language therapy because it is still experimental.			

2011 Recommendation Statement			
There is some evidence for the use of constraint-induced language therapy.	NSF	B	Cherney et al, 2008
Low volume – noncurrent			
2017 Updated Recommendations and Evidence Sources			
There is some evidence for the effectiveness of constraint-induced aphasia therapy on language function and everyday communication in individuals with chronic aphasia.	EBRSR 2016	B	Pulvermuller et al, 2001
	CANADIAN 2013	B	Pulvermuller et al, 2001
Consistent level of Evidence – Low volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			

PARM recommends the use of constraint-induced language therapy for the management of aphasia.

2011 Recommendation Statement

There is insufficient evidence on the effectiveness of group therapy.	NSF	C	Elman & Bernstein-Ellis 1999
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Low volume – noncurrent

2017 Updated Recommendations and Evidence Sources

There is insufficient evidence that participation in group therapy results in improved communication.	EBRSR 2016	IA IB II	Wertz et al, 1981 Elman & Bernstein-Ellis, 1999 Hoover et al, 2014
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Inconsistent level of evidence – Low volume – Non-current – Uniform thought

ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from 2011 PARM guideline.

PARM suggests organizing group therapy and conversation groups for people with aphasia.

2017 Recommendation Statement

There is some evidence that group treatment may be useful across the continuum of care, including the use of community-based aphasia groups.	AHA-ASA 2016	IIb, B	Brady et al, 2012 Lanyon et al, 2013
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Low volume – noncurrent

PARM recommends the use of group treatment in the management of aphasia, including the use of community-based aphasia groups.

2017 Recommendation Statement

There is some evidence that group therapy results in less improvement in graphic (writing) elements of aphasia when compared to individualized therapy.	EBRSR 2016	B	Wertz et al, 1981 Elman & Bernstein-Ellis, 1999
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Low-volume – noncurrent

PARM does not recommend group therapy in improving the graphic (writing) aspect of aphasia.

2017 Recommendation Statement

There is some evidence that participation in group therapy results in improved communication.	EBRSR 2016	B	Wertz et al, 1981 Elman & Bernstein-Ellis, 1999
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Low volume –Current

PARM recommends participation in group therapy to improve communication of patients with aphasia.

2017 Recommendation Statement			
There is some evidence that outpatient and community-based group participation can benefit social networks and community access.	AHA-ASA 2016	IIb, B	Lanyon et al, 2013
Low volume – current			
PARM recommends outpatient and community-based group participation in the management of aphasia in order to improve social networks and community access.			

2017 Recommendation Statement			
There is some evidence that training communication partners may result in improved participation in conversation and improved conversational skills of persons with aphasia and their communication partners.	EBRSR 2016	B	Hoenet et al, 1997 Kagan et al, 2001 Simmons-Mackie et al, 2010
Low volume – Non-current			
PARM recommends communication partner training to improve participation and conversational skills of individuals with aphasia.			

2017 Recommendation Statement			
There is some evidence that volunteers can provide speech and language therapy and achieve similar outcomes in terms of comprehension and communicative ability when compared to speech language therapists.	EBRSR 2016	B	Marshall et al, 1989 Kelly et al, 2011
Low volume – noncurrent			
PARM recommends that in the absence of speech language therapists, trained volunteer health care workers can provide speech and language therapy to patients with aphasia.			

9.2.3 PHARMACOLOGIC APPROACH

Table 84. Pharmacologic treatment for aphasia

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that the use of piracetam is not beneficial for aphasia due to methodological concerns and possible harms.	NSF	B	Greener et al, 2001
Low volume – noncurrent			
2017: No new evidence			
PARM does not endorse the use of piracetam as treatment for aphasia.			

2017 Recommendation Statement			
There is evidence that pharmacotherapy for aphasia may be considered on a case-by-case basis in conjunction with speech and language therapy.	AHA-ASA 2016	IIb, B	Berthier et al, 2006 Berthier et al, 2009 Hong et al, 2012 Ashtaryet al, 2006 Gungoret al, 2011
Moderate volume – noncurrent			
PARM endorses pharmacotherapy for aphasia on a case-by-case basis in conjunction with speech and language therapy			

9.3 DYSPRAXIA OF SPEECH

Table 85. Assessment and management of speech dyspraxia

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that patients with suspected dyspraxia of speech should receive a comprehensive assessment.	NSF	GPP	--
Low volume – Non-current			
2017: No new evidence			
PARM suggests that patients with suspected dyspraxia of speech should receive a comprehensive assessment.			
2011 Recommendation Statement			
There is insufficient evidence that interventions for speech motor skills should be individually tailored and can target articulatory placement and transitioning, speech rate and rhythm, increasing length and complexity of words and sentences, and prosody, including lexical, phrasal and contrastive stress production. In addition, therapy can incorporate:			
- integral stimulation approach with modelling, visual cueing, and articulatory placement cueing	NSF	D	Wambaugh et al, 2006
- principles of motor learning to structure practice sessions (ie. order in which motor skills are practiced during a session, degree of variation and complexity of behaviors practiced, intensity of practice session) and delivery of feedback on performance and accuracy.	NSF	D	Ballard et al, 2007 Maas et al, 2008
- PROMPT therapy which uses tactile cues on the face and neck to cue the articulatory placement cueing.	NSF	D	Wambaugh et al, 2006
Low volume – non current			
2017: No new evidence			

PARM suggests individually tailored interventions for speech motor skills with incorporation of the following therapeutic approaches for dyspraxia:

- a. Integral stimulation approach with modelling, visual cueing, and articulatory placement cueing,
- b. Principles of motor learning to structure practice sessions and delivery of feedback on performance and accuracy
- c. PROMPT therapy

2017 Recommendation Statement

There is evidence that interventions for motor speech disorders should be individually tailored and can include behavioral techniques and strategies that target: <ul style="list-style-type: none"> • Physiological support for speech, including respiration, phonation, articulation, and resonance • Global aspects of speech production such as loudness, rate, and prosody 	AHA-ASA 2016	I B	Mackenzie et al, 2007 Wenke et al, 2008 Wambaugh et al, 2006 Wenke et al, 2011
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Moderate volume – Non-current

PARM endorses individually tailored interventions for motor speech disorders that include behavioral techniques and strategies that target the following:

1. Physiological support for speech, including respiration, phonation, articulation, and resonance
2. Global aspects of speech production such as loudness, rate, and prosody

2011 Recommendation Statement

There is insufficient evidence that the use of augmentative and alternative communication modalities, such as gesture or speech-generating devices is recommended for functional activities	NSF	D	Wambaugh et al, 2006
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Low volume – Non-current

2017: No new evidence

PARM suggests the use of augmentative and alternative communication modalities such as gesture or speech-generating devices is recommended for functional activities.

2017 Recommendation Statement

There is some evidence that strategic training (compensatory strategies) is effective in treatment of apraxia post-stroke.	EBRSR 2016	A	Donkervoort et al, 2001
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Low volume – Non-current

PARM recommends strategic training (compensatory strategies) as an effective treatment of apraxia post-stroke.

9.4 DYSARTHRIA

Table 86. Assessment and management of post-stroke dysarthria

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that patients with unclear or unintelligible speech should be assessed to determine the nature and cause of the speech impairment.	NSF	GPP	--
None			
2017: No new evidence			
PARM suggests that patients with unclear or unintelligible speech should be assessed to determine the nature and cause of the speech impairment.			
2011 Recommendation Statement			
There is insufficient evidence that the following interventions are beneficial for dysarthria:			
Biofeedback or a voice amplifier to change intensity and increase loudness	NSF	D	Cariski & Rosenbek 1999 Simpson et al. 1988
Low volume – Non-current			
Intensive therapy aiming to increase loudness (e.g Lee Silverman Voice Treatment)	NSF	D	Wenke et al. 2008
Low volume – Non-current			
Use of strategies, such as decreased rate, over articulation or gesture	NSF	GPP	--
None			
Oral musculature exercises	--	GPP	--
None			
2017: No new evidence			
PARM suggests the following interventions for dysarthria:			
a. Use of biofeedback or voice amplifier			
b. Use of intensive therapy aiming to increase loudness			
c. Use of strategies such as decreased rate, over articulation or gesture			
d. Oral musculature exercises			
2011 Recommendation Statement			
There is insufficient evidence that people with severe dysarthria can benefit from using augmentative and alternative communication devices in everyday activities.	NSF	GPP	--
None			
2017: No new evidence			

<p>There is some evidence that augmentative and alternative communication and speech supplementation techniques may be useful for individuals with motor speech disorders, when speech is insufficient to meet the individual's communication needs.</p> <p>Augmentative and alternative communication devices and modalities should be used to supplement speech.</p>	AHA-ASA 2016	I, C	Wambaugh et al, 2006 Frankoff et al, 2011 Hanson et al, 2004
Low volume – Non-current			
ADAPTE 2: The recommendation remains unchanged, but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM suggests that people with severe dysarthria can benefit from using augmentative and alternative communication devices in everyday activities.			

2017 Recommendation Statement			
<p>There is insufficient evidence about the effectiveness of behavioral treatments for individuals with motor speech disorder.</p> <p>Speech and language therapists use a range of behavioral treatments to address motor speech disorders in individuals after stroke. The treatment should be tailored to the individual's unique strengths, deficits, goals, priorities, and circumstances and may focus on improving the physiological support for speech and target impairments in respiration, phonation, articulation, and resonance. The treatment may also include strategies to increase the precision of articulation, to modify the rate and loudness of speech, and to improve prosody.</p>	AHA-ASA 2016	III, B	Sellars et al, 2005 West et al, 2005 Wambaugh et al, 2006 Yorkston et al, 2007 Mackenzie et al, 2007 Wenkeet et al, 2008 Wenkeet et al, 2011 Mackenzie C, 2011
High volume – Non-current			
PARM suggests behavioral treatments for individuals with motor speech disorder to improve physiological support for speech such as respiration, phonation, articulation, and resonance.			

2017 Recommendation Statement			
<p>There is evidence that individuals with chronic motor speech disorders may still improve with treatment. But there is no evidence regarding the optimum amount,</p>	AHA-ASA 2016	IIA, A	Mackenzie et al, 2007 Wambaugh et al, 2006 Wenkeet et al, 2011 Palmer et al, 2007

distribution, or variability of practice or the best type, frequency, and timing of treatment.			
Moderate volume -- non-current			
PARM endorses continuing speech therapy for individuals with chronic motor speech disorders depending on the health conditions, preference and available resources. The optimum amount, distribution, variability of practice or type, frequency, and timing of treatment is dependent on the individualized needs of the patient.			

2017 Recommendation Statement			
There is insufficient evidence that telerehabilitation may be useful when face-to-face treatment is impossible or impractical.	AHA-ASA 2016	IIA, C	American Speech-Language Hearing Association, 2005 Cherney et al, 2012
Low volume – Non-current			
PARM suggests telerehabilitation when face-to-face treatment is impossible or impractical for patients with aphasia.			

2017 Recommendation Statement			
There is insufficient evidence that environmental modifications and listener education for individuals with motor speech disorders may be considered to improve communication effectiveness.	AHA-ASA 2016	IIB C	Baylor et al, 2011 Dykstra et al, 2007 Whitehill et al, 2010
Low volume – Non-current			
PARM suggests environmental modifications and listener education for individuals with motor speech disorders to improve communication effectiveness.			

2017 Recommendation Statement			
There is insufficient evidence to recommend behavioral support group and counseling to improve social participation and psychosocial well-being among individuals with motor speech disorders.	AHA-ASA 2016	IIB C	Brady et al, 2011 Dickson et al, 2008 Mackenzie et al, 2012
Low volume – Non-current			
PARM suggests behavioral support group and counseling to improve social participation and psychosocial well-being among individuals with motor speech disorders.			

9.5 PARM CONTEXT POINTS

Table 87. Context points for minimal and additional standard care of practice for aphasia, dysarthria and dyspraxia in stroke patients

	Minimum standard care of practice	Additional standard care of practice
Practice method	<p>Assessment of communication capacity</p> <ul style="list-style-type: none"> - Listening - Speaking - Reading - Writing - Gesturing - Use of technology - Pragmatics <p>Therapeutic strategies:</p> <ul style="list-style-type: none"> - Intensive speech and language therapy - Use of alternative means of communication (gesture, drawing, writing) - Supported conversation - Constraint-induced language therapy - Compensatory strategies - Group therapy and communication partners - Education and involvement of family and caregivers 	<p>Comprehensive assessment by specialist or speech-language pathologist</p> <p>Other therapeutic strategies:</p> <ul style="list-style-type: none"> - Computer-based/assisted aphasia therapy - Brain stimulation/rTMS - Augmentive and alternative communication devices - Biofeedback or voice amplifier - Telerehabilitation - Environment modification
Equipment	<p>Speech therapy room and equipment</p> <p>Assessment scale</p> <p>Reading, writing materials and auditory exercises</p>	<p>Speech and language therapy room</p> <p>Computer and software</p> <p>Brain stimulator</p> <p>Voice amplifier or speech generator</p> <p>Telerehabilitation setup</p>
Workforce	<p>Attending physician</p> <p>Physiatrist/Neurologist</p> <p>Occupational therapist</p>	<p>Speech and language therapist</p> <p>Technician for computer-based therapy, brain stimulation and augmentive speech devices and telerehabilitation</p>

Training	Within competency	Within competency Training in computer-based therapy, brain stimulation and telerehabilitation
When is it done	Assessment upon admission, during hospital stay, prior to discharge and on follow up	On initial consultation or on follow ups, if without significant improvements
Reassessment using at least one standard outcome measure	Monthly	Monthly

9.6 SUMMARY OF PARM RECOMMENDATION STATEMENTS

APHASIA SCREENING

PARM suggests that communication, cognitive function, and the capacity for decision making should be routinely assessed in patients with aphasia.

PARM recommends that all patients should be screened for communication deficits using a screening tool that is valid and reliable. PARM recommends motor speech evaluations, which include acoustic, auditory-perceptual, and physiological measures to assess respiration, phonation, resonance, articulation, prosody, and intelligibility.

PARM recommends all patients with suspected communication deficits should be referred to a Speech-Language Pathologist (SLP) for assessment of communication ability in the following areas: listening, speaking, reading, writing, gesturing, use of technology, pragmatics (e.g. social cues, turn-taking, body language, etc.) and conversation.

PARM suggests that patients with suspected communication difficulties should receive formal, comprehensive assessment by a specialist clinician.

PARM recommends that aphasia in stroke patient should be referred for speech and language therapy.

PARM suggests that patients with right-hemisphere cognitive communicative disorders evaluations should be assessed higher-level language and pragmatic abilities in a variety of communication modalities.

PARM recommends that all health care providers working with persons with stroke across the continuum of care should be trained about aphasia, including the recognition of the impact of aphasia and methods to support communication.

APHASIA MANAGEMENT

MANAGEMENT APPROACHES

PARM endorses that treatment of communication and/or cognitive disorders to facilitate restoration of impaired abilities and to teach compensatory strategies is effective. The procedures selected should be a case-by-case basis to address each patient's specific deficits and needs. These include right hemisphere brain damage cognitive-communicative disorders, neglect, attention disorders, neglect, attention disorders, memory disorders, awareness disorders and other executive function disorders.

PARM suggests that all written information on health, aphasia, social and community supports should be available in an aphasia-friendly format.

PARM recommends that aphasic stroke patients should undergo speech therapy for a minimum of two hours per week.

PARM endorses 19.3 hours of speech therapy program to improve performance on comprehensive language assessments instead of the standard speech therapy of 6.9 hours.

PARM recommends that aphasia therapy in patients at >6 months after stroke should be continued because it can still be efficacious even in the chronic stages.

PARM recommends that all persons with aphasia should have access to a combination of intensive language therapy and communication therapy according their needs, goals and impairment severity.

PARM does not recommend intensive language therapy over standard language therapy to improve performance on comprehensive language assessments or communicative ability.

PARM endorses intensive therapy for patients with aphasia who can tolerate it and if resources permit it.

PARM endorses that speech therapy intensity, distribution, or duration for patients with aphasia should be provided as tolerated and feasible.

PARM suggests that families of persons with aphasia should be engaged in the entire process from screening through intervention, including family education and training in supported communication.

THERAPEUTIC STRATEGIES

PARM suggests the use of alternative means of communication such as gesture, drawing, writing, use of augmentive and alternative communication devices for aphasia.

PARM suggests that aspects of language (including phonological and semantic deficits, sentence level processing, reading and writing) should be treated using the models derived from cognitive neuropsychology as an intervention for aphasia.

PARM suggests the use of gesture as an intervention for aphasia.

PARM suggests the use of supported conversation techniques as an intervention for aphasia.

PARM endorses supported conversation techniques including communication partner training as an intervention for aphasia.

PARM recommends delivery of therapy programs via computer with the addition of newer assistive devices and technology such as i-Pads, tablets and other computer-guided therapies to improve communication.

PARM recommends the use of computerized treatment, if available, to supplement treatment provided by a speech language pathologist.

PARM suggests the use of computerized language therapy to enhance therapy benefits.

PARM recommends rTMS to improve performance on comprehensive language assessment as well as on naming abilities.

PARM does not suggest the routine use of brain stimulation techniques as adjuncts to behavioral speech and language therapy because it is still experimental.

PARM recommends the use of constraint-induced language therapy for the management of aphasia.

PARM suggests organizing group therapy and conversation groups for people with aphasia.

PARM recommends the use of group treatment in the management of aphasia, including the use of community-based aphasia groups.

PARM does not recommend group therapy in improving the graphic (writing) aspect of aphasia.

PARM recommends participation in group therapy to improve communication of patients with aphasia.

PARM recommends outpatient and community-based group participation in the management of aphasia in order to improve social networks and community access.

PARM recommends communication partner training to improve participation and conversational skills of individuals with aphasia.

PARM recommends that in the absence of speech language therapists, trained volunteer health care workers can provide speech and language therapy to patients with aphasia.

PHARMACOLOGIC APPROACH

PARM does not endorse the use of piracetam as treatment for aphasia.

PARM endorses pharmacotherapy for aphasia on a case-by-case basis in conjunction with speech and language therapy.

DYSPRAXIA OF SPEECH

PARM suggests that patients with suspected dyspraxia of speech should receive a comprehensive assessment.

PARM suggests individually tailored interventions for speech motor skills with incorporation of the following therapeutic approaches for dyspraxia:

1. Integral stimulation approach with modelling, visual cueing, and articulatory placement cueing,
2. Principles of motor learning to structure practice sessions and delivery of feedback on performance and accuracy
3. PROMPT therapy

PARM endorses individually tailored interventions for motor speech disorders that include behavioral techniques and strategies that target the following:

1. Physiological support for speech, including respiration, phonation, articulation, and resonance
2. Global aspects of speech production such as loudness, rate, and prosody

PARM suggests the use of augmentative and alternative communication modalities such as gesture or speech-generating devices is recommended for functional activities.

PARM recommends strategic training (compensatory strategies) as an effective treatment of apraxia post-stroke.

DYSARTHRIA

PARM suggests that patients with unclear or unintelligible speech should be assessed to determine the nature and cause of the speech impairment.

PARM suggests the following interventions for dysarthria:

1. Use of biofeedback or voice amplifier
2. Use of intensive therapy aiming to increase loudness
3. Use of strategies such as decreased rate, over articulation or gesture
4. Oral musculature exercises

PARM suggests that people with severe dysarthria can benefit from using augmentative and alternative communication devices in everyday activities.

PARM suggests behavioral treatments for individuals with motor speech disorder to improve physiological support for speech such as respiration, phonation, articulation, and resonance.

PARM endorses continuing speech therapy for individuals with chronic motor speech disorders depending on the health conditions, preference and available resources. The optimum amount, distribution, variability of practice or type, frequency, and timing of treatment is dependent on the individualized needs of the patient.

PARM suggests telerehabilitation when face-to-face treatment is impossible or impractical for patients with aphasia.

PARM suggests environmental modifications and listener education for individuals with motor speech disorders to improve communication effectiveness.

PARM suggests behavioral support group and counseling to improve social participation and psychosocial well-being among individuals with motor speech disorders.

10. Dysphagia and aspiration post stroke

Dysphagia or impaired swallowing is common after stroke. It affects 42% to 67% of patients within 3 days after stroke and of these patients, about half aspirate, and one third develop pneumonia. Dysphagia may be mild or severe, and in some cases, is only present in the acute phase immediately after the stroke. Dysphagia can lead to pneumonia, malnutrition, dehydration, weight loss, and overall decreased quality of life. Aspiration may be “silent” or “occult” and not clinically obvious. Early identification through screening can reduce the risk of developing these adverse health consequences and although no one screening tool can be recommended, a valid tool should be used.

The assessment of dysphagia is generally accomplished clinically by physical examination and by the bedside swallow evaluation which can provide information about the swallow mechanism and guide the clinician in management of the patient. The importance of dysphagia screening done by trained personnel is once again emphasized in this updated guideline. The bedside evaluation alone cannot predict the presence or absence of aspiration because patients may have “silent” aspiration. Instrumental evaluation, videofluoroscopy or fiberoptic endoscopic evaluation of swallowing, allows the clinician to visualize swallow physiology, thus determining the presence or absence of aspiration, the quantity of aspiration, and the physiological and structural causes for dysphagia. This information is necessary for formulating the appropriate treatment plan and may include swallow therapy and diet modifications.

Dietary modification such as the use of thickened liquids, suprathyroid muscle strengthening exercises, and the use of thermo-tactile stimulation show higher level of evidence and should be considered in the management and treatment of dysphagia. High intensity swallowing therapy, which includes dietary modification and direct swallowing exercises every working day for a month or daily for the duration of the hospital stay, is also beneficial in improving swallowing ability. Acupuncture may be considered as an alternative treatment for dysphagia. Other therapies considered but their benefits not yet established are transcranial direct current stimulation and transcranial magnetic stimulation. Oral hygiene protocols may help reduce aspiration pneumonia after stroke. Nutritional supplements are recommended only for patients with malnutrition or those at risk of malnutrition. Referral to a dietitian should be considered for those with nutritional concerns.

Nasogastric tube feeding is the preferred method during the first 2-3 weeks post-stroke for people who do not recover functional swallow. Early nasogastric tube feeding started within 7 days may increase the survival of dysphagic patients who cannot safely eat by mouth. Percutaneous gastrostomy should be placed in patients with chronic inability to swallow safely. The evidence on the effectiveness of these management are reviewed and discussed in this section.

10.1 DYSPHAGIA ASSESSMENT

Table 88. Screening and assessment of post-stroke dysphagia

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that assessment of nutritional risk should be carried out within the first 48 hours with regular re-assessment thereafter during the patient's recovery and be recorded prior to discharge.	SIGN 2011	D	SIGN 2011
Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that patients should be screened for premorbid malnutrition within 48 hours of admission using a valid screening tool and that rescreening should be done throughout inpatient admission and prior to discharge, as well as periodically in outpatient and community settings.	CANADIAN 2013	Level C	Middleton 2011 Lakshminarayan 2010 Hinchey 2005
Low volume – Non-current			
ADAPTE I: The recommendation and strength of evidence is unchanged from the 2011 PARM guideline.			
PARM suggests that assessment of nutritional risk should be carried out within the first 48 hours with regular re-assessment thereafter during the patient's recovery and be recorded prior to discharge.			
2011 Recommendation Statement			
There is insufficient evidence that assessment of a patient's nutritional risk should include an assessment of their ability to eat independently and a periodic record of their food consumption.	SIGN 2010	D	Westergen 2006
Low volume – Current			
2017 Updated Recommendation and Evidence Sources			
There is insufficient evidence that screening of a patient's nutritional status should include an assessment of their ability to eat independently, weight changes and a periodic record of their food consumption.	CANADIAN 2013	Level C	Middleton 2011 Lakshminarayan 2010 Hinchey 2005
Low volume – Non-current			
ADAPTE I: The recommendation and strength of evidence is unchanged from the 2011 PARM guideline.			

PARM suggests that assessment of a patient's nutritional risk should include assessment of their ability to eat independently and a periodic record of their food consumption and weight.

2011 Recommendation Statement

There is insufficient evidence that on-going monitoring of nutritional status after a stroke should include a combination of the following parameters: biochemical measures (eg. low pre-albumin, impaired glucose metabolism), swallowing status, unintentional weight loss, eating assessment and dependence, and nutritional intake.	SIGN 2011	D	Crary et al, 2006 Joonsson et al, 2008 Martineau et al, 2005
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Low volume – Current

2017 Updated Recommendations and Evidence Sources

There is insufficient evidence that assessment of nutritional status should include the use of validated nutrition assessment tools or measures.	CAMEROON 2013	Level C	CSQCS 2006 CMAJ 2010 SCORE 2007
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Low volume – Non-current

ADAPTE I: The recommendation and strength of evidence is unchanged from the PARM 2011 guideline.

PARM suggests that on-going monitoring of nutritional status after a stroke should include a combination of the following parameters: biochemical measures (eg. low pre-albumin, impaired glucose metabolism), swallowing status, unintentional weight loss, eating assessment and dependence, and nutritional intake.

2017 Recommendation Statement

There is insufficient evidence that patients who are not initially alert should be closely monitored and screened when clinically appropriate.	CANADIAN 2013	Level C	Daniels et al, 1997 Logemann et al, 1999 Perry et al, 2001 Trapl et al, 2007 Martino et al, 2009 Edmiston et al, 2010 Turner-Lawrence et al, 2009 Antonios et al, 2010 Schrock et al, 2011
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High volume – Non-current

PARM suggests that patients who are not initially alert should be closely monitored and screened when clinically appropriate.

2011 Recommendation Statement

There is evidence that all stroke patients should be screened for dysphagia before being given food or drink.	SIGN 2011	C	AHCPR 1999 Martino et al, 2000 Perry & Love 2001
	NSF	B	Connolly & Smith 2003

			Hinchey et al, 2005 Martino et al, 2000, 2005 Perry & Love 2001 Ramsey et al, 2003 Westergren 2006
	CSS	B	Connolly & Smith 2003 Hinchey et al, 2005 Martino et al, 2000, 2005 Perry & Love 2001
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that all stroke patients should be screened for dysphagia before initiation of oral intake.	CAMEROON 2013	Level B	CSQCS 2006 SCORE 2007 SIGN 119 2010
	AHA-ASA 2016	Class I Level B	Donovan et al, 2013 Jauch et al, 2013
	CANADIAN 2013	Level C	Middleton 2011 Lakshminarayan 2010 Hinchey 2005
Consistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM strongly endorses that all stroke patients should be screened for dysphagia before initiation of oral intake.			

2011 Recommendation Statement			
There is strong evidence that patients with swallowing problem should be assessed by a speech pathologist or someone trained in the field.	CSS	A	Baskett & McNaughton 2003 Bayley et al, 2006 Intercollegiate Stroke Working Party 2008 Lindsay et al, 2005a,b,c
	CSS	A	Connolly & Smith 2003 Hinchey et al, 2005 Martino et al, 2000, 2005
	NSF	B	Perry & Love 2001 Ramsey et al, 2003 Westergren 2006
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that stroke patients who failed the swallowing screening test should be referred to a speech-language pathologist or occupational therapist for a more detailed assessment.	CANADIAN 2013	C	Middleton et al, 2011 Lakshminarayan et al, 2010
	AHA-ASA 2016	Class IIa Level C	Hinchey et al, 2005 Donovan et al, 2013 Jauch et al, 2013

	CAMEROON 2013	Level A	CSQCS 2006 CMAJ 2010
Inconsistent level of evidence – Moderate volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM strongly endorses that patients with swallowing problem should be assessed by a speech pathologist or someone trained in the field.			

2011 Recommendation Statement			
There is evidence that the gag reflex is not a valid screen for dysphagia and should not be used as a screening tool	NSF	B	Martino et al, 2000 Perry & Love 2001
Low volume – Non current			
2017: No new evidence			
PARM does not endorse the use of gag reflex as a screening tool for dysphagia.			

2011 Recommendation Statement			
There is strong evidence that the water swallow test should be used as a part of the screening for aspiration risk in stroke patients. This includes a positive response to dysphagia, dysphonia, abnormal volitional cough, poor gag and voice change after swallow.	SIGN 2011	B	Ellul et al, 1993 Herbert 1996 Perry & Love 2001
PNA			
Class 1 Level B			
Daniels et al, 1997 DePippo et al, 1994a			
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that the use of water swallow test should be included as part of the swallow screening.	EBRSR 2016	GPP	Osawa et al, 2013 Saitoh et al, 2000 Watanabe et al, 2007 Shoji et al, 2010 John & Berger 2015 Trapl 2007 Teramoto & Fukuchi 2000 Termob et al, 1999
High Volume – Non-current			
ADAPTE 3: The recommendation and the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM strongly endorses the use of water swallow test as a part of the screening for aspiration risk in stroke patients.			

2011 Recommendation Statement			
There is some evidence that a typical swallow screening procedure should include: 1. Initial observation of the patient's consciousness level 2. Observation of the degree of postural control. If the patient is able to actively cooperate and is able to be supported in an upright position, the procedure should also include: 3. Observations of oral hygiene and control of oral secretions, if appropriate, using a water swallow test.	SIGN 2011	B	Perry & Love 2001
Low volume – Non-current			
2017: No new evidence			
PARM recommends a typical swallow screening procedure (see Appendix 8 for details) that should include: a. initial observations of the patient's consciousness level, b. observations of the degree of postural control and c. observations of oral hygiene and observations of control of oral secretions, if appropriate, using a water swallow test.			

2017 Recommendation Statement			
There is evidence that use of swallow screen in patients with dysphagia may reduce the incidence of pneumonia compared to when no screening protocols are assigned or compared to usual care.	EBRSR 2016	Level II	Lakshminarayan et al, 2010 Hirchung et al, 2005 Miles et al, 2013 Odderson et al, 1995
Moderate volume – Non-current			
PARM endorses the use of swallow screen in patients with dysphagia to reduce the incidence of pneumonia.			

10.1.1 BEDSIDE ASSESSMENT

Table 89. Bedside swallowing assessment

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that a standardized clinical bedside assessment (CBA)* should be used by a professional skilled in the management of dysphagia	SIGN 2011	B	Linden et al, 1993 Logemann et al, 1999 Martino et al, 2000 Perry & Love 2001 Smithard et al, 1998

(currently speech and language therapists). *CBA developed by Logemann Annex 3 contains 28 items has been tested for inter and intra rater reliability, see Appendix 9			Splaingard et al, 1988
Moderate volume – Non-current			
2017: No new evidence			
PARM endorses the use of a standardized clinical bedside assessment by a professional skilled in the evaluation of dysphagia.			

2011 Recommendation Statement			
There is insufficient evidence in the use of cervical auscultation in the assessment of dysphagia.	SIGN 2011	3, D	Stroud et al, 2002 Zenner et al, 1995
Low volume – Non-current			
2017: No new evidence			
PARM suggests the use of cervical auscultation in the assessment of dysphagia.			

2011 Recommendation Statement			
There is some evidence on the use of pulse oximetry in determining the relationship of swallowing and oxygen saturation.	SIGN 2011	2+, 3	Collins & Bakheit 1997 Colodny 2000, 2001 Hirst et al, 2002 Leder 2000 Roffe et al, 2001 Rowat et al, 2000 Sherman et al, 1999 Zaidi et al, 1995
High volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence on the use of pulse oximetry for detection of dysphagia and aspiration based on oxygen saturation.	EBRSR 2016	GPP	Sellars et al, 1998 Wang et al, 2005 Ramsey et al, 2003 Smith et al, 2000 Wat et al, 2005 Sherman et al, 1998
Moderate volume – Non-current			
ADAPTE I: The recommendation and strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM suggests the use of pulse oximetry in determining oxygen saturation during swallowing among stroke patients.			

10.1.2 INSTRUMENTAL ASSESSMENT

Table 90. Instrumental assessment of dysphagia

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			

There is no evidence for the use of instrumental testing for swallowing evaluation in acute stroke patients.	PNA	Class II Level B	Smithard et al, 1996
Low volume – Non-current			
2017: No new evidence			
PARM does not endorse the use of instrumental testing for swallowing evaluation in acute stroke patients. However if bedside screening fails, PARM recommends the use of videofluoroscopic modified barium swallow study or flexible endoscopic examination of swallowing.			

2011 Recommendation Statement			
There is some evidence that dysphagia assessment should include bedside screening (including a water-swallowing test), and when it fails, it should be followed by objective assessment, including:	AHA 2010	Class II Level B	Aviv 2000 Chong et al, 2003 Duncan et al, 2005 Leder & Espinosa 2002 Perry & Love 2001 Smithard et al, 1996 Teasell et al, 2009
<ul style="list-style-type: none"> a. Videofluoroscopic modified barium swallow study, or b. Flexible endoscopic examination of swallowing (FEES). 			
Moderate volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is evidence that videofluoroscopic modified barium swallow (VMBS) should be performed in all stroke patients who are at high risk for aspiration based on the results of the swallow screening assessment.	CANADIAN 2013	Level B	Daniels et al, 1997 Logemann et al, 1999 Perry et al, 2001 Trapl et al, 2007 Martino et al, 2009 Edmiston et al, 2010 Turner-Lawrence et al, 2009 Antonios et al, 2010 Schrock et al, 2011
High Volume-Non-current			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM endorses the use of VMBS study and/or FEES if the patient fails the swallow screening test.			

2011 Recommendation Statement			
There is insufficient evidence that patients who fail the swallowing screening should be referred to a speech pathologist for a comprehensive assessment. This may include instrumental examination, ie. VMBS &/or FEES.	USVA/ Dod	GPP	
	NSF	GPP	

2017: No new evidence

PARM suggests that patients who fail the swallowing screening should be referred to a speech pathologist for a comprehensive assessment. This may include instrumental examination (ie. VMBS and/or FEES) (see Appendix 8 for details).

2011 Recommendation Statement

There is evidence that the modified barium swallow test (MBS) and FEES are both valid methods for assessing dysphagia. The clinician should consider which is the most appropriate for different patients in different settings.	SIGN 2011	B	Aviv 2000 Kuhlemeier et al, 1998 Langmore et al, 1991 Logemann 1986 Logemann et al, 1998 Perry & Love 2001 Smithard et al, 1998
Moderate volume – Non-current			

2017: No new evidence

PARM endorses MBS and FEES as valid methods for assessing dysphagia.

2011 Recommendation Statement

There is some evidence that standard criteria should be established for the interpretation of the results of radiological and fiberoptic assessments.	SIGN 2011	D	Han et al, 2001 Kuhlemeier et al, 1998 McCullough et al, 2001 Rosenbek et al, 1996 Scott et al, 1998 Wilcox et al, 1996
Moderate volume – Non-current			

2017: No new evidence

PARM recommends that standard criteria should be established for the interpretation of the results of radiological and fiberoptic assessments of swallowing.

2017 Recommendation Statement

There is some evidence that instrumental evaluation is indicated for those patients suspected of aspiration to verify the presence/absence of aspiration and to determine the physiological reasons for the dysphagia to guide the treatment plan.	AHA-ASA 2016	Class IIa Level B	NCCCC 2008
Low Volume – Non-current			

PARM recommends that instrumental evaluation is indicated for those patients suspected of aspiration to verify the presence/absence of aspiration and to determine the physiological reasons for the dysphagia to guide the treatment plan.

2017 Recommendation Statement

There is some evidence on the use of VMBS studies to guide management decisions for patients with dysphagia.	AHA-ASA 2016	Class IIb Level C	NCCCC 2008
	CANADIAN 2013	Level C	Regan et al, 2014 Geaganage et al, 2012

			Carnaby Mann et al, 2007 Park et al, 2013 Xia et al, 2011 Kim et al, 2009 Carnaby et al, 2006 Food Trial 2005 De Pippo et al, 1994
	EBRSR 2016	Level III	Splaingard et al, 1998 Bach et al, 1989 Wilson et al, 2012 Ramsey et al, 2003 Humphreys et al, 1987 Muz et al, 1991
Consistent Level of Evidence – High Volume – Non-current – Uniform Thought			
PARM recommends the use of Videofluoroscopic Modified Barium Swallow (VBMS) studies to guide management decisions for patients with dysphagia.			

2017 Recommendation Statement			
There is insufficient evidence that FEES may reduce the incidence of pneumonia and improve other important factors associated with dysphagia recovery.	EBRSR 2016	Level IV	Bax et al, 2014 Finlayson et al, 2011 Wilson & Howe et al, 2012 Kjaersgaard et al, 2014 Barquist et al, 2001 Aviv et al, 2001 Leder & Espinosa et al, 2002
Moderate volume – Non-current			
PARM suggests FEES to reduce incidence of pneumonia and improve factors associated with dysphagia recovery.			

10.2 MANAGEMENT OF DYSPHAGIA

Table 91. Management strategies for post-stroke dysphagia

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that fatality is reduced among patients with acute stroke when given early feeding (within 24 hours post stroke) compared with late initial feeding	PNA	Class 1 Level A	The FOOD Trial Collaboration 2005
Low volume – Non-current			
2017: No new evidence			
PARM recommends the giving of early feeding (within 24 hours) to reduce the fatality among stroke patients.			

2011 Recommendation Statements			
There is conflicting evidence that diet modification should be advised. Thickened fluids results in fewer episodes of aspiration and penetration compared with thin fluids among dysphagic individuals following stroke. Dietary modifications with semisolid food progressing to liquids and solid may be tried in dysphagic stroke patients.	SIGN 2011	D	AHCPR 1999 Logemann et al, 1998
	NSF	B	Carnaby et al, 2006
	PNA	Class 1 Level B	Groher 1987 Royal College of Physicians & British Society of Gastroenterology 2010
Inconsistent level of evidence – Moderate volume – Non-current – Variable thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that dietary modifications (i.e. thicker liquids) promote safety of swallowing and reduce incidence of pneumonia.	EBRSR 2016	Level II	Bach et al, 1989 Vets & Logemann et al, 1985 Keller et al, 2012 Logemann & Logemann et al, 1983 Finestone et al, 1998 Milazzo et al, 1989 Groher et al, 1989 Finestone et al, 2001 Churchhill et al, 2004
High volume – Non-current			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends dietary modification in the treatment of dysphagia, such as the use of thickened liquids, in order to promote safety of swallowing and reduce the incidence of pneumonia.			

2011 Recommendation Statement			
There is insufficient evidence on the use of low-risk feeding strategies (i.e., eat while sitting; minimize distractions) to compensate for dysphagia.	AHA 2010	Class IIa Level C	Teasell et al, 2008a
Low volume – Current			
2017: No new evidence			
PARM suggests the use of low-risk feeding strategies (eg. eat while sitting; minimize distractions) to compensate for dysphagia.			

2011 Recommendation Statement			
There is conflicting evidence on the use of compensatory techniques	SIGN 2011	D	AHCPR 1999 Logemann et al, 1998

(postures and maneuvers) as treatment strategy for stroke patients with dysphagia.	NSF	B	Carnaby et al, 2006
Inconsistent level of evidence – Low volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that compensatory techniques such as variations in head positioning, double swallow technique, coughing after swallowing, restorative swallowing therapy, thickened fluids and texture-modified solids may be beneficial in improving swallowing function.	CANADIAN 2013	Level C	Regan et al, 2014 Geaganage et al, 2012 Carnaby Mann et al, 2007 Park et al, 2013 Xia et al, 2011 Kim et al, 2009 Carnaby et al, 2006 Food Trial 2005 De Pippo et al, 1994
	EBRSR 2016	GPP	Terre & Mearin 2012 Logemann 1989
Consistent level of evidence – High Volume – Non-current – Uniform Thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM suggests the use of compensatory techniques (postures and maneuvers) as treatment strategy for stroke patients with dysphagia.			

2011 Recommendation Statement			
There is insufficient evidence on the use of restorative strategies (ie. shaker head lifting exercises).	NSF	C	Logemann et al, 2009 Shaker et al, 2002
Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that restorative swallowing strategies may be used in dysphagia management.	CANADIAN 2013	C	Regan et al 2014 Geaganage et al 2012 Carnaby Mann et al 2007 Park et al 2013 Xia et al 2011 Kim et al 2009 Carnaby et al 2006 Food Trial 2005 De Pippo et al 1994
High volume – Non-current			
ADAPTE 1: The recommendation and strength of evidence is unchanged from the 2011 PARM guideline.			
PARM suggests the use of restorative strategies (eg. shaker head lifting exercises) in the treatment of dysphagia.			

2011 Recommendation Statement			
There is insufficient evidence on the use of thermo tactile stimulation.	NSF	C	Leelamanit et al, 2002 Lim et al 2009 Rosenbek et al, 1998
Low volume – Non-current			
2017 Updated Recommendations and Evidence Source			
There is some evidence that the use of thermal application has an effect on swallowing function in patients with dysphagia.	EBRSR 2016	Level Ib & II	Rosenbek 1991, 1998 Nakamura & Fujishima 2013
Low volume – Non-current			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends the use of thermo tactile stimulation in the treatment of dysphagia.			

2011 Recommendation Statement			
There is some evidence on the use of electrical stimulation.	SIGN 2011	1-, 2-	Bulow et al, 2008 Freed et al, 2001 Ludlow et al, 2007 Power et al, 2006
NSF			
Inconsistent level of evidence – Moderate volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that the use of electrical stimulation may improve swallowing function although benefits are still unclear.	AHA-ASA 2016	Class III Level A	Geeganage et al, 2012
	EBRSR 2016	Level Ib & II	Lee et al, 2014 Kushner et al, 2013 Jorgensen et al, 1999 Lim et al, 2009 Freed et al, 2001 Carnaby, Mann & Cray 2007 Tan et al, 2013
Inconsistent Level of Evidence – High Volume – Current – Uniform Thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends the use of electrical stimulation in the treatment of dysphagia.			

2011 Recommendation Statement			
There is evidence on the use of suprathyroid muscle-strengthening exercises.	SIGN 2011	1+	Robbins et al, 2007 Shaker et al, 2002
Low volume – Current			
2017: No new evidence			
PARM endorses the use of suprathyroid muscle-strengthening exercises in the treatment of dysphagia.			

2011 Recommendation Statement			
There is insufficient evidence on the use of lingual muscle strengthening exercises.	SIGN 2011	2-	Robbins et al.,2007 Shaker et al, 2002
Low volume – Current			
2017: No new evidence			
PARM suggests the use of lingual muscle strengthening exercises in the treatment of dysphagia.			

2011 Recommendation Statement			
There is insufficient evidence on the use of multi-pronged dysphagia interventions (eg, diet modification, swallowing exercises, and airway protection strategies; biofeedback plus swallowing maneuvers) for the treatment of dysphagia	AHA 2010	Class IIa Level B	Bülow et al, 2008 Teasell et al, 2008a
Low volume – Current			
2017: No new evidence			
PARM suggests the use of multipronged dysphagia interventions for the treatment of dysphagia.			

2017 Recommendation Statement			
There is insufficient evidence that an individualized management plan should be developed to address therapy for dysphagia, dietary needs and specialized nutrition plans.	CANADIAN 2013	Level C	Daniels et al, 1997 Logemann et al, 1999 Perry et al, 2001 Trapl et al, 2007 Martino et al, 2009 Edmiston et al, 2010 Turner-Lawrence et al, 2009 Antonios et al, 2010 Schrock et al, 2011
High Volume – Non-current			
PARM suggests individualized management plans to address dysphagia therapy, dietary needs and specialized nutrition plans.			

2017 Recommendation Statement			
There is evidence on the benefit of high intensity swallowing therapy with dietary prescription at improving swallowing ability and return to a normal diet in patients with dysphagia post stroke.	EBRSR 2016	Ib	De Pippo et al, 1994 Carnaby et al, 2006 Odderson et al, 1995 Lin et al, 2003 Takahata et al, 2011 McCullough et al, 2012, 2013 Nakamura & Fujishima 2013
High volume – Non-current			
PARM endorses the use of high intensity swallowing therapy with dietary prescription to improve swallowing ability in stroke patients with dysphagia.			

2017 Recommendation Statement			
There is evidence on encouraging stroke patients with dysphagia to feed themselves whenever possible to reduce the risk of pneumonia.	CANADIAN 2013	Level C	Daniels et al, 1997 Logemann et al, 1999 Perry et al, 2001 Trapl et al, 2007 Martino et al, 2009 Edmiston et al, 2010 Turner-Lawrence et al, 2009 Antonios et al, 2010 Schrock et al, 2011
	EBRSR 2016	Level I	Heart & Stroke Foundation Dysphagia Guidelines 2002 Heart & Stroke Foundation Ontario 2002
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
PARM endorses encouragement of stroke patients with dysphagia to feed themselves when capable and within precautions.			

2017 Recommendation Statement			
Routine use of nutritional supplements has not been shown to be beneficial.	AHA-ASA 2013	Class III Level B	Dennis et al, 2006 Dennis et al, 2005
Nutritional supplements are reasonable to consider for patients who are malnourished or at risk of malnourishment.	AHA-ASA 2016	Class IIa Level B	Dennis et al, 2005
There is conflicting evidence supporting the use of nutritional supplements for patients who are malnourished or at risk of malnourishment.			
Inconsistent level of evidence - Low volume- Non-current – Variable thought			
PARM suggests the use of nutritional supplements for patients who are malnourished or at risk of malnourishment.			

2017 Recommendation Statement			
There is strong evidence on the implementation of oral hygiene protocols to reduce the risk of aspiration pneumonia after a stroke.	AHA-ASA 2016	Class I Level B	Sorensen et al, 2013 Langdon et al, 2009
	CANADIAN 2013	Level B	Daniels et al, 1997 Logemann et al, 1999 Perry et al, 2001 Trapl et al, 2007 Martino et al, 2009 Edmiston et al, 2010

			Turner-Lawrence et al, 2009 Antonios et al, 2010 Schrock et al, 2011
Consistent level of evidence – High Volume - Non-current – Uniform Thought			
PARM strongly endorses the implementation of oral hygiene protocols to reduce the risk of aspiration pneumonia after a stroke.			

2017 Recommendation Statement			
There is some evidence that acupuncture may be considered as an adjunctive treatment for dysphagia.	AHA-ASA 2016	Class IIb Level B	Xie et al, 2008
Low volume – Non-current			
PARM recommends consideration of acupuncture as an adjunctive treatment for dysphagia.			

2017 Recommendation Statement			
There is some evidence on incorporating principles of neuroplasticity into dysphagia rehabilitation interventions.	AHA-ASA 2016	Class IIa Level C	Robbins et al, 2008
Low volume – Non-current			
PARM recommends incorporating principles of neuroplasticity into dysphagia rehabilitation interventions.			

2017 Recommendation Statement			
There is some evidence that behavioral interventions may be considered as a component of dysphagia treatment.	AHA-ASA 2016	Class IIb Level A	Geeganage et al, 2012 Ashford et al, 2009
Low volume – Current			
PARM recommends that behavioral interventions be considered as part of dysphagia treatment.			

2017 Recommendation Statement			
There is evidence that stroke patients with suspected nutritional concerns, hydration deficits, or other comorbidities that may affect nutrition (i.e diabetes) should be referred to a dietitian.	CANADIAN 2013	Level B	Daniels et al, 1997 Logemann et al, 1999 Perry et al, 2001 Trapl et al, 2007 Martino et al, 2009 Edmiston et al, 2010 Turner-Lawrence et al, 2009 Antonios et al, 2010 Schrock et al, 2011
High volume – Non-current			
PARM endorses referral of stroke patients with suspected nutritional concerns, hydration deficits or other comorbidities that may affect nutrition (i.e. diabetes) to a dietitian.			

2017 Recommendation Statement			
There is conflicting evidence that transcranial direct currents may improve dysphagia outcomes. .	EBRSR 2016	Level Ia	Kumar 2011 Shigematsu 2013 Yang 2012
	AHA-ASA 2016	Class III Level A	Geeganage et al, 2012
Consistent level of evidence - Moderate volume – Current – Variable Thought			
PARM suggests the use of transcranial direct currents as an option, if available, to improve dysphagia.			

2017 Recommendation Statement			
There is conflicting evidence that repetitive transcranial magnetic stimulation may improve swallowing function.	EBRSR 2016	Level Ia	Michon 2014 Momosaki 2014
	AHA-ASA 2016	Class III Level A	Geeganage et al, 2012
Consistent level of evidence – Moderate volume – Current – Variable thought			
PARM suggests the use of repetitive transcranial magnetic stimulation as a management option, if available, to improve swallowing and reduce aspiration among patients with dysphagia.			

10.3 NASOGASTRIC/PERCUTANEOUS ENDOSCOPIC GASTROSTOMY TUBE FEEDING

Table 92. Nasogastric/percutaneous gastrostomy tube feeding for post-stroke patients with dysphagia

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that nasogastric tube feeding is the preferred method during the first month post-stroke for people who do not recover functional swallow.	NSF	B	The FOOD Trial Collaboration 2005
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that nasogastric tube feeding should be used for short term (2-3 weeks) nutritional support for patients who cannot swallow safely.	AHA-ASA 2016	Class I Level B	Dennis et al, 2005
Low volume – Non-current			
ADAPTE I: The recommendation and strength of evidence is unchanged from the PARM 2011 guideline.			
PARM recommends that nasogastric tube feeding is the preferred method during the first month post-stroke for people who do not recover functional swallow.			

2011 Recommendation Statement			
There is insufficient evidence that feeding via percutaneous endoscopic gastrostomy (PEG) is the recommended feeding route for long term (> 4 weeks) enteral feeding. Patients requiring long term tube feeding should be reviewed regularly.	SIGN 2011 PNA	B Class I Level C	Panos et al, 1994 CREST 2004 Rotilio et al, 2004
Inconsistent level of evidence – Low volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that percutaneous gastrostomy should be placed in patients with chronic inability to swallow safely.	AHA-ASA 2016	Class I Level B	Dennis et al, 2005 Dennis et al, 2006 Geeganage et al. 2012
Low volume-Non-current			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline. PARM guideline.			
PARM recommends that feeding via percutaneous endoscopic gastrostomy (PEG) is the recommended feeding route for long term (> 4 weeks) enteral feeding. Patients requiring long term tube feeding should be reviewed regularly.			

2011 Recommendation Statement			
There is insufficient evidence that patient's and carer's perceptions and expectations of PEG feeding should be taken into account and the benefits, risks and burden of care fully explained before initiating feeding	SIGN 2010	D	Callahan et al 2000 Elia et al 2001 Rickman 1998
Low volume – Non-current			
2017: No new evidence			
PARM suggests consideration of patient's and carer's perceptions and expectations of PEG feeding along with full explanation of its benefits, risks, and burden of care prior to initiation of feeding.			

2011 Recommendation Statement			
There is some evidence that PEG insertion is preferred to open gastrostomy because of its lower mortality and morbidity.	PNA	Class 1 Level B	Lowe et al 1997
Low volume – Non-current			
2017: No new evidence			
PARM recommends the use of PEG insertion over the use of open gastrostomy due to its lower mortality and morbidity.			

2017 Recommendation Statement			
There is some evidence that patients who cannot take solid food and liquids orally should receive enteral feedings to maintain hydration and nutrition while undergoing efforts to restore swallowing.	AHA-ASA 2013	Class I Level B	O'Mahony et al,1995 James et al, 1998
Low volume – Non-current			
PARM recommends enteral feedings for patients who cannot tolerate solid food and liquids orally to maintain hydration and nutrition while undergoing efforts to restore swallowing.			

2017 Recommendation Statement			
There is some evidence that tube feedings should be initiated within 7 days after stroke for patients who cannot safely swallow.	AHA-ASA 2016	Class I Level A	Dennis et al, 2005
Low volume – Non-current			
PARM recommends that enteral feedings should be initiated within 7 days after stroke for patients who cannot safely swallow.			

10.4 PARM CONTEXT POINTS

Table 93. Context points for minimum and additional standard care of practice for dysphagia assessment in stroke patients

	Minimum standard care of practice	Additional standard care of practice
Practice method	Assessment of alertness and dysphagia Water swallow test or standardized clinical bedside assessment	Videofluoroscopy-modified barium swallow test (VMBS) and/or flexible endoscopic evaluation of swallowing (FEES)
Equipment	Water, food of different consistencies (pudding and biscuits), spoon, cup Stethoscope Pulse oximeter	Videofluoroscopy machine Fiberoptic endoscopy machine
Workforce	Physiatrist Occupational therapist Nurse	Radiologist Otolaryngologist Speech pathologist
Training	Within competency Training needed for water swallow test and standardized clinical bedside assessment	Within competency Specialist training in tertiary hospital
When is it done	Upon admission as screening tool for aspiration	Upon admission (if with failed water swallow test and stable vital signs)

	Before nasogastric tube removal or before giving anything by mouth	During admission if without improvement or if with signs and symptoms of aspiration
Reassessment using at least one standard outcome measure	Monthly until able to eat without aspiration	Monthly to every 3 months until able to eat without aspiration

Table 94. Context points for minimum and additional standard care of practice for dysphagia management in stroke patients

	Minimum standard care of practice	Additional standard care of practice
Practice method	Food modification Compensatory and restorative techniques Therapeutic exercise for feeding training Nasogastric tube insertion	Pharyngeal electrical stimulation Percutaneous endoscopic gastrostomy (PEG)
Equipment	Food preparation equipment, blender Swallowing therapy equipment Nasogastric tube, stethoscope,	Electrical stimulator for swallowing Operating room with endoscopy equipment
Workforce	Physiatrist/Physician Occupational therapist Nurse	Gastroenterologist or general surgeon Speech pathologist Nutritionist Psychiatrist/Psychologist
Training	Within competency	Within competency Training on use of electrical stimulation and PEG tube insertion
When is it done	Upon admission or during hospital stay once patient is conscious and medically stable NGT may be inserted as soon as risk for aspiration has been established	During hospital stay - ES if patient is stable PEG: At least one month/4 weeks after stroke if patient's swallowing capacity is not expected to improve in the next 2-3 months and long term enteral feeding is considered
Reassessment using at least one standard outcome measure	Monthly until able to eat without aspiration	Monthly until able to eat without aspiration

10.5 SUMMARY OF PARM RECOMMENDATION STATEMENTS

DYSPHAGIA ASSESSMENT

PARM suggests that assessment of nutritional risk should be carried out within the first 48 hours with regular re-assessment thereafter during the patient's recovery and be recorded prior to discharge.

PARM suggests that assessment of a patient's nutritional risk should include assessment of their ability to eat independently and a periodic record of their food consumption and weight.

PARM suggests that on-going monitoring of nutritional status after a stroke should include a combination of the following parameters: biochemical measures (eg. low pre-albumin, impaired glucose metabolism), swallowing status, unintentional weight loss, eating assessment and dependence, and nutritional intake.

PARM suggests that patient who are not initially alert should be closely monitored and screened when clinically appropriate.

PARM strongly endorses that all stroke patients should be screened for dysphagia before initiation of oral intake.

PARM strongly endorses that patients with swallowing problem should be assessed by a speech pathologist or someone trained in the field.

PARM does not endorse the use of gag reflex as a screening tool for dysphagia.

PARM strongly endorses the use of water swallow test as a part of the screening for aspiration risk in stroke patients.

PARM recommends a typical swallow screening procedure that should include:

- a. Initial observations of the patient's consciousness level
- b. Observations of the degree of postural control and
- c. Observations of oral hygiene and observations of control of oral secretions, if appropriate, using a water swallow test

PARM endorses the use of swallow screen in patient with dysphagia to reduce the incidence of pneumonia.

BEDSIDE ASSESSMENT

PARM endorses the use of a standardized clinical bedside assessment by a professional skilled in the evaluation of dysphagia.

PARM endorses the use of a standardized clinical bedside assessment by a professional skilled in the evaluation of dysphagia.

PARM suggests the use of cervical auscultation in the assessment of dysphagia.

PARM suggests the use of pulse oximetry in determining oxygen saturation during swallowing among stroke patients.

INSTRUMENTAL ASSESSMENT

PARM does not endorse the use of instrumental testing for swallowing evaluation in acute stroke patients. However, if bedside screening fails, PARM recommends the use of videofluoroscopic modified barium swallow study or flexible endoscopic examination of swallowing.

PARM endorses the use of VMBS study and/or FEES if the patient fails the swallow screening test.

PARM suggests that patients who fail the swallowing screening should be referred to a speech pathologist for a comprehensive assessment. This may include instrumental examination (i.e. VMBS and/or FEES).

PARM endorses MBS and FEES as valid methods for assessing dysphagia.

PARM recommends that standard criteria should be established for the interpretation of the results of radiological and fiberoptic assessments of swallowing.

PARM recommends that instrumental evaluation is indicated for those patients suspected of aspiration to verify the presence/absence of aspiration and to determine the physiological reasons for the dysphagia to guide the treatment plan.

PARM recommends the use of Videofluoroscopic Modified Barium Swallow (VMBS) studies to guide management decisions for patients with dysphagia.

PARM suggests FEES to reduce incidence of pneumonia and improve factors associated with dysphagia recovery.

MANAGEMENT OF DYSPHAGIA

PARM recommends the giving of early feeding (within 24 hours) to reduce the fatality among stroke patients.

PARM recommends dietary modification in the treatment of dysphagia, such as the use of thickened liquids, in order to promote safety of swallowing and reduce the incidence of pneumonia.

PARM suggests the use of low-risk feeding strategies (eg. eat while sitting; minimize distractions) to compensate for dysphagia.

PARM suggests the use of compensatory techniques (postures and maneuvers) as treatment strategy for stroke patients with dysphagia.

PARM suggests the use of restorative strategies (eg. shaker head lifting exercises) in the treatment of dysphagia.

PARM recommends the use of thermo tactile stimulation in the treatment of dysphagia.

PARM recommends the use of electrical stimulation in the treatment of dysphagia.

PARM endorses the use of suprathyroid muscle-strengthening exercises in the treatment of dysphagia.

PARM suggests the use of lingual muscle strengthening exercises in the treatment of dysphagia.

PARM suggests the use of multipronged dysphagia interventions for the treatment of dysphagia.

PARM suggests individualized management plans to address dysphagia therapy, dietary needs and specialized nutrition plans.

PARM endorses the use of high intensity swallowing therapy with dietary prescription to improve swallowing ability in stroke patients with dysphagia.

PARM endorses encouragement of stroke patients with dysphagia to feed themselves when capable and within precautions.

PARM suggests the use of nutritional supplements for patients who are malnourished or at risk of malnourishment.

PARM strongly endorses the implementation of oral hygiene protocols to reduce the risk of aspiration pneumonia after a stroke.

PARM recommends consideration of acupuncture as an adjunctive treatment for dysphagia.

PARM recommends incorporating principles of neuroplasticity into dysphagia rehabilitation interventions.

PARM recommends that behavioral interventions be considered as part of dysphagia treatment.

PARM endorses referral of stroke patients with suspected nutritional concerns, hydration deficits or other comorbidities that may affect nutrition (ie. diabetes) to a dietitian.

PARM suggests the use of transcranial direct currents as an option, if available, to improve dysphagia.

PARM suggests the use of repetitive transcranial magnetic stimulation as a management option, if available, to improve swallowing and reduce aspiration among patients with dysphagia.

NASOGASTRIC/PERCUTANEOUS ENDOSCOPIC GASTROSTOMY TUBE FEEDING

PARM recommends that nasogastric tube feeding is the preferred method during the first month post-stroke for people who do not recover functional swallow.

PARM recommends that feeding via percutaneous endoscopic gastrostomy (PEG) is the recommended feeding route for long term (> 4 weeks) enteral feeding. Patients requiring long term tube feeding should be reviewed regularly.

PARM suggests consideration of patient's and carer's perceptions and expectations of PEG feeding along with full explanation of its benefits, risks, and burden of care prior to initiation of feeding.

PARM recommends the use of PEG insertion over the use of open gastrostomy due to its lower mortality and morbidity.

PARM recommends enteral feedings for patients who cannot tolerate solid food and liquids orally to maintain hydration and nutrition while undergoing efforts to restore swallowing.

PARM recommends that enteral feedings should be initiated within 7 days after stroke for patients who cannot safely swallow.

11. Post-stroke medical complications

Medical complications following stroke present potential barriers to optimal recovery. For a more favorable outcome, complications such as fever, pain, venous thromboembolism and incontinence should be addressed in all hospitalized stroke patients. It involves early recognition, so that appropriate management strategies may be implemented. Management of secondary complications focuses on preventive strategies and reductions of impairments.

11.1 CENTRAL POST-STROKE PAIN

Central post-stroke pain (CPSP) is a neuropathic pain syndrome that develops post-stroke characterized by pain and sensory abnormalities in the body parts that correspond to the brain territory that has been injured by the cerebrovascular lesion. It is thought to be due to injury to pathways or brain centers involved in pain processing.

Table 95. Assessment and management of central post-stroke pain

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that pain intensity should be assessed using a pain scale.	USVA/ Dod	II	Australian Acute Musculoskeletal Pain Guidelines Group 2003 Moulin et al, 2007
Low volume – Current			
2017: No new evidence			
PARM recommends the use of a pain scale for the assessment of pain intensity.			

2011 Recommendation Statement			
There is some evidence for the need to assess nature and location of pain.	USVA/ Dod	II	Australian Acute Musculoskeletal Pain Guidelines Group 2003 Moulin et al, 2007
Low volume – Current			
2017: No new evidence			
PARM recommends the need for a thorough assessment of pain - its location, nature and intensity.			

2017 Recommendation Statement			
There is insufficient evidence that the diagnosis of central poststroke pain should be based on established diagnostic criteria after other causes of pain have been excluded.	AHA-ASA 2016	C	Klit et al, 2009

Low volume – Non-current
PARM suggests the use of established criteria for the diagnosis of central poststroke pain after all other causes of pain have been excluded.

2011 Recommendation Statement			
There is evidence to tailor pain management plan to patient needs.	USVA/ Dod	II	Australian Acute Musculoskeletal Pain Guidelines Group 2003 Dworkin et al, 2003, 2007 Jensen, 2002 Kerns &Habib, 2004 Moulin et al, 2007 Turk & Winter, 2006
High volume – Non-current			
2017: No new evidence			
PARM endorses individualized and tailored pain management plans to meet patients' needs.			

2011 Recommendation Statement			
There is evidence for the need to balance the benefits against the side effects of pain treatment interventions.	USVA/ Dod	II	Australian Acute Musculoskeletal Pain Guidelines Group 2003 Dworkin et al, 2003, 2007 Jensen, 2002 Moulin et al, 2007
High volume – Non-current			
2017: No new evidence			
PARM endorses pain treatment interventions with balanced benefit-side effect profiles.			

2011 Recommendation Statement			
There is evidence to consider use of non-pharmacological agents in pain management.	USVA/ Dod	II	Australian Acute Musculoskeletal Pain Guidelines Group 2003 Kerns &Habib, 2004 Turk & Winter, 2006 Moulin et al, 2007
Moderate volume – Non-current			
2017: No new evidence			
PARM endorses the use of non-pharmacological agents/modalities for pain control such as biofeedback, massage, imaging therapy, and physical therapy, where applicable.			

2011 Recommendation Statement			
There is evidence that stroke patients with CPSP should receive at trial of tricyclic antidepressants,	NSF	B	Saarto & Wiffen, 2007

first, followed by other tricyclic agents or venlafaxine. A final dose of 75 mg of amitriptyline, in selected patients, led to a clinically significant reduction in CPSP without side effects, leading to dose reduction.	SIGN 2010	1+	Leijon & Boivie, 1989
Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017: No new evidence			
PARM endorses the use of tricyclic antidepressants for the management of CPSP.			

2011 Recommendation Statement			
There is insufficient evidence that stroke patients with CPSP should receive a trial of anticonvulsants, (i.e., carbamazepine). A final dose of 800 mg of carbamazepine, in selected patients, led to a reduction in CPSP but with more significant side effects.	NSF	C	Wiffen et al, 2005
	SIGN 2010	1+	Leijon&Boivie, 1989
Inconsistent level of evidence – Low volume – Non-current – Uniform thought			
2017: No new evidence			
PARM suggests the use of anticonvulsants such as carbamazepine with a final dose 800 mg for the management of CPSP with careful consideration of its potential side effects.			

2011 Recommendation Statement			
There is strong evidence that lamotrigine at a final dose of 200 mg/day showed moderate reduction in CPSP, but with a high drop-out rate because of adverse events.	SIGN 2010	1-	Vestergaard et al, 2001
Low volume (against) – Current			
2017: No new evidence			
PARM endorses the selective use of lamotrigine (at a final dose of 200 mg/day) for the management of CPSP with careful consideration of its potential side effects.			

2011 Recommendation Statement			
There is evidence to avoid, or use with caution, centrally acting analgesics.	USVA/Dod	II	Australian Acute Musculoskeletal Pain Guidelines Group 2003 Dworkin et al, 2003, 2007 Jensen, 2002 Moulin et al, 2007
High volume – Non-current			
2017: No new evidence			
PARM endorses cautious use of centrally acting analgesics for CPSP.			

2011 Recommendation Statement			
There is insufficient evidence for a referral to a specialist pain management team in any patient whose CPSP is not controlled within a few weeks.	NSF	GPP	-
Low volume – Current			
2017: No new evidence			
PARM suggests a referral to a specialist pain management team of any patient whose CPSP is not controlled within a few weeks.			

2011 Recommendation Statement			
There is evidence to consider referral to a health psychologist.	USVA/ Dod	II	Kerns &Habib, 2004 Turk & Winter, 2006
Low volume – Non-current			
2017: No new evidence			
PARM endorses referral to a health psychologist of any patient with CPSP.			

11.2 DEEP VENOUS THROMBOEMBOLISM / PULMONARY EMBOLISM

Deep vein thrombosis (DVT) is a potentially life-threatening condition in which blood clots form in the deep veins of the body. Venous thromboembolism (VTE) occurs when these clots break free and travel through the body's circulatory system. Clot that travel to the lungs is recognized as pulmonary embolism (PE), and is life-threatening.

Table 96. Preventive and therapeutic strategies for deep venous thrombosis, thromboembolism and pulmonary embolism

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that early mobilization and adequate hydration should be encouraged for all acute stroke patients to help prevent venous thromboembolism. However, there is currently no evidence to support or refute the use of very early mobilization (within 48 hours of stroke onset).	NSF	GPP	Indredavik et al, 1999 Kelly et al, 2004
	CSS	C	-
	SIGN 2010	1++	Bernhardt et al, 2009
Inconsistent level of evidence – Low volume – Non-current – Uniform thought			
2017: No new evidence			
PARM suggests that early mobilization and adequate hydration should be encouraged in all acute stroke patients to help prevent DVT and PE.			

2011 Recommendation Statement			
There is some evidence that patients at high risk of venous	CSS	A	Canadian Stroke Network 2006, 2007

thromboembolism should be started on venous thromboembolism prophylaxis immediately.			SIGN 1997
Low volume – Non-current			
2017: No new evidence			
PARM recommends immediate initiation of venous thromboembolism prophylaxis for post-stroke patients at high risk.			

2011 Recommendation Statement			
There is evidence that antiplatelet therapy should be used for people with ischemic stroke to help prevent DVT/PE. Low dose aspirin has been shown to be safe and effective in preventing deep vein thrombosis (DVT) and pulmonary embolism. Aspirin (300 mg/day) should be given to all patients with acute ischemic stroke in the first two weeks following stroke onset to help prevent deep vein thrombosis and pulmonary embolism (provided there are no known contraindications to aspirin therapy).	NSF	A	Sandercock et al, 2008a
	SIGN 2010	1++	Sandercock et al, 2008a
	SIGN 2010	A	Sandercock et al, 2008a
Consistent level of evidence – Current – Low volume – Uniform thought			
2017: No new evidence			
PARM endorses antiplatelet therapy for people with ischemic stroke to help prevent DVT/PE. Low dose aspirin (300mg/day) should be given to all patients with acute ischemic stroke in the first two weeks following stroke onset.			

2011 Recommendation Statement			
There is evidence that low molecular weight heparin should be considered for patients with acute ischemic stroke at high risk of venous thromboembolism or unfractionated heparin for patients with renal failure.	NSF	B	Sherman et al, 2007
	CSS	B	Sherman et al, 2007
Consistent level of evidence – Low volume – Current – Uniform thought			
2017: No new evidence			
PARM endorses the use low molecular weight heparin for patients with acute ischemic stroke at high risk of venous thromboembolism or unfractionated heparin for patients with renal failure.			

2011 Recommendation Statement			
There is evidence that the use of anti-embolism stockings ALONE is insufficient for post-stroke venous thromboembolism prophylaxis.	NSF	B	CLOTS Trial Collaboration 2009 Mazzone et al, 2004
	SIGN 2010	1++	CLOTS Trial Collaboration 2009
	CSS	A	Andre et al, 2007 CLOTS Trial Collaboration 2009 Mazzone et al, 2004
Consistent level of evidence – Low volume – Current – Uniform thought			
2017: No new evidence			
PARM does not endorse the use of anti-embolism stockings alone for post-stroke venous thromboembolism prophylaxis.			

2011 Recommendation Statement			
There is insufficient evidence on the safety and efficacy of anticoagulant deep vein thrombosis prophylaxis after intracerebral hemorrhage. Antithrombotics and anticoagulants should be avoided for at least 48 hours after onset.	NSF	GPP	-
	CSS	C	Boeer et al, 1991 Tetri et al, 2008
Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017: No new evidence			
Low volume – Non-current			
PARM suggests that antithrombotics and anticoagulants should be avoided for at least 48 hours after onset of intracerebral hemorrhage due to insufficient evidence on its safety and efficacy.			

2011 Recommendation Statement			
There is some evidence that anticoagulant therapy in the first two weeks after ischemic stroke can cause hemorrhagic stroke or hemorrhagic transformation of the ischemic stroke and has no net benefit.	SIGN 2010	1++	Sandercock et al, 2008b
Low volume – Current			
2017: No new evidence			
PARM recommends the cautious use of anticoagulant therapy during the first two weeks of ischemic stroke due to the risk of hemorrhagic stroke or hemorrhagic transformation of ischaemic stroke.			

2017 Recommendation Statement			
There is evidence that intermittent pneumatic compression may reduce the occurrence of DVT as compare to no prophylaxis.	AHA-ASA 2016	B	Naccarato et al, 2010
	EBRSR 2016	1a	Dennis et al, 2013 Naccarato et al, 2010

Consistent level of evidence - Low volume – Non-current – Uniform thought
PARM endorses the use of intermittent pneumatic compression to reduce the occurrence of DVT.

11.3 VOIDING DYSFUNCTION/INCONTINENCE

Voiding dysfunction refers to bladder and urinary problems or abnormalities in the process of urination as a consequence of underlying nervous system pathology. It is considered as an independent predictor of death, disability, and discharge to a long-term care facility (Brittain et al. 1999; Sreeraj et al. 2012; van Kuijk et al. 2001)

11.3.1 URINARY INCONTINENCE

Table 97. Diagnosis and management of post-stroke urinary incontinence

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that all stroke patients should be screened for urinary incontinence and retention, by trained personnel using a standard medical and nursing assessment.	NSF	B	Martin et al, 2006 Thomas et al, 2008
	SIGN 2010	4	Brittain et al, 1998
	CSS	C	-
Inconsistent level of evidence – Low volume – Non-current – Variable thought			
2017: No new evidence.			
PARM suggests that all stroke patients should be screened for urinary incontinence and retention, by trained personnel using a standard medical and nursing assessment.			

2011 Recommendation Statement
There is insufficient evidence that systematic professional input in the assessment and management of continence problems may improve outcomes and the greatest impact may be in the acute phase of post-stroke rehabilitation.
Low volume – Non-current
2017: No new evidence
PARM suggests obtaining multi-disciplinary systematic professional input for the assessment and management of continence problems to improve outcomes especially in the acute phase of post-stroke rehabilitation.

2011 Recommendation Statement
There is insufficient evidence that in people with functional incontinence, a whole-team approach is recommended.

None
2017: No new evidence
PARM suggests a whole-team approach for the management of functional incontinence.

2011 Recommendation			
There is insufficient evidence that a portable bladder ultrasound scan should be used to assist in diagnosis and management of urinary incontinence.	NSF CSS	B C	Martin et al, 2006 -
Inconsistent level of evidence – Low volume – Current – Uniform thought			
2017: No new evidence			
PARM suggests that a portable bladder ultrasound scan, a painless method for assessing post-void residual, should be used to assist in the diagnosis and management of urinary incontinence.			

2011 Recommendation Statement			
There is insufficient evidence that routine and specific assessment of bladder function should include assessing urinary retention through the use of a bladder scanner or an in-and-out catheterization and measuring urinary frequency, volume, control, and presence of dysuria should be used.	AHA(2010)	Class IIb Level C	Nwosu et al, 1998
Low volume – Non-current			
2017: No new evidence			
PARM suggests a routine and specific assessment of bladder function for the diagnosis of urinary incontinence, which includes assessment of urinary retention through the use of a bladder scanner or in-and-out catheterization and measurement of urinary frequency, volume, control and presence of dysuria.			

2011 Recommendation Statement			
There is some evidence that stroke survivors with confirmed continence difficulties should have a continence management plan formulated, documented, implemented and monitored.	NSF	B	Thomas et al, 2008
Low volume – Current			
2017: No new evidence			
PARM suggests that stroke survivors with confirmed continence difficulties should have a formulated, documented, implemented and monitored continence management plan.			

2011 Recommendation Statement			
There is insufficient evidence that a community continence management plan should be developed with the stroke survivor and family/carer prior to discharge and should include information on accessing continence resources and appropriate review in the community.	NSF	GPP	-
None			
2017: No new evidence			
PARM suggests that a community continence management plan should be developed with the stroke survivor and family/carer prior to discharge and should include information on accessing continence resources and appropriate review in the community.			

2011 Recommendation Statement			
There is insufficient evidence that people with urinary retention and their family/carer will require education about management, where to access supplies, and who to contact in case of problems if they are discharged with either intermittent or in-dwelling catheterization.	NSF	GPP	-
None			
2017: No new evidence			
PARM suggests educating patients and their family/carers about catheter management, supply access and medical contact information in case of problems after discharge			

2011 Recommendation			
There is insufficient evidence that the use of indwelling catheters should be avoided as an initial management strategy, except in acute urinary retention. If urinary retention is severe, intermittent catheterization should be used to assist bladder emptying during hospitalization. If retention continues, intermittent catheterization is preferable to indwelling catheterization.	NSF CSS	GPP A	- -
Inconsistent level of evidence – Uniform thought			
2017: No new evidence			
PARM suggests the use of intermittent catheterization for chronic and severe urinary retention. Indwelling catheters should be avoided as an initial management strategy except in acute urinary retention.			

2011 Recommendation Statement			
There is insufficient evidence that for people with urinary retention using intermittent catheterization, a closed sterile catheterization technique should be used in the hospital.	NSF	C	Quigley & Riggan, 1993
Low volume – Non-current			
2017: No new evidence			
PARM suggests that for people with urinary retention using intermittent catheterization, a closed sterile catheterization technique should be used in the hospital.			

2011 Recommendation Statement			
There is insufficient evidence that for people with urge incontinence, a prompted or scheduled voiding regime program/bladder retraining should be trialed. Bladder retraining with urge suppression for those with urge symptoms who are independent of caregivers and motivated (in combination with pelvic floor exercises in men) is recommended.	NSF SIGN 2010	GPP 3	Dumoulin et al, 2005 Thomas et al, 2008
Inconsistent level of evidence – Low volume – Current – Uniform thought			
2017: No new evidence			
PARM suggests the use of a prompted or scheduled voiding regime program/bladder retraining in persons with urge incontinence.			

2011 Recommendation Statement			
There is some evidence that for people with urge incontinence, anticholinergic drugs can be trialed.	NSF	B	Nabi et al, 2006 Wallace et al, 2004
Low volume – Current			
2017: No new evidence.			
PARM recommends the use of anticholinergic drugs for those with urge incontinence.			

2011 Recommendation Statement			
There is insufficient evidence that in people with urinary incontinence, if continence is unachievable, containment aids can assist with social continence.	NSF	GPP	-
None			
2017: No new evidence			
PARM suggests the use of containment aids which can assist with social continence in patients where continence is unachievable.			

2011 Recommendation Statement			
There is insufficient evidence that if incontinence persists, the stroke survivor should be re-assessed and referred for specialist review.	NSF	GPP	-
None			
2017: No new evidence			
PARM suggests reassessment and referral for specialist review for post-stroke patients with persistent incontinence.			

2011 Recommendation Statement			
There is insufficient evidence that in people with urinary retention, where management of chronic retention requires catheterization, consideration should be given to the choice of appropriate route, urethral or suprapubic.	NSF	GPP	-
None			
2017: No new evidence			
PARM suggests the consideration of suprapubic or urethral catheterization in suitable patients with chronic urinary retention.			

11.3.2 FECAL INCONTINENCE

Fecal incontinence is a common problem following stroke. It is reported that major fecal incontinence was 4.5 times more prevalent among stroke survivors compared with non-stroke controls (Brittain, 2006).

Table 98. Diagnosis and management of post-stroke fecal incontinence

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation			
There is insufficient evidence that all stroke survivors with suspected fecal continence difficulties should be assessed by trained personnel using a structured functional assessment. It should include a full assessment (including a rectal examination).	NSF AHA 2010 SIGN 2010	B Class 1 Level B 4	Harari et al, 2003 Teasell et al, 2008b -
Inconsistent level of evidence – Low volume – Non-current – Consistent thought			
2017: No new evidence			
PARM suggests that all stroke survivors with suspected fecal continence difficulties should be assessed using a structured functional assessment, including a rectal examination.			

2011 Recommendation Statement			
There is insufficient evidence that patients should have individualized bowel programs that are patient-centered.	SIGN 2010	GPP	-
None			
2017: No new evidence			
PARM suggests that patients should have individualized bowel programs that are patient centered.			

2011 Recommendation Statement			
There is insufficient evidence that there should be due cognizant of an individual's life style and care preferences when designing a bowel program.	SIGN 2010	GPP	-
None			
2017: No new evidence			
PARM suggests that individual's life style and care preferences should be considered when designing a bowel programme.			

2011 Recommendation Statement			
There is insufficient evidence that information provision, education and support for patient and carer, and careful discharge planning and preparation are required for any patient discharged with bowel incontinence.	NSF	GPP	-
	SIGN 2010	GPP	-
None			
2017: No new evidence			
PARM suggests information provision, education and support for patient and caregiver as well as careful discharge planning and preparation for any patient discharged with bowel incontinence.			

2011 Recommendation Statement			
There is some evidence that for stroke patients with constipation or fecal incontinence, appropriate management of constipation, fecal overflow or bowel incontinence should be established and targeted education provided.	NSF	B	Harari et al, 2003
Low volume – Non-current			
2017: No new evidence.			
PARM recommends establishment of appropriate management of constipation, fecal overflow or bowel incontinence and provision of targeted education for stroke patients.			

2011 Recommendation Statement			
There is insufficient evidence that bowel habit retraining using type and timing of diet and exploiting the gastro-colic reflex should be used for people who have bowel dysfunction.	NSF	C	Venn et al, 1992
Low volume – Non-current			
2017: No new evidence			
PARM suggests the use of bowel habit retraining using type and timing of diet for people who have bowel dysfunction.			

2011 Recommendation Statement			
There is insufficient evidence that if continence is unachievable, containment aids can assist with social continence.	NSF	GPP	-
None			
2017: No new evidence			
PARM suggests the use of containment aids to assist with social continence if continence is unachievable.			

11.4 DECUBITUS ULCERS AND CONTRACTURES

Stroke patients generally have hemiparesis, sensory deficits, and altered levels of consciousness which place them at risk for joint and muscle contractures and skin breakdown. These can cause pain and difficulty in self-care, including dressing, and hygiene. These may worsen their quality of life if not addressed by the physician.

Table 99. Assessment and management of decubitus ulcers and contractures post-stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation			
There is insufficient evidence that all stroke survivors at risk (ie. stroke severity, reduced mobility, diabetes, incontinence and nutritional status) should have a thorough pressure care risk assessment completed upon admission and regular evaluation by trained personnel. The risk for skin breakdown should be assessed using a standardized assessment tool (such as the Braden risk scale). But there is insufficient evidence in recommending an intervention based on the result of standardized assessment tool.	NSF SIGN 2010 USVA/Dod	GPP 4 1	- NHS Quality Improvement Scotland 2009 Gresham et al, 1995 Sussman & Bates-Jensen, 1998

Inconsistent level of evidence – Low volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that all stroke survivors at risk (ie. stroke severity, reduced mobility, diabetes, incontinence and nutritional status) should have a thorough pressure care risk assessment completed upon admission and regular evaluation by trained personnel. The risk for skin breakdown should be assessed using a standardized assessment tool (such as the Braden risk scale). But there is insufficient evidence in recommending an intervention based on the result of standardized assessment tool.	AHA-ASA 2016	C	Pressure Ulcer Prevention and Treatment Protocol: Health Care Protocol ICSI 2012
Low volume – Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline. PARM suggests that all stroke survivors at risk should have a pressure care risk assessment completed upon admission by trained personnel, followed by regular evaluation.			

2011 Recommendation			
There is evidence that all stroke survivors assessed as high risk should be provided with appropriate pressure-relieving aids and strategies, such as a pressure-relieving mattress as an alternative to a standard hospital mattress, use of proper positioning, turning, and transferring techniques and judicious use of barrier sprays, lubricants, and protective dressings and padding to avoid skin injury due to maceration, friction or excessive pressure.	NSF USVA/ Dod	B I	McInnes et al, 2008 Gresham et al, 1995 Reddy et al, 2006
Consistent level of evidence – Low volume – Current – Uniform thought			
2017: No new evidence			
PARM endorses that all stroke survivors assessed as high risk should be provided with appropriate pressure-relieving aids and strategies, use of proper positioning, turning, and transferring techniques and judicious use of barrier sprays, lubricants, and protective dressings and padding.			

2017 Recommendation Statement			
There is insufficient evidence that positioning of the hemiplegic	AHA-ASA 2016	B	Ada et al, 2005 De Long et al, 2010

shoulder in maximum external rotation while the patient is either sitting or in bed for 30 minutes daily is probably indicated for preventing shoulder contractures			
Low volume – Non-current			
PARM suggests positioning of the hemiplegic shoulder in maximum external rotation while the patient is either sitting or in bed for 30 minutes daily in order to prevent development of shoulder contractures.			

2017 Recommendation Statement			
There is insufficient evidence for the use of resting hand/wrist splints, along with regular stretching and spasticity management in patients lacking active hand movement.	AHA-ASA 2016	C	Harvey et al, 2006 Lannin et al, 2007 Hesse et al, 2012 Management of Stroke Rehabilitation Working Group, Veteran Affairs/Department of Defense 2010 Royal College of Physicians Intercollegiate Stroke Working Party 2008 Mayer and Harvey, 2014
High volume – Non-current			
PARM suggests the use of resting hand/wrist splints, along with regular stretching and spasticity management in patients lacking active hand movement.			

2017 Recommendation Statement			
There is insufficient evidence on using serial casting or static adjustable splints to reduce mild to moderate elbow and wrist contractures.	AHA-ASA 2016	C	Hesse, 2012 Basaran et al, 2012 Tyson et al, 2011 Management of Stroke Rehabilitation Working Group, Veteran Affairs/Department of Defense 2010
Moderate volume – Non-current			
PARM suggests serial casting or static adjustable splints to reduce mild to moderate elbow and wrist contractures.			

2017 Recommendation Statement			
There is insufficient evidence on the effectiveness of surgical release of brachialis, brachioradialis, and biceps muscles for substantial elbow contractures and associated pain.	AHA-ASA 2016	B	Namdari, 2012
Low volume – Current			

PARM suggests consideration of surgical release of brachialis, brachioradialis, and biceps muscles for substantial elbow contractures and associated pain.

2017 Recommendation Statement			
There is some evidence that using resting ankle splints at night and during assisted standing will prevent ankle contracture in the hemiplegic limb.	AHA-ASA 2016	B	Robinson et al, 2008
Low volume – Non-current			
PARM recommends the use of resting ankle splints at night and during assisted standing for prevention of ankle contracture in the hemiplegic limb.			

11.5 TEMPERATURE MANAGEMENT / INFECTION

Table 100. Temperature and infection management

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation			
There is insufficient evidence that temperature should be monitored as part of routine vital sign assessments.	CSS	C	Jones et al, 2007
Low volume – Current			
2017: No new evidence			
PARM suggests that temperature should be monitored as part of routine vital sign assessments.			

2011 Recommendation			
There is insufficient evidence that antipyretic therapy, comprising regular paracetamol and/or physical cooling measures should be used routinely where fever occurs.	NSF	C	Den Hertog et al, 2009 Mayer et al, 2004
	CSS	B	-
Inconsistent level of evidence – Low volume – Current – Uniform thought			
2017: No new evidence			
PARM suggests the use of temperature-reducing measures, comprising of regular paracetamol and/or physical cooling measures, for the management of fever post-stroke.			

2011 Recommendation			
There is some evidence that antipyretic and antimicrobial therapy may be initiated as required.	CSS	B	-
None			
2017: No new evidence			
PARM recommends initiation of appropriate antipyretic and antimicrobial therapy as required for signs of infection.			

11.6 SLEEP APNEA

The prevalence of sleep apnea is high in stroke patients—estimated to be between 50% and 70% (Hermann and Bassetti, 2009). Untreated sleep apnea maybe associated with poor functional outcome after stroke.

Table 101. Management of sleep apnea post-stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation			
There is evidence that continuous positive airway pressure (CPAP) or oral devices should be used for stroke survivors with sleep apnea.	NSF	B	Giles et al, 2006 Lim et al, 2004
Low volume – Current			
2017: No new evidence			
PARM endorses the use of CPAP or oral devices for stroke survivors with sleep apnea.			

11.7 SEIZURES

Seizures post-stroke are a known occurrence. A study by Bladin et al. (2000) showed higher mortality among patients with seizures at 30 days and 1 year post stroke, compared to patients who were seizure-free. This necessitates the physician to have a familiarity with seizure medications and management to better treat this condition.

Table 102. Management of post-stroke seizures

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation			
There is some evidence that patients who have experienced seizures post-stroke should receive monotherapy with an antiepileptic drug to prevent seizure reoccurrence.	ESRBR 2016	1b, 2	Gupta et al, 1988 Silverman et al, 2002
Low volume – Non-current			
2017: No new evidence			
PARM recommends that patients who have experienced post stroke seizure should receive monotherapy with an antiepileptic drug to prevent seizure recurrence.			
2017 Recommendation			
There is evidence that prophylactic treatment with antiepileptic drugs may not be effective in preventing first seizures post stroke.	AHA-ASA 2016	C	Adams et al, 2007 Balami and Buchan, 2012 Connolly et al, 2012
	EBRSR 2016	1a	Rowan et al, 2005 Gilad et al, 2011

			Gilad et al, 2007 Sykes et al, 2014 Kwan and Wood, 2010 van Tuijl, 2011
Inconsistent level of evidence - High volume – Non-current			
2017: No new evidence			
PARM does not endorse the use of prophylactic antiepileptic drugs to prevent the first post-stroke seizure.			

11.8 PARM CONTEXT POINTS

Standard care of practice is to prevent complications occurring during post stroke period. This is particularly relevant for decubitis ulcer, subluxed shoulder, bladder and bowel incontinence, depression, deep venous thrombosis and sleep disturbances. It is everybody's responsibility to be alert for these complications and to actively educate the patient and relatives about these issues and how to prevent them.

The recommendations provide clear instruction about the management of these complications should they occur. Complications often result from poor medical and nursing care. Where complications are preventable, and occur through poor practices, they place unnecessary burdens on scarce health resources.

11.9 SUMMARY OF PARM RECOMMENDATION STATEMENTS

CENTRAL POST-STROKE PAIN

PARM recommends the use of a pain scale for the assessment of pain intensity.

PARM recommends the need for a thorough assessment of pain – its location, nature and intensity.

PARM suggests the use of established criteria for the diagnosis of central poststroke pain after all other causes of pain have been excluded.

PARM endorses individualized and tailored pain management plans to meet patients' needs.

PARM endorses pain treatment interventions with balanced benefit-side effect profiles.

PARM endorses the use of non-pharmacological agents/modalities for pain control such as biofeedback, massage, imaging therapy, and physical therapy, where applicable.

PARM endorses the use of tricyclic antidepressants for the management of CPSP.

PARM suggests the use of anticonvulsants such as carbamazepine with a final dose of 800 mg for the management of CPSP with careful consideration of its potential side effects.

PARM endorses the selective use of lamotrigine (at a final dose of 200 mg/day) for the management of CPSP with careful consideration of its potential side effects.

PARM endorses cautious use of centrally acting analgesics for CPSP.

PARM suggests a referral to a specialist pain management team of any patient whose CPSP is not controlled within a few weeks.

PARM endorses referral to a health psychologist of any patient with CPSP.

DEEP VENOUS THROMBOEMBOLISM / PULMONARY EMBOLISM

PARM suggests that early mobilization and adequate hydration should be encouraged in all acute stroke patients to help prevent DVT and PE.

PARM recommends immediate initiation of venous thromboembolism prophylaxis for post-stroke patients at high risk.

PARM endorses antiplatelet therapy for people with ischemic stroke to help prevent DVT/PE. Low dose aspirin (300mg/day) should be given to all patients with acute ischemic stroke in the first two weeks following stroke onset.

PARM endorses the use of low molecular weight heparin for patients with acute ischemic stroke at high risk of venous thromboembolism or unfractionated heparin for patients with renal failure.

PARM does not endorse the use of anti-embolism stockings alone for post-stroke venous thromboembolism prophylaxis.

PARM suggests that antithrombotics and anticoagulants should be avoided for at least 48 hours after onset of intracerebral hemorrhage due to insufficient evidence on its safety and efficacy.

PARM recommends the cautious use of anticoagulant therapy during the first two weeks of ischemic stroke due to the risk of hemorrhagic stroke or hemorrhagic transformation of ischemic stroke.

PARM endorses the use of intermittent pneumatic compression to reduce the occurrence of DVT.

VOIDING DYSFUNCTION / INCONTINENCE

PARM suggests that all stroke patients should be screened for urinary incontinence and retention, by trained personnel using a standard medical and nursing assessment.

PARM suggests obtaining multi-disciplinary systematic professional input for the assessment and management of continence problems to improve outcomes especially in the acute phase of post-stroke rehabilitation.

PARM suggests a whole-team approach for the management of functional incontinence.

PARM suggests that a portable bladder ultrasound scan, a painless method for assessing post-void residual, should be used to assist in the diagnosis and management of urinary incontinence.

PARM suggests a routine and specific assessment of bladder function for the diagnosis of urinary incontinence, which includes assessment of urinary retention through the use of a bladder

scanner or in-and-out catheterization and measurement of urinary frequency, volume, control and presence of dysuria.

PARM suggests that stroke survivors with confirmed continence difficulties should have a formulated, documented, implemented and monitored continence management plan.

PARM suggests that a community continence management plan should be developed with the stroke survivor and family/carer prior to discharge and should include information on accessing continence resources and appropriate review in the community.

PARM suggests educating patients and their family/carers about catheter management, supply access and medical contact information in case of problems after discharge.

PARM suggests the use of intermittent catheterization for chronic and severe urinary retention. Indwelling catheters should be avoided as an initial management strategy except in acute urinary retention.

PARM suggests that for people with urinary retention using intermittent catheterization, a closed sterile catheterization technique should be used in the hospital.

PARM suggests the use of a prompted or scheduled voiding regime program/bladder retraining in persons with urge incontinence.

PARM recommends the use of anticholinergic drugs for those with urge incontinence.

PARM suggests the use of containment aids which can assist with social continence in patients where continence is unachievable.

PARM suggests reassessment and referral for specialist review for post-stroke patients with persistent incontinence.

PARM suggests the consideration of suprapubic or urethral catheterization in suitable patients with chronic urinary retention.

FECAL INCONTINENCE

PARM suggests that all stroke survivors with suspected fecal continence difficulties should be assessed using a structured functional assessment, including a rectal examination.

PARM suggests that patients should have individualized bowel programs that are patient centered.

PARM suggests that the individual's lifestyle and care preferences should be considered when designing a bowel program.

PARM suggests information provision, education and support for patient and caregiver as well as careful discharge planning and preparation for any patient discharged with bowel incontinence.

PARM recommends establishment of appropriate management of constipation, fecal overflow or bowel incontinence and provision of targeted education for stroke patients.

PARM suggests the use of bowel habit retraining using type and timing of diet for people who have bowel dysfunction.

PARM suggests the use of containment aids to assist with social continence if continence is unachievable.

DECUBITUS ULCERS AND CONTRACTURES

PARM suggests that all stroke survivors at risk should have a pressure care risk assessment completed upon admission by trained personnel, followed by regular evaluation.

PARM endorses that all stroke survivors assessed as high risk should be provided with appropriate pressure-relieving aids and strategies, use of proper positioning, turning, and transferring techniques and judicious use of barrier sprays, lubricants, and protective dressings and padding.

PARM suggests positioning of the hemiplegic shoulder in maximum external rotation while the patient is either sitting or in bed for 30 minutes daily in order to prevent development of shoulder contractures.

PARM suggests the use of resting hand/wrist splints, along with regular stretching and spasticity management in patients lacking active hand movement.

PARM suggests serial casting or static adjustable splints to reduce mild to moderate elbow and wrist contractures.

PARM suggests consideration of surgical release of brachialis, brachioradialis, and biceps muscles for substantial elbow contractures and associated pain.

PARM recommends the use of resting ankle splints at night and during assisted standing for prevention of ankle contracture in the hemiplegic limb.

TEMPERATURE MANAGEMENT / INFECTION

PARM suggests that temperature should be monitored as part of routine vital sign assessments.

PARM suggests the use of temperature-reducing measures, comprising of regular paracetamol and/or physical cooling measures, for the management of fever post-stroke.

PARM recommends initiation of appropriate antipyretic and antimicrobial therapy as required for signs of infection.

SLEEP APNEA

PARM endorses the use of CPAP or oral devices for stroke survivors with sleep apnea.

SEIZURES

PARM recommends that patients who have experienced post stroke seizure should receive monotherapy with an antiepileptic drug to prevent seizure recurrence.

PARM does not endorse the use of prophylactic antiepileptic drugs to prevent the first post stroke seizure.

12. Depression and mood disorders in stroke

Depression has been defined as a psychopathological feeling of sadness that may present as a diminished interest or pleasure in almost all activities, poor sleep, decreased appetite, or fatigue (Kaplan et al, 1994). It has been associated with poorer functional recovery, increased risk for dependence, poorer cognitive function, reduction in social participation and increased risk for mortality (CANADIAN 2013). Approximately one-third of post-stroke patients will exhibit symptoms of depression at some time following the stroke event, usually within the first three months (CANADIAN 2013; Hacket et al, 2005). Severity of functional limitations, stroke severity, cognitive impairment, previous history of depression and female sex have all been identified as important risk factors for the development of post-stroke depression (CANADIAN 2013; EBRSR 2016). Families and caregivers of post-stroke patients are also at risk for depression, with a reported incidence as high as 30-60% (CANADIAN 2013).

Depression may also be found to coexist with other mood disorders or psychiatric symptoms such as anxiety. The prevalence of anxiety among post-stroke patients was estimated at 20-29% but there are limited studies regarding its assessment and management in relation to stroke. Anxiety can create uncomfortable or disabling feelings of worry and fear accompanied by physical symptoms that can make participation in therapy more difficult (CANADIAN 2013; EBRSR 2016).

Appropriate and timely identification and treatment of post-stroke depression and other mood disorders are important to improve post-stroke outcomes. Provision of information and education as well as assessment of the family's/caregiver's psychosocial and support needs are also essential for the continuing recovery of post-stroke patients.

12.1 IDENTIFICATION

Table 103. Screening and assessment of mood disorders

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that patients with suspected altered mood (i.e. depression, anxiety, emotional lability) should be assessed by trained personnel using a standardized and validated scale, such as: <ul style="list-style-type: none">• Stroke Aphasic Depression Questionnaire (SAD-Q)• General Health Questionnaire of 12 items (GHQ-12)	NSF 2010	B GPP	Aben et al, 2002 Benaim et al, 2004 Bennet et al, 2006

<ul style="list-style-type: none"> • Hamilton Depression Rating Scale • Montgomery-Asberg Depression Scale • Patient Health Questionnaire 			
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Low volume – Non-current

2017 Updated Recommendations and Evidence Sources

<p>There is evidence that all patients with stroke should be screened for depressive symptoms using a validated tool, such as:</p> <ul style="list-style-type: none"> • Patient Health Questionnaire - 9 (PHQ-9) • Hamilton Depression Scale (HAM-D) • Stroke Aphasic Depression Questionnaire-10 (SADQ-10) 	CANADIAN 2013	Level A	Lowe et al, 2004
	CAMEROON 2013	Level A	SCORE, 2007
	AHA-ASA 2016	GPP	Winstein et al, 2016
	EBRSSR 2016	Level 1a	Schramke et al, 1998 Aben et al, 2002 Lincoln et al, 2003 Williams et al, 2004 Gabaldon et al, 2007 Salter et al, 2007 da Rocha e Silva et al, 2013 Kang et al, 2013 White et al, 2013 D'Aniello et al, 2014 Lees et al, 2014 Meader et al, 2014

Inconsistent level of evidence – High volume – Non-current – Uniform thought

ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.

PARM endorses that post-stroke patients with suspected altered mood (i.e. depression, anxiety, emotional lability) should be assessed using a standardized validated scale, such as the following:

- Stroke Aphasic Depression Questionnaire (SAD-Q)
- General Health Questionnaire of 12 items (GHQ-12)
- Hamilton Depression Rating Scale
- Montgomery-Asberg Depression Scale
- Patient Health Questionnaire

2011 Recommendation Statement

<p>There is some evidence that screening should be performed at certain transition periods, which may include:</p> <ol style="list-style-type: none"> a. upon admission to acute care, particularly if any evidence of depression or mood change is noted b. before discharge to the community from acute care 	CSS 2010	A	Duncan et al, 2005
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or during early rehabilitation if transferred to inpatient rehabilitation setting			
c. periodically during inpatient rehabilitation			
d. periodically following discharge to the community.			

Low volume – Non-current

2017 Updated Recommendations and Evidence Sources

There is insufficient evidence that screening should take place at various stages throughout the continuum of stroke care. Stages of care may include: a. during acute care stay, particularly if evidence of depression or mood changes are noted b. following hospital discharge from the emergency department or inpatient setting to an outpatient or community-based healthcare setting c. throughout rehabilitation within inpatient, outpatient, and home-based settings, according to client progress d. periodically, following discharge to the community, during follow-up appointments and/or during periodic health assessments with primary care practitioners and consulting specialists.	CANADIAN 2013	GPP	Lindsay et al, 2013
	CAMEROON 2013	Level A	SCORE, 2007

Inconsistent level of evidence – Low volume – Current – Uniform thought

ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.

PARM recommends that screening for mood disorders should be performed at certain transition periods or stages of stroke care. These transition periods may include the following:

- a. During acute care stay, particularly if evidence of depression or mood changes are noted
- b. Before or following hospital discharge from the emergency department or inpatient setting to an outpatient or community-based healthcare setting
- c. Throughout rehabilitation within inpatient, outpatient, and/or home-based settings, according to client progress
- d. Following discharge to the community, during follow-up appointments and/or during periodic health assessments with primary care practitioners and consulting specialists.

2017 Recommendation Statement

There is evidence that the Hospital Anxiety and Depression Scale (HADS) may be used to screen for mood alterations among post-stroke patients.	CANADIAN 2013 EBRSR 2016	Level A Level 5	Lowe et al, 2004 Schramke et al, 1998 Aben et al, 2002 Lincoln et al, 2003 Williams et al, 2004 Gabaldon et al, 2007 Salter et al, 2007 da Rocha e Silva et al, 2013 Kang et al, 2013 White et al, 2013 D'Aniello et al, 2014 Lees et al, 2014 Meader et al, 2014
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
PARM endorses the use of the Hospital Anxiety and Depression Scale (HADS) to screen for mood alterations among post-stroke patients.			

2017 Recommendation Statement			
There is strong evidence that the Center for Epidemiological Studies Depression Scale (CES-D) may be used to screen for depression among post-stroke patients.	CANADIAN 2013 EBRSR 2016	Level A Level 1a	Lowe et al, 2004 Schramke et al, 1998 Lincoln et al, 2003 Williams et al, 2004 Gabaldon et al, 2007 Salter et al, 2007 da Rocha e Silva et al, 2013 Kang et al, 2013 White et al, 2013 D'Aniello et al, 2014 Lees et al, 2014 Meader et al, 2014
Consistent level of evidence – High volume – Current – Uniform thought			
PARM strongly endorses the use of the Center for Epidemiological Studies Depression Scale (CES-D) to screen for depression among post-stroke patients.			

2017 Recommendation Statement			
There is insufficient evidence that the Post-Stroke Depression Predict Scale (DePres) may be used to detect post-stroke depression.	EBRSR 2016	Level 5	de Man-Van Ginkel et al, 2013
Low volume – Current			
PARM suggests the use of the Post-Stroke Depression Predict Scale (DePres) to detect post-stroke depression.			

2017 Recommendation Statement			
There is some evidence that the following scales may also be used	CANADIAN 2013	Level A	Lowe et al, 2004

<p>to screen for depression among post-stroke patients:</p> <ul style="list-style-type: none"> • Geriatric Depression Scale (GDS) • Beck Depression Inventory (BDI) • Aphasia Depression Rating Scale (ADRS) 			
Low volume – Non-current			
<p>PARM recommends the use of the following scales to screen for depression among post-stroke patients:</p> <ul style="list-style-type: none"> • Geriatric Depression Scale (GDS) • Beck Depression Inventory (BDI) • Aphasia Depression Rating Scale (ADRS) 			

2017 Recommendation Statement			
<p>There is some evidence that the following scales may be used to screen for mood alterations among pediatric post-stroke patients:</p> <ul style="list-style-type: none"> • Children's Depression Inventory (CDI) • Kidscreen 52 (Generic HRQL measure) 	CANADIAN 2013	Level A	Lowe et al, 2004
Low volume – Non-current			
<p>PARM recommends the use of the following scales to screen for mood alterations among pediatric post-stroke patients:</p> <ul style="list-style-type: none"> • Children's Depression Inventory (CDI) • Kidscreen 52 (Generic HRQL measure) 			

2017 Recommendation Statement			
<p>There is some evidence that screening should also include evaluation of risk factors for depression, such as:</p> <ul style="list-style-type: none"> • female sex • younger age • previous stroke • history of depression or psychiatric illness • severe disability/functional limitations • cognitive impairment 	CANADIAN 2013	Level C	Neau et al, 1992 Neau et al, 1998 Paolucci et al, 1999 Hackett & Anderson, 2005 Paolucci et al, 2005 Van de Port et al, 2007
	EBRSR 2016	GPP	Hou et al, 2013 Kouwenhoven et al, 2013 McCarthy et al, 2013 Ojagbemi et al, 2013 Paul et al, 2013 Tang et al, 2013a Tang et al, 2013c Zhang et al, 2013 Goldfinger et al, 2014 Huang et al, 2014 Jiang et al, 2014 Li et al, 2014

			Ojagbemi et al, 2014 Saxena et al, 2015 Tanislav et al, 2015
Consistent level of evidence – High volume – Current – Uniform thought			
PARM recommends that screening for post-stroke patients should also include evaluation of risk factors for depression, such as:			
<ul style="list-style-type: none"> • female sex • younger age • previous stroke • history of depression or psychiatric illness • severe disability/functional limitations • cognitive impairment 			

2017 Recommendation Statement

There is insufficient evidence that patients identified as at risk for mood disorders or depression during screening should be referred and managed by a mental health specialist or healthcare professional with expertise in diagnosis and management of mood disorders in stroke patients (i.e. psychiatrist or psychologist).	CAMEROON 2013	GPP	Fanfon et al, 2013
Low volume – Current			
PARM suggests that post-stroke patients at risk for mood disorders or depression during screening should be referred and managed by a mental health specialist or healthcare professional with expertise in diagnosis and management of mood disorders in stroke patients (i.e. psychiatrist or psychologist).			

2017 Recommendation Statement

There is evidence that patients and their families should be provided with information and education at all stages of care about the potential impact of stroke on their mood and that of family and caregivers. Patients and their caregivers should have their psychosocial and support needs assessed and reviewed on a regular basis (at least annually) as part of long-term stroke management. Ongoing, individualized contact and supportive communication may reduce the risk for deterioration of psychological health following stroke.	CANADIAN 2013	GPP	Lindsay et al, 2013
	CAMEROON 2013	Level A, B	Lindsay et al, 2010
	AHA-ASA 2016	Level B, Class I Level B, Class IIb	Bergersen et al, 2010 Chen et al, 2010
	EBRSR 2016	Level 1a, 1b, 2	Lincoln et al, 2003 Burton & Gibbon, 2005 Claiborne, 2006 Joubert et al, 2006 Joubert et al, 2008 Hackett et al, 2013 Rochette et al, 2013 Drummond et al, 2013 Ostwald et al, 2014
Inconsistent level of evidence – High volume – Non-current – Uniform thought			

PARM endorses the provision of periodic patient and caregiver/family education regarding the impact of stroke on their mood, regular assessment of their psychosocial and support needs (at least annually) and ongoing, individualized contact and supportive communication to reduce the risk for deterioration of psychological health following stroke.

12.2 PREVENTION

Table 104. Prevention of post-stroke depression

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that psychological strategies (i.e. problem solving and motivational interviewing) can be used to prevent depression after stroke. This can be incorporated with education programmes. One to one format is not recommended.	NSF 2010	B	Hackett et al. 2008a
	SIGN 2010	1++	Hackett et al. 2008a
Consistent level of evidence – Low volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that non-pharmacological, talk-based interventions including problem-solving therapy and motivational interviewing may be used to enhance rehabilitation and prevent depression post stroke.	CANADIAN 2013	Level B	Lincoln & Flanagan, 2003 Watkins et al, 2007 Hackett et al.,2008 Mitchell et al, 2009 Wilson et al, 2009 Watkins et al, 2011 Alexopoulos et al, 2012
	EBRSR 2016	Level 1a	Watkins et al, 2007 Watkins et al, 2011
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM strongly endorses the use of psychological strategies (i.e. problem solving and motivational interviewing) for the prevention of post-stroke depression. The strategy may be incorporated with education programs and administered in group format (with family or caregivers).			

2011 Recommendation Statement			
There is strong evidence that routine use of antidepressant to prevent stroke depression is not recommended.	NSF 2010	B	Hackett et al, 2008b
	SIGN 2010	1++	Ayana et al, 1998
	USVA/Dod 2010	1	Almeida et al, 2006 Anderson et al, 2004 Dam et al, 1996 Palomaki et al, 1999 Raffaele et al, 1996 Robinson et al, 2000
Consistent level of evidence – High volume – Non-current – Uniform thought			

2017 Updated Recommendations and Evidence Sources			
There is conflicting evidence for the use of prophylactic antidepressants to prevent post-stroke depression.	CANADIAN 2013	GPP	AGAINST: Lindsay et al, 2013
	CAMEROON 2013	Level A	AGAINST: Adams et al, 2007 Lindsay et al, 2010
	AHA-ASA 2016	GPP	UNKNOWN: Winstein et al, 2016
	EBRSR 2016	Level 1a	FOR: Palomäki et al, 1999 Narushima et al, 2002 Rasmussen et al, 2003 Niedermaier et al, 2004 Almeida et al, 2006 Robinson et al, 2008b Mikami et al, 2011 Chollet et al, 2011 Tsai et al, 2011 Mikami et al, 2013
Inconsistent level of evidence – High volume – Non-current – Variable thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM strongly endorses against the routine use of antidepressant medications to prevent post-stroke depression.			

2017 Recommendation Statement			
There is some evidence that the use of omega-3 fatty acid dietary supplementation (fish oil capsules) has no impact on mood post stroke.	EBRSR 2016	Level 1b	Hibbeln, 1998 Poppitt et al, 2009 Appleton et al, 2010
Low volume – Non-current			
PARM does not recommend the use of omega-3 fatty acid (fish oil) dietary supplementation to prevent post-stroke depression and/or mood disorders.			

2017 Recommendation Statement			
There is evidence that long-term vitamin B therapy may reduce the risk for depression following stroke.	EBRSR 2016	Level 1b	Tiemeier et al, 2002 Kim et al, 2008 Almeida et al, 2010 Huijts et al, 2012
Moderate volume – Non-current			
PARM endorses long-term vitamin B supplementation to reduce the risk of post-stroke depression.			

12.3 TREATMENT

12.3.1 PHARMACOLOGIC TREATMENT FOR POST-STROKE DEPRESSION

Table 105. Pharmacologic treatment for post-stroke depression

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that treatment should be monitored and should continue for a minimum of six months if a good response is to be achieved.	CSS 2010	A	-
Low volume			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that pharmacologic treatment should be regularly monitored and continued for a minimum of six months before slowly withdrawing the antidepressant, if a good response is achieved.	CANADIAN 2013	GPP	Lindsay et al, 2013
	CAMEROON 2013	Level A	Lindsay et al, 2010
Inconsistent level of evidence – Low volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM recommends that patients prescribed with antidepressants should be monitored every six months.			

2011 Recommendation Statement			
There is strong evidence that antidepressants can be used for patients who are depressed following due consideration of a benefit and risk profile for the individual and for those who are with emotional lability.	NSF 2010	B	Hackett et al, 2008b
No recommendation is made for the use of one class of antidepressants over another; however, side effect profiles suggest that selective serotonin reuptake inhibitors may be favored in this patient population.	SIGN 2010	1++	Hackett et al, 2008b
	USVA/Dod 2010	1	Andersen, 1995 Bhogal et al, 2005a Chen et al, 2006 Cole et al, 2001 Gill & Hatcher, 2000 Kimura et al, 2000 Miyai & Reeding, 1998 Ried et al, 2006 Robinson et al, 2000 Van de Meent et al, 2003 Wiart et al, 2000
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that patients diagnosed with post-stroke depression should be	CANADIAN 2013	Level A	Williams et al, 2000 Chen et al, 2006 Hackett et al, 2008

<p>treated with antidepressants in the absence of contraindications and closely monitored to verify effectiveness.</p> <p>No recommendation for the use of any particular class of antidepressants is made. SSRIs are commonly used and generally well tolerated in this patient population.</p>		Level B	Tuunainen et al, 2009 Coupland et al, 2011 Wu et al, 2011 Chen et al, 2007 Yi et al, 2010 Salter et al, 2012
	AHA-ASA 2016	Level A, Class III Level B, Class I	Gainotti et al, 2001 Bhogal et al, 2005 Hackett et al, 2008 Ried et al, 2011 Karaikos et al, 2012 Chollet et al, 2013
	EBRSR 2016	Level 1a	Andersen et al, 1994 Robinson et al, 2000 Wiart et al, 2000 Fruehwald et al, 2003 Choi-Kwon et al, 2006 Murray et al., 2005

Consistent level of evidence – High volume – Non-current – Uniform thought

ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.

PARM strongly endorses the use of antidepressants for post-stroke patients with depression and emotional lability following due consideration of a benefit-risk profile for the individual. No recommendation is made for the use of one class of antidepressants over another. However, side effect profiles suggest that selective serotonin reuptake inhibitors (SSRI) may be favorable for the post-stroke population.

2011 Recommendation Statement			
There is evidence that the use of heterocyclic antidepressants is not advised for patients with cardiac arrhythmia, heart block, urinary outlet obstruction and narrow-angle glaucoma. This relatively high incidence of side effects associated with heterocyclic antidepressants, especially in elderly patients, must be taken into account when deciding on their use.	CSS 2010	A	Fruehwald et al, 2003 Hackett et al, 2004 Lipsey et al, 1984 Robinson et al, 2000 Teasell et al. 2009
Moderate volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is evidence that heterocyclic antidepressants should be used with caution due to its side effects especially among elderly patients. These medications have also been linked to adverse cardiovascular, anticholinergic and antihistamine	EBRSR 2016	Level 1a	Lipsey et al, 1984 Finklestein et al, 1987 Lauritzen et al, 1994 Kumar, 1999 Robinson et al, 2000 Chen et al, 2006 Hackett et al, 2008 Steffens et al, 2008

effects as well as worsening of white matter lesions.			
High volume – Non-current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM does not endorse the use of heterocyclic antidepressants for the treatment of post-stroke depression in elderly patients and those with cardiac arrhythmia, heart block, urinary outlet obstruction and narrow-angle glaucoma.			

2017 Recommendation Statement			
There is some evidence that reboxetine, a norepinephrine reuptake inhibitor, may be an effective treatment for “retarded” post-stroke depression characterized by lethargy and slowness to initiate action.	EBRSR 2016	Level 1b	Rampello et al, 2005
Low volume – Non-current			
PARM recommends the use of reboxetine for the treatment of post-stroke depression characterized by lethargy and slowness to initiate action.			

2017 Recommendation Statement			
There is some evidence that duloxetine, a selective serotonin and norepinephrine reuptake inhibitor (SNRI), may improve depression symptoms post-stroke.	EBRSR 2016	Level 1b	Zhang et al, 2013
Low volume – Current			
PARM recommends the use of duloxetine for the treatment of post-stroke depression.			

2017 Recommendation Statement			
There is insufficient evidence that venlafaxine, an SNRI, may improve post-stroke depression.	EBRSR 2016	Level 4	Dahmen et al, 1999 Kucukalic et al, 2007
Low volume – Non-current			
PARM suggests the use of venlafaxine for the treatment of post-stroke depression.			

2017 Recommendation Statement			
There is some evidence that nefiracetam, a GABA compound, may not be effective in the treatment of post-stroke depression.	EBRSR 2016	Level 1b	Robinson et al, 2008
Low volume – Non-current			
PARM does not recommend the use of nefiracetam for the treatment of post-stroke depression.			

2017 Recommendation Statement			
There is evidence that methylphenidate, a psychostimulant, may be effective in treating symptoms of depression. Use with caution in individuals with cardiovascular disorders.	EBRSR 2016	Level 1b	Lingam et al, 1988 Masand et al, 1991 Johnson et al, 1992 Lazarus et al, 1992 Lazarus et al, 1994 Grade et al, 1998
Moderate volume – Non-current			
PARM endorses the use of methylphenidate for the treatment of post-stroke depression. Caution should be observed in individuals with cardiovascular disorders.			

2017 Recommendation Statement			
There is insufficient evidence that valdoxan, a melatonin agonist, may be used for the treatment of post-stroke depression.	EBRSR 2016	Level 4	Montgomery & Kasper, 2007 Bogolepova et al, 2011
Low volume – Non-current			
PARM suggests the use of valdoxan for the treatment of post-stroke depression.			

2017 Recommendation Statement			
There is some evidence that the use of Free and Easy Wanderer Plus (FEWP), a herbal medicine, may be as effective as fluoxetine in the treatment of post-stroke depression. Further research is required.	EBRSR 2016	Level 1b	Zhang et al, 2007 Li et al, 2008 Davidson & Zhang, 2008
Low volume – Non-current			
PARM recommends the use of Free and Easy Wanderer Plus (FEWP), a herbal medicine, for the treatment of post-stroke depression. However, further research is still required.			

12.3.2 PSYCHOLOGICAL TREATMENT FOR POST-STROKE DEPRESSION

Table 106. Psychological treatment for post-stroke depression

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that psychological intervention (cognitive behavioral intervention) can be used for stroke patients who are depressed.	NSF 2010	B	Hackett et al, 2008a
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is conflicting evidence for the use of psychotherapy and cognitive behavioral therapy (CBT) for post-stroke depression.	CANADIAN 2013	Level C	UNCERTAIN: Lincoln & Flanagan, 2003 Hackett et al, 2008 Wilson et al, 2009

These therapies could be considered where appropriate at the discretion of the mental health expert.			Mitchell et al, 2009 Alexopoulos et al, 2012
	AHA-ASA 2016	Level B, Class IIb	UNCERTAIN: Hackett et al, 2008
	EBRSR 2016	Level 1b Level 1a	FOR: Thomas et al, 2013 Humphreys et al, 2015 AGAINST: Lincoln et al, 1997 Lincoln et al, 2003 Chang et al, 2011 Johansson et al, 2012 Hoffmann et al, 2015
Inconsistent level of evidence – High volume – Non-current – Variable thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM recommends the use of psychological intervention (cognitive behavioral intervention and psychotherapy) in the management of post-stroke depression.			

2017 Recommendation Statement			
There is evidence that psychosocial behavioral therapy (CBT and psychotherapy) may be used as an effective adjunct to treatment with antidepressants for post-stroke depression.	CANADIAN 2013	Level C	Watkins et al, 2007 Robinson et al, 2008 Watkins et al, 2011
	AHA-ASA 2016	GPP	Winstein et al, 2016
	EBRSR 2016	Level 1b	Sondergaard et al, 2006 Hackett et al, 2008 Joubert et al, 2008 Mitchell et al, 2009 Cao et al, 2013 Yan et al, 2015
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
PARM endorses the use of psychosocial behavioral therapy (CBT and psychotherapy) as an effective adjunct to pharmacologic treatment with antidepressants for post-stroke depression.			

2017 Recommendation Statement			
There is some evidence that patients with mild depressive symptoms or those diagnosed with minor depression may initially be managed by “watchful waiting”.	CANADIAN 2013	B	van't Veer-Tazelaar et al, 2009 Dozeman et al, 2012
Low volume – Non-current			
PARM recommends that patients with mild depressive symptoms or those diagnosed with minor depression may initially be managed by “watchful waiting”.			

12.3.3 ALTERNATIVE TREATMENT STRATEGIES FOR POST-STROKE DEPRESSION

Table 107. Alternative treatment strategies for post-stroke depression

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is conflicting evidence for the use of exercise training as a complementary treatment for post-stroke depression.	CANADIAN 2013	Level C	FOR: Tuuainen et al, 2009 Zhang et al, 2010 Graven et al, 2011
	AHA-ASA 2016	Level B, Class IIb	FOR: Gainotti et al, 2001 Sigwalt et al, 2011 Woods et al, 2002 Sjosten et al, 2006 Mead et al, 2009 de Man-van Ginkel et al, 2010 Saunders et al, 2013 Eng & Reime, 2014
	EBRSR 2016	Level 1a, 2	AGAINST: Sjosten & Kivela, 2006 Lai et al, 2006 Mead et al, 2007 Lennon et al, 2008 Macko et al, 2008 Smith & Thompson, 2008 Brittle et al, 2009 Sims et al, 2009 Stuart et al, 2009 Harrington et al, 2010 Van de Port et al, 2012 Batcho et al, 2013 Taylor-Piliae et al, 2013 Immink et al, 2014 Baek et al, 2014 McDonnell et al, 2014 Ploughman et al, 2014 Taricco et al, 2014 Linder et al, 2015 Topcuoglu et al, 2015
Inconsistent level of evidence – High volume – Non-current – Variable thought			
PARM suggests the use of exercise training as a complementary treatment for post-stroke depression.			

2017 Recommendation Statement			
There is some evidence that light therapy may be an effective adjunct to SSRI antidepressants for the treatment of post-stroke depression	EBRSR 2016	Level 1a, 1b	Sondergaard et al. 2006

and non-seasonal depression, in general.			
Low volume – Non-current			
PARM recommends the use of light therapy as an adjunct to pharmacologic treatment (i.e. SSRI) of post-stroke depression.			

2017 Recommendation Statement			
There is conflicting evidence for the use of music therapy as an adjunct treatment for post-stroke depression.	CANADIAN 2013	Level C	FOR: Sarkamo et al, 2008 Jun et al, 2012
	EBRSR 2016	Level 1b, 2	AGAINST: Marwick, 1996 Purdie et al, 1997 Nayak et al, 2000 Sarkamo et al, 2008 Kim et al, 2011 Jun et al, 2013
Inconsistent level of evidence – High volume – Non-current – Variable thought			
PARM suggests the use of music therapy as an adjunct treatment for post-stroke depression.			

2017 Recommendation Statement			
There is insufficient evidence that art therapy may improve post-stroke depression.	EBRSR 2016	Level 4	Ali et al, 2014
Low volume – Current			
PARM suggests the use of art therapy for the treatment of post-stroke depression.			

2017 Recommendation Statement			
There is some evidence that relaxing therapies (unilateral nostril breathing) may not improve post-stroke depression symptomatology.	EBRSR 2016	Level 2	Manzoni et al, 2008 Kneebone et al, 2014 Marshall et al, 2014
Low volume – Current			
PARM does not recommend the use of relaxing therapies for the treatment of post-stroke depression.			

2017 Recommendation Statement			
There is evidence that acupuncture may not improve post-stroke depression.	EBRSR 2016	Level 1b, 2	Sze et al, 2002 Wayne et al, 2005 Youn et al, 2013 Jong-In et al, 2013 Man et al, 2014
Moderate volume – Current			
PARM does not endorse the use of acupuncture for the treatment of post-stroke depression.			

2017 Recommendation Statement			
There is evidence that repetitive transcranial magnetic stimulation (rTMs) as an adjunct treatment may	EBRSR 2016	Level 1a	Janicak et al, 2002 Loo et al, 2003 Grunhaus et al, 2003 Jorge et al, 2004

reduce symptoms of post-stroke depression.			Kim et al, 2010
Moderate volume – Non-current			
PARM endorses the use of transcranial magnetic stimulation (rTMs) as an adjunct treatment for post-stroke depression.			

2017 Recommendation Statement			
There is insufficient evidence for the use of electroconvulsive therapy (ECT) for the treatment of short-term depressive symptoms post-stroke.	EBRSR 2016	Level 3	Murray et al, 1986 Currier et al, 1992 Janicak et al, 2002 Harmandayan et al, 2012
Moderate volume – Non-current			
PARM suggests the use of electroconvulsive therapy as an adjunct treatment for short-term depressive symptoms in post-stroke patients.			

2017 Recommendation Statement			
There is some evidence that hyperbaric oxygen therapy (HBOT) combined with dexamethasone or fluoxetine may improve post-stroke depression.	EBRSR 2016	Level 1a	Cao et al, 2013 Yan et al, 2015
Low volume – Current			
PARM recommends the use of hyperbaric oxygen therapy as an adjunct to pharmacologic treatment of post-stroke depression.			

12.3.4 TREATMENT STRATEGIES FOR POST-STROKE ANXIETY

Table 108. Treatment strategies for post-stroke anxiety

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is evidence that patients with marked anxiety should be offered psychological therapy, if possible.	CANADIAN 2013	Level B	Campbell & Burton et al, 2011
	CAMEROON 2013	Level B	Lindsay et al, 2010
Consistent level of evidence – Low volume – Non-current – Uniform thought			
PARM endorses the use of psychological therapy for the treatment of post-stroke anxiety.			

2017 Recommendation Statement			
There is some evidence that massage therapy may improve post-stroke anxiety.	EBRSR 2016	Level 2	Dunn et al, 1995 Mok & Woo, 2004
Low volume – Non-current			
PARM recommends the use of massage therapy for the treatment of post-stroke anxiety.			

2017 Recommendation Statement			
There is some evidence that relaxing therapies (unilateral nostril breathing) may not improve post-stroke anxiety symptomatology.	EBRSR 2016	Level 2	Manzoni et al, 2008 Kneebone et al, 2014 Marshall et al, 2014
Low volume – Current			
PARM does not recommend the use of relaxing therapies for the treatment of post-stroke anxiety.			

2017 Recommendation Statement			
There is insufficient evidence that art therapy may improve post-stroke anxiety.	EBRSR 2016	Level 4	Ali et al, 2014
Low volume – Current			
PARM suggests the use of art therapy for the treatment of post-stroke anxiety.			

2017 Recommendation Statement			
There is insufficient evidence for the use of pharmacotherapy as an adjunct to psychotherapy for the treatment of post-stroke anxiety.	CANADIAN 2013	Level C	Campbell & Burton et al, 2011
Low volume – Non-current			
PARM suggests the use of pharmacotherapy as an adjunct to psychotherapy for the treatment of post-stroke anxiety.			

12.3.5 TREATMENT FOR POST-STROKE EMOTIONAL INCONTINENCE

Table 109. Treatment for post-stroke emotional incontinence

Recommendation	Guideline	Body of Evidence	References
2017 Recommendation Statement			
There is strong evidence that antidepressants may be effective in the treatment of post-stroke emotional incontinence. Side effect profiles suggest that selective serotonin reuptake inhibitors may be preferred for the stroke population.	CANADIAN 2013	Level A	Hackett et al, 2010
	CAMEROON 2013	Level A	Adams et al, 2007
	EBRSR 2016	Level 1a	Andersen et al, 1993 Robinson et al, 1993 Andersen, 1995 Andersen, 1997 Brown et al, 1998 Burns et al, 1999 Kim & Choi-Kwon, 2000 House et al, 2004 Choi-Kwon et al, 2006 Choi-Kwon et al, 2008
Consistent level of evidence – High volume – Non-current – Uniform thought			
PARM strongly endorses the use of antidepressant medications (i.e. SSRI) for the treatment of post-stroke emotional incontinence			

12.4 PARM CONTEXT POINTS

Table 110. Context points for minimum and additional standard care of practice for the screening and assessment of post-stroke mood disorders

	Minimum standard care of practice	Additional standard care of practice
Practice method	<p>Screening</p> <ul style="list-style-type: none"> - Review/Evaluate for risk factors - Use standardized scales for assessment <p>Provide patient and caregiver education and assess their psychosocial needs</p> <p>Referral to mental health specialist</p>	Coordination with social worker, community support team
Equipment	<p>Assessment room</p> <p>At least one assessment scale for mood disorders</p>	<p>Group/Family Assessment room</p> <p>All available assessment scales for mood disorders</p>
Workforce	<p>Attending physician</p> <p>Psychologist/Psychiatrist</p>	<p>Social worker</p> <p>Community Support Team</p> <p>Developmental pediatrician (for pediatric patients)</p>
Training	<p>Within competency</p> <p>Administration and interpretation of one assessment tool for mood disorders</p>	<p>Within competency</p> <p>Administration and interpretation of available assessment tools for mood disorders</p>
When is it done	<ul style="list-style-type: none"> - During acute care stay - After discharge - During follow up 	<p>Periodic assessment:</p> <ul style="list-style-type: none"> - During acute care stay - Before or after discharge - Throughout rehabilitation - Following discharge to the community
Reassessment using at least one standard outcome measure	<p>Every 3 months from initial assessment</p> <p>Include family/caregiver in assessment</p>	<p>Monthly for 6 months then every 3 months</p> <p>After 1 year from completion of treatment plans</p> <p>Include family/caregiver in assessment</p>

Table 111. Context points for minimum and additional standard care of practice for the prevention, management and treatment of post-stroke depression

	Minimum standard care of practice	Additional standard care of practice
Practice method	<p>Prevention</p> <ul style="list-style-type: none"> - Psychological strategies (i.e. problem solving and motivational interviewing) - Long-term vitamin B supplementation <p>Pharmacologic management</p> <ul style="list-style-type: none"> - SSRI antidepressants - Reboxetine - Duloxetine - Methylphenidate <p>Psychological treatment</p> <ul style="list-style-type: none"> - Watchful waiting (mild) - CBT and psychotherapy <p>Other forms of management</p> <ul style="list-style-type: none"> - Exercise training 	<p>Pharmacologic management</p> <ul style="list-style-type: none"> - Venlafaxine - Valdoxan - Herbal medications (i.e. Free and Easy Wanderer Plus (FEWP)) <p>Other non-invasive forms of management</p> <ul style="list-style-type: none"> - Light therapy - Music therapy - Art therapy <p>Invasive forms of management</p> <ul style="list-style-type: none"> - ECT - rTMS - HBOT
Equipment	<p>Psychotherapy Room</p> <p>Physical/Occupational Therapy Rooms</p>	<p>Lighting equipment</p> <p>Music/Art equipment and tools</p> <p>Equipment for rTMS/ECT/HBOT and treatment room with emergency kit</p>
Workforce	<p>Attending physician</p> <p>Neurologist</p> <p>Psychologist/Psychiatrist</p> <p>Physical therapist/Occupational therapist</p> <p>Nurse/Aide</p>	<p>Therapists/Technicians (for special treatment and equipment)</p> <p>Anesthesiologist</p> <p>Developmental pediatrician (for pediatric patients)</p>
Training	Within competency	<p>Within competency</p> <p>Proper technique and administration of light therapy, rTMS/ECT/HBOT</p>
When is it done	<p>Upon consultation</p> <p>Upon appointment with therapists and other specialists</p>	<p>Upon consultation</p> <p>Upon appointment with therapists and other specialists</p>
Reassessment using at least one standard outcome measure	<p>Every 6 months</p> <p>Assess mood symptoms every consult</p> <p>Include family/caregiver in assessment</p>	<p>Every 3-6 months</p> <p>Assess mood symptoms every consult</p> <p>Include family/caregiver in assessment</p>

Table 112. Context points for minimum and additional standard care of practice for the management and treatment of other post-stroke mood disorders

	Minimum standard care of practice	Additional standard care of practice
Practice method	<i>Post-stroke anxiety management</i> <ul style="list-style-type: none"> - Psychological therapy - Massage therapy <i>Post-stroke emotional incontinence management</i> <ul style="list-style-type: none"> - Antidepressants (SSRI) 	Post-stroke anxiety management <ul style="list-style-type: none"> - Pharmacotherapy + Psychological therapy - Art therapy
Equipment	Psychotherapy Room Physical/Occupational Therapy Rooms	Art equipment and tools
Workforce	Attending physician Psychologist/Psychiatrist Physical therapist/Occupational therapist Nurse/Aide	Art therapist Developmental pediatrician (for pediatric patients)
Training	Within competency	Within competency
When is it done	Upon consultation Upon appointment with therapists and other specialists	Upon consultation Upon appointment with therapists and other specialists
Reassessment using at least one standard outcome measure	Every 6 months Assess mood symptoms every consult Include family/caregiver in assessment	Every 3-6 months Assess mood symptoms every consult Include family/caregiver in assessment

12.5 SUMMARY OF PARM RECOMMENDATION STATEMENTS

IDENTIFICATION

PARM endorses that post-stroke patients with suspected altered mood (i.e. depression, anxiety, emotional lability) should be assessed using a standardized validated scale, such as the following:

- Stroke Aphasic Depression Questionnaire (SAD-Q)
- General Health Questionnaire of 12 items (GHQ-12)
- Hamilton Depression Rating Scale
- Montgomery-Asberg Depression Scale
- Patient Health Questionnaire

PARM recommends that screening for mood disorders should be performed at certain transition periods or stages of stroke care. These transition periods may include the following:

- a. During acute care stay, particularly if evidence of depression or mood changes are noted
- b. Before or following hospital discharge from the emergency department or inpatient setting to an outpatient or community-based healthcare setting
- c. Throughout rehabilitation within inpatient, outpatient, and/or home-based settings, according to client progress
- d. Following discharge to the community, during follow-up appointments and/or during periodic health assessments with primary care practitioners and consulting specialists.

PARM endorses the use of the Hospital Anxiety and Depression Scale (HADS) to screen for mood alterations among post-stroke patients.

PARM strongly endorses the use of the Center for Epidemiological Studies Depression Scale (CES-D) to screen for depression among post-stroke patients.

PARM suggests the use of the Post-Stroke Depression Predict Scale (DePres) to detect post-stroke depression.

PARM recommends the use of the following scales to screen for depression among post-stroke patients:

- Geriatric Depression Scale (GDS)
- Beck Depression Inventory (BDI)
- Aphasia Depression Rating Scale (ADRS)

PARM recommends the use of the following scales to screen for mood alterations among pediatric post-stroke patients:

- Children's Depression Inventory (CDI)
- Kidscreen 52 (Generic HRQL measure)

PARM recommends that screening for post-stroke patients should also include evaluation of risk factors for depression, such as:

- female sex
- younger age
- previous stroke
- history of depression or psychiatric illness
- severe disability/functional limitations
- cognitive impairment

PARM suggests that post-stroke patients at risk for mood disorders or depression during screening should be referred and managed by a mental health specialist or healthcare professional with expertise in diagnosis and management of mood disorders in stroke patients (i.e. psychiatrist or psychologist).

PARM endorses the provision of periodic patient and caregiver/family education regarding the impact of stroke on their mood, regular assessment of their psychosocial and support needs (at least annually) and ongoing, individualized contact and supportive communication to reduce the risk for deterioration of psychological health following stroke.

PREVENTION

PARM strongly endorses the use of psychological strategies (i.e. problem solving and motivational interviewing) for the prevention of post-stroke depression. The strategy may be incorporated with education programs and administered in group format (with family or caregivers).

PARM strongly endorses against the routine use of antidepressant medications to prevent post-stroke depression.

PARM does not recommend the use of omega-3 fatty acid (fish oil) dietary supplementation to prevent post-stroke depression and/or mood disorders.

PARM endorses long-term vitamin B supplementation to reduce the risk of post-stroke depression.

TREATMENT

PHARMACOLOGIC TREATMENT FOR POST-STROKE DEPRESSION

PARM recommends that patients prescribed with antidepressants should be monitored every six months.

PARM strongly endorses the use of antidepressants for post-stroke patients with depression and emotional lability following due consideration of a benefit-risk profile for the individual. No recommendation is made for the use of one class of antidepressants over another. However, side effect profiles suggest that selective serotonin reuptake inhibitors (SSRI) may be favorable for the post-stroke population.

PARM does not endorse the use of heterocyclic antidepressants for the treatment of post-stroke depression in elderly patients and those with cardiac arrhythmia, heart block, urinary outlet obstruction and narrow-angle glaucoma.

PARM recommends the use of reboxetine for the treatment of post-stroke depression characterized by lethargy and slowness to initiate action.

PARM recommends the use of duloxetine for the treatment of post-stroke depression.

PARM suggests the use of venlafaxine for the treatment of post-stroke depression.

PARM does not recommend the use of nefiracetam for the treatment of post-stroke depression.

PARM endorses the use of methylphenidate for the treatment of post-stroke depression. Caution should be observed in individuals with cardiovascular disorders.

PARM suggests the use of valdoxan for the treatment of post-stroke depression.

PARM recommends the use of Free and Easy Wanderer Plus (FEWP), a herbal medicine, for the treatment of post-stroke depression. However, further research is still required.

PSYCHOLOGICAL TREATMENT FOR POST-STROKE DEPRESSION

PARM recommends the use of psychological intervention (cognitive behavioral intervention and psychotherapy) in the management of post-stroke depression.

PARM endorses the use of psychosocial behavioral therapy (CBT and psychotherapy) as an effective adjunct to pharmacologic treatment with antidepressants for post-stroke depression.

PARM recommends that patients with mild depressive symptoms or those diagnosed with minor depression may initially be managed by “watchful waiting”.

ALTERNATIVE TREATMENT STRATEGIES FOR POST-STROKE DEPRESSION

PARM suggests the use of exercise training as a complementary treatment for post-stroke depression.

PARM recommends the use of light therapy as an adjunct to pharmacologic treatment (i.e. SSRI) of post-stroke depression.

PARM suggests the use of music therapy as an adjunct treatment for post-stroke depression.

PARM suggests the use of art therapy for the treatment of post-stroke depression.

PARM does not recommend the use of relaxing therapies for the treatment of post-stroke depression.

PARM does not endorse the use of acupuncture for the treatment of post-stroke depression.

PARM endorses the use of transcranial magnetic stimulation (rTMs) as an adjunct treatment for post-stroke depression.

PARM suggests the use of electroconvulsive therapy as an adjunct treatment for short-term depressive symptoms in post-stroke patients.

PARM recommends the use of hyperbaric oxygen therapy as an adjunct to pharmacologic treatment of post-stroke depression.

TREATMENT STRATEGIES FOR POST-STROKE ANXIETY

PARM endorses the use of psychological therapy for the treatment of post-stroke anxiety.

PARM recommends the use of massage therapy for the treatment of post-stroke anxiety.

PARM does not recommend the use of relaxing therapies for the treatment of post-stroke anxiety.

PARM suggests the use of art therapy for the treatment of post-stroke anxiety.

PARM suggests the use of pharmacotherapy as an adjunct to psychotherapy for the treatment of post-stroke anxiety.

TREATMENT FOR POST-STROKE EMOTIONAL INCONTINENCE

PARM strongly endorses the use of antidepressant medications (i.e. SSRI) for the treatment of post-stroke emotional incontinence.

13. Community-based rehabilitation and reintegration

Transition from in-patient rehabilitation to the community setting is often a challenging task for the stroke survivor and the patient's support system. Most of the concepts in in-patient rehabilitation is also applicable in community based rehabilitation, however, specific issues such as the role of the caregivers/ family members, return to work and leisure, sexuality and driving poses a challenge for the patient, unique in the out-patient setting.

13.1 SELF-MANAGEMENT

Table 113. Approaches to self-management post-stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that stroke survivors living in the community who have difficulty with activities of daily living should have access to therapy, where appropriate, to improve or prevent deterioration in activities of daily living.	CSS	A	National Stroke Foundation 2005
	SIGN 2010	1+	Intercollegiate Stroke Working Party 2008
	NSF	C	Lorig et al, 2001 Kendall et al, 2007 Outpatient Service Trialist 2003 Scottish Government 2009
Inconsistent level of evidence – Moderate volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that stroke survivors living in the community who have difficulty with ADLs, IADLs and mobility should have access to therapy, as well as evaluation, where appropriate, to improve or prevent deterioration in activities of daily living.	CAMEROON 2013	C	Working group consensus 2013
	AHA-ASA 2016	1A	Graven et al, 2011 Ryan et al, 2006
Inconsistent level of evidence – Low volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM recommends that stroke survivors living in the community who have difficulty with ADLs, IADLs and mobility should have access to therapy, as well as evaluation, where appropriate, to improve or prevent deterioration in activities of daily living.			
2011 Recommendation Statement			
There is evidence that patients with aphasia should be taught	CSS	A	Out-patient service Trialist 2003

supportive conversation techniques.	NSF	A	Cherney et al, 2008
Consistent level of evidence – Low volume – Current – Uniform thought			
2017: No new evidence			
PARM endorses that patients with aphasia should be taught supportive conversation techniques.			

2011 Recommendation Statement			
There is strong evidence that patients with dysphagia should be offered swallowing therapy and opportunity for reassessment as required.	CSS	A	Martino et al, 2000 Perry and Love, 2001
	NSF	B	Ashford et al, 2009 Connolly & Smith, 2003 Hinchey et al, 2005 Ramsey et al, 2003 Westergren, 2006
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that patients with dysphagia should undergo swallowing evaluation and management.	CAMEROON	B	AU NSF 2010
Low volume – Non-current			
ADAPTE I: The recommendation remained unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM strongly endorses that stroke patients with dysphagia should be offered swallowing therapy and opportunity for reassessment as required.			

2011 Recommendation Statement			
There is some evidence that patient education should promote self-efficacy through mastering self-management skills, including action planning, modelling behaviors and problem-solving strategies, reinterpreting symptoms and social persuasion through group support and guidance for individual efforts.	CSS	B	Duncan et al, 2005 USVA/DoD 2003
	NSF	C	Fu et al, 2003 Lorig et al, 1999 Warsi et al, 2004
Inconsistent level of evidence – Moderate volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that a specialized social support intervention that includes the stroke patient's social support network may not be effective in improving perceived social support or functional recovery. However, this may be beneficial for healthier, non-frail stroke survivors.	EBRSR 2016	1B, 2A	Towle et al, 1989 Christie & Weigall, 1984

<p>Low volume – Non-current</p> <p>ADAPTE I: The recommendation remained unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.</p> <p>PARM recommends that patient education should promote self-efficacy through mastering self-management skills, including action planning, modeling behaviors and problem-solving strategies, reinterpreting symptoms and social persuasion through group support and guidance for individual efforts.</p>
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2011 Recommendation Statement			
There is evidence that people with difficulties in mobility should be offered an exercise program specific to those difficulties and monitored throughout the program.	CSS	B	Intercollegiate Stroke Working Party 2008 National Stroke Foundation 2005 Outpatient Service Trialists 2003
Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017: No new evidence			
PARM endorses that people with difficulties in mobility should be offered an exercise program specific to those difficulties and monitored throughout the program.			

2017 Recommendation Statement			
There is strong evidence that rehabilitation should be continued after discharge from in-patient and outpatient services during the first year after stroke at a frequency appropriate to the needs of the client.	CAMEROON 2013	A	Adams et al, 2007
	AHA-ASA 2016	Class IIA, Level B	Allison, 2011 Prvu Bettger, 2012 Shepperd, 2013
Consistent level of evidence – Moderate volume – Current – Uniform thought			
PARM strongly endorses that rehabilitation should be continued after discharge from in-patient and outpatient services during the first year after stroke at a frequency appropriate to the needs of the client.			

2017 Recommendation Statement			
There is some evidence that acute care hospitals and rehabilitation facilities should maintain up-to-date inventories of community resources.	AHA-ASA 2016	Class I, Level C	White, 2007
Low volume – Non-current			
PARM recommends that acute care hospitals and rehabilitation facilities should maintain up to date inventories of community resources.			

2017 Recommendation Statement			
There is evidence that information about local resources be provided to the patient and family.	AHA-ASA 2016	Class I, Level C	White, 2007
	EBRSR 2016	Class I, Level A	Glass et al, 2004 Friedland, 1992
Consistent level of evidence – Low volume – Non-current – Uniform thought			

PARM suggests that information on local resources be provided to the patient and family upon discharge.

2017 Recommendation Statement

There is insufficient evidence that contact with community resources be offered through formal or informal referral.	CAMEROON 2013	C	Working group consensus 2013
	AHA-ASA 2016	Class I, Level C	Forster, 2012

Inconsistent level of evidence – Low volume – Current – Uniform thought

PARM suggests that contact with community resources be offered through formal or informal referral.

2017 Recommendation Statement

There is insufficient evidence that identification and management of post-stroke depression should also be considered as part of follow-up and evaluation of stroke survivors in the community.	CAMEROON 2013	C	AU NSF 2010 CMAJ 2010
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Low volume – Non-current

PARM suggests the identification and management of post-stroke depression as part of follow-up and evaluation of stroke survivors in the community.

2017 Recommendation Statement

There is some evidence that early attendance (within 6 months of stroke) at a day service is associated with improved participation in leisure activities.	EBRSR 2016	Class I, Level B	Corr et al, 2004
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Low volume – Non-current

PARM recommends that attendance within 6 months of stroke at a day service improves participation in leisure activities.

2017 Recommendation Statement

There is evidence that home-based support and care management interventions are not associated with improved social activity, mood, quality of life or physical independence.	EBRSR 2016	Class I, Level A	Allen et al, 2009 Dennis et al, 1997 Forster et al, 2009 Mant et al, 2000 Mayo et al, 2008 Burton and Gibbon 2005 Tilling et al, 2005 Boter et al, 2004 Drummond et al, 2013 Forster and Young 1996 Claiborne 2006 Lincoln et al, 2003
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High volume – Non-current

PARM does not endorse home-based support and care management for improving social activity, mood, quality of life or physical independence.

2017 Recommendation Statement			
There is evidence that participation in an online program providing information and support through contact with both a nurse and other caregivers has no impact on depression or life satisfaction.	EBRSR 2016	Class I, Level B	Wang et al, 2015 Franzen-Dahlin et al, 2008 Malini 2015 Smith et al, 2012 Pierce et al, 2009 Steiner et al, 2008
Moderate volume – Current			
PARM does not endorse the use of online programs providing information and support through contact with a nurse and other caregivers in the management of depression or life satisfaction.			

13.2 DRIVING

Table 114. Approaches to return to driving post-stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that stroke survivors should not return to driving for at least one month post event. A follow-up assessment (normally undertaken by a general physician (GP) or specialist) should be conducted prior to driving to assess suitability.	NSF	GPP	National Transport Commission 2010 Unsworth 2007
	SIGN 2010	GPP	DVLA 2011 Lovell and Russell, 2005
	PNA	Class I, Level C	Duncan et al, 2005 DVLA 2008 New Zealand Stroke Foundation 2003
Consistent level of evidence – Moderate volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that stroke survivors should not return to driving for at least one month.	CANADIAN 2013	C	SIGN 2010
Low volume – Non-current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM suggests that stroke survivors should not return to driving for at least one month. Follow-up assessment should be conducted prior to driving to assess suitability.			

2011 Recommendation Statement			
There is insufficient evidence that patients with a single TIA may resume driving after at least one month from the incident for non-professional license holders, and at	PNA	Class IIIB Level C	DVLA 2008 New Zealand Stroke Foundation 2003

least 6 weeks for professional license holders, provided the cause of the TIA is identified and treated. The patient would be subject to regular assessment.			
Low volume - Current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that individuals who have experienced one or multiple TIAs should be instructed not to resume driving until a comprehensive neurological assessment shows no residual loss of functional ability, to include motor function and cognitive ability, discloses no obvious risk of sudden re-occurrence and any underlying cause has been addressed with appropriate treatment.	CANADIAN 2013	C	White, 2002 CCMTA Medical Standards for Drivers 2013
Low volume – Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM suggests that individuals who have experienced one or multiple TIAs should be instructed not to return to driving until a comprehensive neurological assessment shows no residual loss in functional ability (including cognitive and motor) and the underlying cause of the TIA has been treated.			

2011 Recommendation Statement			
There is some evidence that any patient who does wish to drive should be informed that they are required to report their condition to the relevant driver license authority and notify their car insurance company before returning to driving.	NSF	GPP	National Transport Commission 2010
	USVA/Dod	GPP	Lovell and Russell, 2005
	SIGN 2010	GPP	Unsworth, 2007 EBRSR 2009
Consistent level of evidence – Moderate volume – Current – Uniform thought			
2017: No new evidence			
PARM recommends that any patient who does wish to drive should be informed that they are required to report their condition to the relevant driver license authority and notify their car insurance company before returning to driving.			

2011 Recommendation Statement			
There is some evidence that emphasis should not only be given to functional assessment, but to cognitive and behavioral assessment of an individual after stroke. If there is a doubt regarding	PNA	Class I Level B	Dobbs, 2005 Doege & Engelberg, 1986 Yale, 2003

cognitive consequence of stroke, it is advised that patient be referred to a neuropsychologist for psychometric tests.			
Low volume – Non-current			
2017: No new evidence			
PARM recommends that emphasis should not only be given to functional assessment, but to cognitive and behavioral assessment of an individual after stroke. If there is a doubt regarding cognitive consequence of stroke, it is advised that patient be referred to a neuropsychologist for psychometric tests.			

2017 Recommendation Statement			
There is evidence that patients returning to driving should be screened for any residual sensory, motor and cognitive deficits to ascertain readiness to return to driving according to safety and local laws.	AHA-ASA 2016	Class IIa, Level B	Devos, 2010
	CANADIAN 2013	Level B	White, 2012
Consistent level of evidence – Low volume – Non-current – Uniform thought			
PARM endorses that patients returning to driving should be screened for any residual sensory, motor and cognitive deficits to ascertain readiness to return to driving according to safety and local laws.			

2011 Recommendation Statement			
There is some evidence that patients with stroke related seizures may be allowed to resume driving after at least 3 months seizure free interval.	PNA	Class I Level B	New Zealand Stroke Foundation 2003
Low volume – Non-current			
2017: No new evidence			
PARM recommends that patients with stroke related seizures may be allowed to resume driving after at least 3 months' seizure free interval.			

2011 Recommendation Statement			
There is evidence that the presence of homonymous hemianopsia or homonymous quadrantanopia is considered unsafe for driving. If indicated, visual field assessment may be recommended to determine fitness to drive.	PNA	Class IIB Level C	Schulte et al, 1999 Shute & Woodhouse, 1990
Low volume – Non-current			
2017: No new evidence			
PARM recommends that patients with homonymous hemianopsia or homonymous quadrantanopia should be evaluated using visual field assessment to determine fitness to drive. They are considered unfit for driving.			

2011 Recommendation Statement			
There is insufficient evidence that in the presence of diplopia, it is reasonable to advise a patient to refrain from driving. Driving may resume upon confirmation that diplopia is controlled by glass or by a patch which the patient undertakes to wear while driving	PNA	Class IIB Level C	Shute & Woodhouse, 1990
Low volume – Non-current			
2017: No new evidence			
PARM suggests that patients with diplopia should be advised to refrain from driving. Driving may resume upon confirmation that diplopia is controlled by glass or by a patch which the patient undertakes to wear while driving.			

2011 Recommendation Statement			
There is insufficient evidence that if a person is deemed medically fit but is required to undertake further testing, they should be referred for an occupational therapy driving assessment. Relevant health professionals should discuss the results of the test and provide a written record of the decision to the patient as well as informing the GP.	NSF	GPP	National Transport Commission 2010
Low volume – Current			
2017: No new evidence			
PARM suggests that if a person is deemed medically fit but is required to undertake further testing, they should be referred for an occupational therapy driving assessment. Relevant health professionals should discuss the results of the test and provide a written record of the decision to the patient as well as informing the GP.			

2017 Recommendation Statement			
There is some evidence that individuals who appear to be ready to return to driving, as demonstrated by successful performance on fitness-to-drive tests, should have an on-the-road test administered by an authorized person.	AHA-ASA 2016	Class I Level C	Yale, 2003 Akinwuntan, 2005
Low volume – Non-current			
PARM recommends that individuals who appear to be ready to return to driving should have an on-the-road test administered by an authorized person.			

2017 Recommendation Statement			
There is strong evidence training programs such as simulator-based	AHA-ASA 2016	Class 2B, Level C	Akinwuntan et al, 2005 Devos et al, 2009

training to help prepare for on-the-road driving test.	CANADIAN 2013	Level B	Marshall et al, 2007 Devos et al, 2011 Mazer et al, 2003 Crotty et al, 2009 Akinwuntan et al, 2005
	EBRSR 2016	Class I, Level B	Akinwuntan et al, 2005 Akinwuntan et al, 2010 Devos et al, 2009 Mazer et al, 2003 Crotty et al, 2009
Consistent level of evidence – High volume – Non current – Uniform thought			
PARM strongly endorses training programs such as stimulator-based training to help prepare for on-the-road driving tests.			

2017 Recommendation Statement			
There is some evidence that Dynavision training is not effective in improving the results of on-road assessments in individuals with stroke.	EBRSR 2016	Class I, Level B	Crotty and George, 2009
Low volume – Non-current			
PARM does not suggest the use of Dynavision training in improving the results of on-road assessments in individuals with stroke.			

2017 Recommendation Statement			
There is insufficient evidence that individuals who have relevant residual neurological deficits related to driving ability, a full comprehensive driving evaluation is recommended to determine fitness to drive.	CANADIAN 2013	Level C	Finestone, 2010
Low volume – Non-current			
PARM suggests that individuals who have relevant residual neurological deficits related to driving ability undergo a full comprehensive driving evaluation to determine fitness to drive.			

13.3 LEISURE/PHYSICAL ACTIVITIY

Table 115. Approaches to leisure/physical activity post-stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that any stroke survivor with declining physical activity, activities of daily living or mobility at six months or later after stroke should be assessed for appropriate targeted rehabilitation	CSS	A	Duncan et al, 2005
	NSF	A	Intercollegiate Stroke Working Party 2008 Walker et al, 2004

Consistent level of evidence – Low volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that any stroke survivor with difficulty engaging in leisure activities should be assessed for appropriate targeted rehabilitation ,	AHA-ASA 2016	Class 2A Level B	Desrosiers, 2007 Walker, 2004 Barker, 2006
	CANADIAN 2013	Level A	Drummond, 1990 Eriksson, 2012 Walker, 2004 Desrosiers, 2007
Consistent level of evidence – Moderate volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM strongly endorses that any stroke survivor with difficulty engaging in leisure activities should be assessed for appropriate targeted rehabilitation.			

2011 Recommendation Statement			
There is some evidence that targeted occupational therapy programs can be used to increase participation in leisure activities.	NSF	A	Walker et al, 2004
Low volume – Non-current			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that targeted occupational therapy programs can be used in leisure activities in conjunction with stroke rehabilitation.	CANADIAN 2013	Class 2A Level B	Ven Ber Ploeg, 2006 Ven Ber Ploeg, 2009
Low volume – Non-current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM recommends that the targeted occupational therapy programs can be used to increase participation in leisure activities in conjunction with stroke rehabilitation.			

2011 Recommendation Statement			
There is some evidence that stroke survivors should be provided with a cardiovascular fitness program to maximize functional outcomes after stroke (and as part of overall vascular risk reduction). Patients should be prescribed modified activities to allow age appropriate target heart rates to be achieved for 20 to 30 minutes, three times per week.	USVA/DoD	B	EBRSR 2009
Low volume – Non-current			
2017: No new evidence			

PARM recommends that stroke survivors should be provided with a cardiovascular fitness program to maximize functional outcomes after stroke (and as part of overall vascular risk reduction). Patients should be prescribed modified activities to allow age appropriate target heart rates to be achieved for 20 to 30 minutes, three times per week.

2011 Recommendation Statement

There is some evidence of patient participation in regular strengthening and aerobic exercise programs at home or in an appropriate community setting that are designed with consideration of the patient's co-morbidities and functional limitations.	NSF	A	Walker et al, 2004
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Low volume – Non-current

2017: No new evidence

PARM recommends that the patient participates in a regular strengthening and aerobic exercise program at home or in an appropriate community program that is designed with consideration of the patient's co-morbidities and functional limitations.

2017 Recommendation Statement

There is strong evidence that patients should be given the opportunity to discuss about pre-stroke leisure pursuits, assessed for rehabilitative needs to resume these activities and encouraged to participate in these activities to maintain an active and healthy lifestyle.	AHA-ASA 2016	Class 2A Level B	Primack, 2012 Taylor, 2004 Aoyagi, 2010
	CANADIAN 2013	Level B	Schwarzenegger, 2005 Hartman-Maeir, 2007

Consistent level of evidence – Moderate volume – Non-current – Uniform thought

PARM strongly endorses that patients should be given the opportunity to discuss about pre-stroke leisure pursuits, assessed for rehabilitative needs to resume these activities and encouraged to participate in these activities to maintain an active and healthy lifestyle.

2017 Recommendation Statement

There is some evidence that participation in a leisure education program focused on awareness and competency development is associated with improvement in number and duration of activities and reduction in depressive symptoms.	EBRSR 2016	Class IB	Desrosiers, 2007
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Low volume – Non-current

PARM recommends that participation in a leisure education program focused on awareness and competency development is associated with improvement in number and duration of activities and reduction in depressive symptoms.

13.4 RETURN TO WORK

Table 116. Approaches to return to work

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is insufficient evidence that stroke survivors who wish to work should be offered assessment (i.e. to establish their cognitive, language and physical abilities relative to their work demands), assistance to resume or take up work, or referral to a supported employment service.	NSF	GPP	Daniel et al, 2009 Wozniak & Kittner, 2002
	USVA/DoD	C	Greshem et al, 1995 Van Velzen et al, 2009
Inconsistent level of evidence – Moderate volume – Current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is evidence that initial screening (including cognitive, language, physical and motor abilities) should take place early in the rehabilitation phase and become included in the individualized patient goal setting and planning for rehabilitative needs for resumption of work.	AHA-ASA 2016	Class 2B Level C	Doucet, 2012 Kauranen, 2013 Andersen, 2012 Hannerz, 2011 Busch, 2008 Saeki, 2010 Hackett, 2012
	CANADIAN 2013	Level B	Gabrielle, 2009 Morris, 2011
	EBRSR 2016	Class III	Baldwin and Brusco, 2011 Duncan, 2005
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends initial screening should take place early in the rehabilitation phase and become included in the individualized patient goal setting and planning for rehabilitative needs for resumption of work.			

2011 Recommendation Statement			
There is some evidence that people wishing to return to work should have access to advice on benefits, employment, legal rights and referral to social work, if appropriate.	SIGN 2010	2++	The Stroke Association & Different Strokes 2006
Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that patients should receive vocational rehabilitation services, as appropriate and where available,	CANADIAN 2013	Level C	Morris 2011 Wozniak2002

for advice on benefits, employment, legal rights and referral to social work.			
Low volume – Non-current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline. PARM recommends that patients should receive vocational rehabilitation services, as appropriate and where available, for advice on benefits, employment, legal rights and referral to social work.			

2011 Recommendation Statement			
There is some evidence that employers should be encouraged to provide skills retraining and flexible work opportunities to people returning to work after a stroke.	SIGN 2010	2++	The Stroke Association & Different Strokes 2006
Low volume - Current			
2017 Updated Recommendations and Evidence Sources			
There is insufficient evidence that employers and education providers should be encouraged to provide work/school modifications and flexibility to allow patients to return to work/school.	CANADIAN 2013	C	Morris 2011 Wozniak 2002
Low volume – Non-current			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline. PARM recommends that employers should be encouraged to provide skills retraining and flexible work opportunities to people returning to work after a stroke.			

2017 Recommendation Statement			
There is insufficient evidence that a detailed cognitive assessment including a neuropsychological evaluation is recommended in vocational planning.	CANADIAN 2013	C	Morris 2011
Low volume – Non-current			
PARM suggests a detailed cognitive assessment including a neuropsychological evaluation in vocational planning.			

2017 Recommendation Statement			
There is insufficient evidence that resumption of vocational interests should be encouraged where possible. A gradual resumption should occur when fatigue is a concern.	CANADIAN 2013	C	Morris 2011
Low volume – Non-current			

PARM suggests that resumption of vocational interests should be encouraged where possible. A gradual resumption should occur when fatigue is a concern.

13.5 SEXUALITY

Table 117. Approaches to sexuality and related issues post-stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is some evidence that sexual issues should be discussed during rehabilitation and addressed again after transition to the community when the post-stroke patient and partner are ready. Low volume – Non-current	CSS	B	Stanton, 2000
2017 Updated Recommendations and Evidence Sources			
There is evidence that sexual issues should be discussed during rehabilitation and addressed again after transition to the community when the post-stroke patient and partner are ready. Verbal and written information should be provided and adapted to patients who have communication limitations such as aphasia.	AHA-ASA 2016	Class IIB Level B	Schmitz et al, 2010 Passier et al, 2010 Stein et al, 2013 Gianotten et al, 2006
	CANADIAN 2013	Level C	Stein et al, 2013 Carlsson et al, 2007 Song et al, 2011
	EBRSR 2016	Class III	Duncan et al, 2005 McLaughlin & Cregan, 2005 Stein et al, 2013 Hamam et al, 2013
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM endorses that sexual issues should be discussed during rehabilitation and addressed again after transition to the community when the post-stroke patient and partner are ready. Verbal and written information should be provided and adapted to patients who have communication limitations such as aphasia.			
2011 Recommendation Statement			
There is insufficient evidence that any intervention should address psychosocial aspects as well as physical function.	NSF	GPP	Aloni et al, 1994 Korpelainen et al, 1999 McCormick et al, 1986
Low volume - Current			
2017: No new updates			
PARM recommends that any intervention should address psychosocial aspects as well as physical function.			

2011 Recommendation Statement			
There is insufficient evidence that stroke patients may have sexual activity after a stroke event once they are physically and emotionally ready.	PNA	Class IIA Level C	AHA 1995
Low volume – Non-current			
2017: No new evidence			
PARM suggests that stroke patients may have sexual activity after a stroke event once they are physically and emotionally ready.			

2011 Recommendation Statement			
There is some evidence that stroke patients may use prostaglandin E5 inhibitors such as sildenafil, tadalafil or vardenafil upon physician's recommendation.	PNA	Classs IIA Level A	Cheitlin et al, 1999 Mittleman et al, 2008
Low volume – Non-current			
2017: No new evidence			
PARM recommends the use of prostaglandin E5 inhibitors such as sildenafil, tadalafil or vardenafil upon physician's recommendation.			

2011 Recommendation Statement			
There is insufficient evidence that oral contraceptive pills should be discouraged among female stroke patients.	PNA	Class III Level C	Goldstein et al, 2006
Low volume - Current			
2017: No new evidence			
PARM suggests that oral contraceptive pills should be discouraged among females stroke patients.			

13.6 SUPPORT

Table 118. Social support system post-stroke

Recommendation	Guideline	Body of Evidence	References
2011 Recommendation Statement			
There is evidence that stroke survivors and their caregivers should have their individual psychosocial and support needs reviewed on a regular basis	CSS	B	Anderson, 1992
	NHRMC	A	Bhogal et al, 2003a Brereton et al, 2007 Eldred & Sykes, 2008 Lee et al, 2007 Lui et al, 2005 Visser-Meily et al, 2005
	AHA 2010	Class I Level C	Bakas, 2009 Bakas et al, 2002, 2004, 2006b, 2009a,b Clark et al, 2003

			Dennis et al, 1997 Duncan et al, 2005 Family Caregiver Alliance 2006 King & Semik, 2006 Murray et al, 2006 Pierce et al, 2006 Van Heugten et al, 2006 Visser-Meily et al, 2004, 2005
Inconsistent level of evidence – High volume – Current – Uniform thought			
2017: No new evidence			
PARM endorses that stroke survivors and their caregivers should have their individual psychosocial and support needs reviewed on a regular basis.			

2011 Recommendation Statement			
There is some evidence that follow-up contacts with family caregivers should be arranged and performed after discharge by a designated health care personnel in the inpatient and outpatient settings.	AHA 2010	Class I Level A	Evans et al, 1988 Goldberg et al, 1997 Kalra et al, 2004 Ski & O'Connell, 2007 Teng et al, 2003 Van Heugten et al, 2006
Moderate volume - Current			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that people with stroke living in the community, including their family and caregivers should have regular and ongoing monitoring and follow-up with health care providers to assess recovery, prevent deterioration, maximize functional and psychosocial outcomes and improve quality of life.	AHA-ASA 2016	Class IC	Chen, 2010 Bergersen, 2009 Sharma, 2011
Low volume - Current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM recommends that people with stroke living in the community, including their family and caregivers should have regular and ongoing monitoring and follow-up with health care providers to assess recovery, prevent deterioration, maximize functional and psychosocial outcomes and improve quality of life.			

2011 Recommendation Statement			
There is strong evidence that information should be available to patients and carers routinely and offered using active information strategies, which include a mixture	CSS	B	Pound et al, 1995 Lee et al, 2007
	NHMRC	A	Brereton et al, 2007 Eldred and Sykes, 2008
	AHA 2010	Class I Level C	Visser-Meily et al, 2005 Bakas et al, 2002

of education and counselling techniques			Duncan et al, 2005 Mant et al. 2000, 2005 Pain & McLellan, 1990 Van Heugten et al, 2006
Inconsistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is strong evidence that information should be available to patients and carers routinely and offered using active information strategies, which include a mixture of education and counselling techniques. Simple information provision alone is not effective.	CAMEROON	A	AU NSF 2010 Adams et al, 2007
	EBRSR 2016	Class II	Forster et al, 2013 Wang et al, 2013 Mckellar, 2015 Skidmore et al, 2014 Tarcicco et al, 2014
Consistent level of evidence – Moderate volume – Current – Uniform thought			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM strongly endorses that information should be available to patients and carers routinely and offered using active information strategies, which include a mixture of education and counselling techniques.			

2011 Recommendation Statement			
There is some evidence that patients, families and caregivers should be prepared with appropriate and realistic expectations regarding role changes, and the availability of services and resources within changing care environments	NHMRC	B	Brereton et al, 2007 Smith et al, 2008
Low volume – Current			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that patients and their caregivers should be offered education programs to assist them in adapting to their new role and that they should participate in goal setting.	CAMEROON	B	CMAJ 2010
Low volume – Non-current			
ADAPTE 1: The recommendation and strength of evidence remain unchanged from the 2011 PARM guideline.			
PARM recommends that patients and their caregivers should be offered education programs to assist them in adapting to their new role and that they should participate in goal setting.			

2011 Recommendation Statement			
There is strong evidence that family and caregiver education should include training in personal care	NHRMC	B	Bhogal et al, 2003a Lee et al, 2007 Lui et al, 2005

techniques, communication strategies, physical handling techniques, other daily living activity goals and preferences, how to access community services and resources, problem-solving techniques, health system navigation and self-management.	AHA 2010	Class I Level A	Bakas, 2009 Evans et al, 1988 Forster & Young, 1996 Grant, 1999 Grant et al, 2001 Harlow & Murray, 2001 King et al, 2007 Kotila et al, 1998 Larson et al, 2005 Lee et al, 2007 Ski & O'Connell, 2007 Smith et al, 2004, 2008 Van den Heuvel et al, 2000 Van Heugten et al, 2006
Consistent level of evidence – High volume – Non-current – Uniform thought			
2017 Updated Recommendations and Evidence Sources			
There is some evidence that multi-faceted interventions which address all CBR components (including social inclusion, empowerment, education and livelihood) should be provided in the community. These services should include an individually prescribed exercise program.	CAMEROON	C	Working group consensus 2013
	AHA-ASA 2016	Class IIB Level A	Perrin, 2010 Levine, 2006 Salter, 2009 Lurbe-Puerto, 2012 Steiner, 2008 Campos de Oliveira, 2011
Inconsistent level of evidence – Moderate volume – Non-current – Uniform thought			
ADAPTE 1: The recommendation remains unchanged but the strength of evidence changed (decreased) from the 2011 PARM guideline.			
PARM strongly endorses the use of multi-faceted interventions which address all CBR components in the community. These services should include an individually prescribed exercise program.			

2011 Recommendation Statement			
There is some evidence that there should be assessment and reinforcement of caregiver knowledge of stroke warning signs, lifestyle changes, and risk factors for secondary stroke prevention in inpatient and outpatient settings. This should also include medication management, the survivor's condition and treatment plans, and poststroke complications.	AHA 2010	Class I Level B	Bakas, 2009 Bakas et al, 2002, 2004 Braithwaite & McGown, 1993 Duncan et al, 2005 Gordon et al, 2004 Gräsel et al, 2005, 2006 Harlow & Murray, 2001 King & Semik, 2006 Lincoln et al, 2003 Mant et al, 2000, 2005 Ostwald et al, 2006 Pain & McLellan, 1990 Rodgers et al, 1999

			Sacco et al, 2006a Smith et al, 2004 Van den Heuvel et al, 2000 Van Heugten et al, 2006
High volume – Non-current			
2017: No new evidence			
PARM recommends that there should be assessment and reinforcement of caregiver knowledge of stroke warning signs, lifestyle changes, and risk factors for secondary stroke prevention in inpatient and outpatient settings. This should also include medication management, the survivor's condition and treatment plans, and poststroke complications.			

2011 Recommendation Statement			
There is insufficient evidence that there should be a provision of family education regarding communication techniques	AHA 2010	Class I Level C	Bakas et al, 2006b Booth & Swabey, 1999 Draper et al, 2007 Duncan et al, 2005 Kagan et al, 2004 Kalra et al, 2004 Van Heugten et al, 2006
Moderate volume – Non-current			
2017: No new evidence			
PARM suggests that there should be a provision of family education regarding communication techniques.			

2011 Recommendation Statement			
There is insufficient evidence that caregivers should be asked about survivors' depressive symptoms, emotions, and difficult behaviors so that strategies can be provided for caregivers and treatment or counseling can be sought for the survivor	AHA 2010	Class I Level C	Bakas, 2009 Bakas et al, 2002, 2004, 2006b Cameron et al, 2006 Clark et al, 2006 Duncan et al, 2005 Kagan et al, 2004 McKinney et al, 2002
High volume - Current			
2017: No new evidence			
PARM suggests that caregivers should be asked about survivors' depressive symptoms, emotions, and difficult behaviors so that strategies can be provided for caregivers and treatment or counseling can be sought for the survivor.			

2011 Recommendation Statement			
There is insufficient evidence that caregivers should be encouraged to attend therapy sessions so they can provide support and promote the survivor's self-care while avoiding overdependence in inpatient and outpatient settings	AHA 2010	Class I Level C	Bakas et al, 2006b Duncan et al, 2005 Van Heugten et al, 2006
Low volume - Current			
2017 Updated Recommendations and Evidence Sources			

There is some evidence that caregivers should be encouraged to attend therapy sessions so they can provide support and promote the survivor's self-care while avoiding overdependence in inpatient and outpatient settings	ASA 2016	Class IIA Level B	Bakas, 2014 Thomas, 2008 Visser-Meily, 2005
<u>Low volume – Non-current</u>			
ADAPTE 2: The recommendation remains unchanged but the strength of evidence changed (increased) from the 2011 PARM guideline.			
PARM recommends that caregivers should be encouraged to attend therapy sessions so they can provide support and promote the survivor's self-care while avoiding overdependence in inpatient and outpatient settings.			

2017 Recommendation Statement			
There is some evidence for the use of alternative methods of communication and support (i.e. telephone visits, telehealth or web-based support), particularly for patients in rural settings.	AHA-ASA 2016	Class IIB Level B	Lutz 2009
<u>Low volume – Non-current</u>			
PARM recommends the use of alternative methods of communication and support, particularly for patients in rural settings			

13.7 PARM CONTEXT POINTS

Table 119. Context points for minimum and additional standard care of practice for return to driving, leisure, physical activity, work, sexuality, and social support of stroke patients

	Minimum standard care of practice	Additional standard care of practice
Practice method	<p>Self-management</p> <ul style="list-style-type: none"> - Access to therapy - Action planning and problem solving skills training - Exercise program <p>Driving</p> <ul style="list-style-type: none"> - Sensory, motor, cognitive and behavioral assessment at least one month after stroke - Inform licensing authorities for re-evaluation <p>Leisure</p>	<p>Driving</p> <ul style="list-style-type: none"> - Occupational therapy driving assessment - Simulator training and on-the-road test <p>Return to Work</p> <ul style="list-style-type: none"> - Vocational rehabilitation services - Professional counseling and referral to social welfare

	<ul style="list-style-type: none"> - Targeted occupational therapy - Fitness program - Awareness and competency development <p>Return to Work</p> <ul style="list-style-type: none"> - Cognitive, language and physical assessment <p>Sexuality</p> <ul style="list-style-type: none"> - Neurological and psychological assessment - Pharmacologic interventions as necessary <p>Support</p> <ul style="list-style-type: none"> - Access to health information - Opportunities for training - Needs assessment - Establishment of steady communication 	
Equipment	Community therapy center or home-based rehabilitation Therapy equipment Recreational activities and equipment Educational and health-related references	Driving simulator Vocational rehabilitation facility Counselling facility Gym facility
Workforce	Community physician and/or Physiatrist/Neurologist Physical and Occupational therapist Licensing authority/medical officer for driving	Speech and language therapist Orthotist Psychologist/Psychiatrist Technical instructors Fitness/exercise instructors
Training	Within competency	Within competency
When is it done	On initial consultation or follow up	On follow up, after initial assessments and appropriate therapy
Reassessment using at least one standard outcome measure	Monthly for the first 6 months of stroke then every 3 months	As needed

13.8 SUMMARY OF PARM RECOMMENDATION STATEMENTS

SELF-MANAGEMENT

PARM recommends that stroke survivors living in the community who have difficulty with ADLs, IADLs and mobility should have access to therapy, as well as evaluation, where appropriate, to improve or prevent deterioration in activities of daily living.

PARM endorses that patients with aphasia should be taught supportive conversation techniques.

PARM strongly endorses that stroke patients with dysphagia should be offered swallowing therapy and opportunity for reassessment as required.

PARM recommends that patient education should promote self-efficacy through mastering self-management skills, including action planning, modeling behaviors and problem-solving strategies, reinterpreting symptoms and social persuasion through group support and guidance for individual efforts.

PARM endorses that people with difficulties in mobility should be offered an exercise program specific to those difficulties and monitored throughout the program.

PARM strongly endorses that rehabilitation should be continued after discharge from in-patient and outpatient services during the first year after stroke at a frequency appropriate to the needs of the client.

PARM recommends that acute care hospitals and rehabilitation facilities should maintain up to date inventories of community resources.

PARM suggests that information on local resources be provided to the patient and family upon discharge.

PARM suggests that contact with community resources be offered through formal or informal referral.

PARM suggests the identification and management of post-stroke depression as part of follow-up and evaluation of stroke survivors in the community.

PARM recommends that attendance within 6 months of stroke at a day service improves participation in leisure activities.

PARM does not endorse home-based support and care management for improving social activity, mood, quality of life or physical independence.

PARM does not endorse the use of online programs providing information and support through contact with a nurse and other caregivers in the management of depression or life satisfaction.

DRIVING

PARM suggests that stroke survivors should not return to driving for at least one month. Follow-up assessment should be conducted prior to driving to assess suitability.

PARM suggests that individuals who have experienced one or multiple TIAs should be instructed not to return to driving until a comprehensive neurological assessment shows no residual loss in functional ability (including cognitive and motor) and the underlying cause of the TIA has been treated.

PARM recommends that any patient who does wish to drive should be informed that they are required to report their condition to the relevant driver license authority and notify their car insurance company before returning to driving.

PARM recommends that emphasis should not only be given to functional assessment, but to cognitive and behavioral assessment of an individual after stroke. If there is a doubt regarding cognitive consequence of stroke, it is advised that patient be referred to a neuropsychologist for psychometric tests.

PARM endorses that patients returning to driving should be screened for any residual sensory, motor and cognitive deficits to ascertain readiness to return to driving according to safety and local laws.

PARM recommends that patients with stroke related seizures may be allowed to resume driving after at least 3 months' seizure free interval.

PARM recommends that patients with homonymous hemianopsia or homonymous quadrantanopia should be evaluated using visual field assessment to determine fitness to drive. They are considered unfit for driving.

PARM suggests that patients with diplopia should be advised to refrain from driving. Driving may resume upon confirmation that diplopia is controlled by glass or by a patch which the patient undertakes to wear while driving.

PARM suggests that if a person is deemed medically fit but is required to undertake further testing, they should be referred for an occupational therapy driving assessment. Relevant health professionals should discuss the results of the test and provide a written record of the decision to the patient as well as informing the GP.

PARM recommends that individuals who appear to be ready to return to driving should have an on-the-road test administered by an authorized person.

PARM strongly endorses training programs such as stimulator-based training to help prepare for on-the-road driving tests.

PARM does not suggest the use of Dynavision training in improving the results of on-road assessments in individuals with stroke.

PARM suggests that individuals who have relevant residual neurological deficits related to driving ability undergo a full comprehensive driving evaluation to determine fitness to drive.

LEISURE/PHYSICAL ACTIVITY

PARM strongly endorses that any stroke survivor with difficulty engaging in leisure activities should be assessed for appropriate targeted rehabilitation.

PARM recommends that the targeted occupational therapy programs can be used to increase participation in leisure activities in conjunction with stroke rehabilitation.

PARM recommends that stroke survivors should be provided with a cardiovascular fitness program to maximize functional outcomes after stroke (and as part of overall vascular risk reduction). Patients should be prescribed modified activities to allow age appropriate target heart rates to be achieved for 20 to 30 minutes, three times per week.

PARM recommends that the patient participates in a regular strengthening and aerobic exercise program at home or in an appropriate community program that is designed with consideration of the patient's co-morbidities and functional limitations.

PARM strongly endorses that patients should be given the opportunity to discuss about pre-stroke leisure pursuits, assessed for rehabilitative needs to resume these activities and encouraged to participate in these activities to maintain an active and healthy lifestyle.

PARM recommends that participation in a leisure education program focused on awareness and competency development is associated with improvement in number and duration of activities and reduction in depressive symptoms.

RETURN TO WORK

PARM recommends initial screening should take place early in the rehabilitation phase and become included in the individualized patient goal setting and planning for rehabilitative needs for resumption of work.

PARM recommends that patients should receive vocational rehabilitation services, as appropriate and where available, for advice on benefits, employment, legal rights and referral to social work.

PARM recommends that employers should be encouraged to provide skills retraining and flexible work opportunities to people returning to work after a stroke.

PARM suggests a detailed cognitive assessment including a neuropsychological evaluation in vocational planning.

PARM suggests that resumption of vocational interests should be encouraged where possible. A gradual resumption should occur when fatigue is a concern.

SEXUALITY

PARM endorses that sexual issues should be discussed during rehabilitation and addressed again after transition to the community when the post-stroke patient and partner are ready. Verbal and written information should be provided and adapted to patients who have communication limitations such as aphasia.

PARM recommends that any intervention should address psychosocial aspects as well as physical function.

PARM suggests that stroke patients may have sexual activity after a stroke event once they are physically and emotionally ready.

PARM recommends the use of prostaglandin E5 inhibitors such as sildenafil, tadalafil or vardenafil upon physician's recommendation.

PARM suggests that oral contraceptive pills should be discouraged among females stroke patients.

SUPPORT

PARM endorses that stroke survivors and their caregivers should have their individual psychosocial and support needs reviewed on a regular basis.

PARM recommends that people with stroke living in the community, including their family and caregivers should have regular and ongoing monitoring and follow-up with health care providers to assess recovery, prevent deterioration, maximize functional and psychosocial outcomes and improve quality of life.

PARM strongly endorses that information should be available to patients and carers routinely and offered using active information strategies, which include a mixture of education and counselling techniques.

PARM recommends that patients and their caregivers should be offered education programs to assist them in adapting to their new role and that they should participate in goal setting.

PARM strongly endorses the use of multi-faceted interventions which address all CBR components in the community. These services should include an individually prescribed exercise program.

PARM recommends that there should be assessment and reinforcement of caregiver knowledge of stroke warning signs, lifestyle changes, and risk factors for secondary stroke prevention in inpatient and outpatient settings. This should also include medication management, the survivor's condition and treatment plans, and poststroke complications.

PARM suggests that there should be a provision of family education regarding communication techniques.

PARM suggests that caregivers should be asked about survivors' depressive symptoms, emotions, and difficult behaviors so that strategies can be provided for caregivers and treatment or counseling can be sought for the survivor.

PARM recommends that caregivers should be encouraged to attend therapy sessions so they can provide support and promote the survivor's self-care while avoiding overdependence in inpatient and outpatient settings.

PARM recommends the use of alternative methods of communication and support, particularly for patients in rural settings.

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11	The timing, intensity, frequency and duration of rehabilitation of stroke patients
12	Outpatient stroke rehabilitation
13	Context points for minimal and additional standard care of practice for early inpatient rehabilitation
14	Context points for minimal and additional standard care of practice for ongoing outpatient rehabilitation
15	Identification and interventions for stroke risk factors
16	Smoking as a stroke risk factor and options to facilitate smoking cessation
17	Dietary recommendations for stroke risk reduction (primary/secondary prevention)
18	The roles of physical activity in the primary and secondary prevention of stroke
19	Weight management as part of secondary prevention for stroke
20	Alcohol consumption as a risk factor for stroke
21	Management of hypertension as a major component of primary and secondary stroke prevention
22	Antiplatelet therapy in the management of stroke
23	Serum lipid management as a component of stroke prevention
24	Management options for carotid artery stenosis to decrease the risk for stroke
25	Management options for intracranial atherosclerosis post-stroke
26	Oral contraception in the context of stroke
27	Screening for and management of diabetes mellitus as a risk factor for stroke
28	Management of patent foramen ovale in the context of stroke
29	Hormone replacement therapy in the context of stroke
30	Management of metabolic syndrome in the prevention of stroke
31	Screening and management of cardiac abnormalities in the context of stroke
32	Management options for stroke in the context of pregnancy
33	Recreational drug use in the context of stroke
34	Context points for minimum and additional standard care of practice for secondary prevention of stroke
35	Approach to therapy for lower extremity rehabilitation of stroke patients
36	Gait training for stroke patients

37	Other treatment modalities for gait training in stroke patients
38	Management of spasticity in stroke patients
39	Management of contractures in stroke patients
40	Cardiorespiratory fitness in stroke patients
41	Balance and falls in stroke patients
42	Medications used in motor recovery following stroke
43	Brain stimulation for the improvement of gait and balance in stroke patients
44	Alternative and complementary medicine for post-stroke patients
45	Context points for minimum and additional standard care of practice for lower extremity interventions post-stroke
46	ADL and strength assessment and training to improve upper extremity function in post-stroke patients
47	Constraint induced movement therapy in the improvement of upper limb motor function in post-stroke patients
48	Mental practice and imagery in the improvement of upper limb motor function in post-stroke patients
49	Electromechanical assisted therapy in the improvement of upper limb motor function in post-stroke patients
50	Repetitive task training in the improvement of upper limb motor function in post-stroke patients
51	Electrical stimulation and electromyographic biofeedback in the improvement of upper limb motor recovery in post-stroke patients
52	Virtual reality and telerehabilitation in the recovery of upper limb function in post-stroke patients
53	Bilateral practice therapy in the improvement of upper limb function in post-stroke patients
54	Neurodevelopmental technique for the improvement of upper limb function in post-stroke patients
55	Strengthening exercises to facilitate improvement of upper limb function in post-stroke patients
56	Mirror therapy in the improvement of upper limb function in post-stroke patients
57	Splinting as management for upper limb contractures in post-stroke patients
58	Pharmacologic approaches for the improvement of upper limb function in post-stroke patients
59	Alternative interventions for the improvement of upper limb function in post-stroke patients
60	Context points for minimum and additional standard care of practice for upper extremity interventions post-stroke
61	Approaches to assessment of post-stroke shoulder pain
62	Prevention of post-stroke shoulder pain
63	Approach to treatment of post-stroke shoulder pain
64	Non-pharmacologic management strategies for post-stroke shoulder pain
65	Pharmacologic approaches for the management of post-stroke shoulder pain
66	Context points for minimum and additional standard care of practice for assessment and management of post-stroke shoulder pain.
67	Assessment of post-stroke patients with cognitive impairment
68	Management approaches for patients with post-stroke cognitive impairment
69	Non-pharmacologic treatment strategies for patients with cognitive impairment
70	Pharmacologic treatment for patients with post-stroke cognitive impairment
71	Assessment of post-stroke limb apraxia

72	Treatment for post-stroke limb apraxia
73	Assessment of post-stroke neglect
74	Non-pharmacologic treatment strategies for post-stroke neglect
75	Pharmacologic treatment for post-stroke neglect
76	Assessment of executive function
77	Treatment for post-stroke executive dysfunction
78	Context points for minimum and additional standard care of practice for assessment of post-stroke cognitive impairment, limb apraxia, neglect and executive function
79	Context points for minimum and additional standard care of practice for management and treatment of post-stroke cognitive impairment, limb apraxia and executive function
80	Context points for minimum and additional standard care of practice for management and treatment of post-stroke neglect
81	Aphasia screening
82	Management approaches for aphasia
83	Therapeutic strategies for aphasia
84	Pharmacologic treatment for aphasia
85	Assessment and management of speech dyspraxia
86	Assessment and management of post-stroke dysarthria
87	Context points for minimal and additional standard care of practice for aphasia, dysarthria and dyspraxia in stroke patients
88	Screening and assessment of post-stroke dysphagia
89	Bedside swallowing assessment
90	Instrumental assessment of dysphagia
91	Management strategies for post-stroke dysphagia
92	Nasogastric/percutaneous gastrostomy tube feeding for post-stroke patients with dysphagia
93	Context points for minimum and additional standard care of practice for dysphagia assessment in stroke patients
94	Context points for minimum and additional standard care of practice for dysphagia management in stroke patients
95	Assessment and management of central post-stroke pain
96	Preventive and therapeutic strategies for deep venous thrombosis, thromboembolism and pulmonary embolism
97	Diagnosis and management of post-stroke urinary incontinence
98	Diagnosis and management of post-stroke fecal incontinence
99	Assessment and management of decubitus ulcers and contractures post-stroke
100	Temperature and infection management
101	Management of sleep apnea post-stroke
102	Management of post-stroke seizures
103	Screening and assessment of mood disorders
104	Prevention of post-stroke depression
105	Pharmacologic treatment for post-stroke depression
106	Psychological treatment for post-stroke depression
107	Alternative treatment strategies for post-stroke depression
108	Treatment strategies for post-stroke anxiety
109	Treatment for post-stroke emotional incontinence

110	Context points for minimum and additional standard care of practice for the screening and assessment of post-stroke mood disorders
111	Context points for minimum and additional standard care of practice for the prevention, management and treatment of post-stroke depression
112	Context points for minimum and additional standard care of practice for the management and treatment of other post-stroke mood disorders
113	Approaches to self-management post-stroke
114	Approaches to return to driving post-stroke
115	Approaches to leisure/physical activity post-stroke
116	Approaches to return to work
117	Approaches to sexuality and related issues post-stroke
118	Social support system post-stroke
119	Context points for minimum and additional standard care of practice for return to driving, leisure, physical activity, work, sexuality, and social support of stroke patients
A1	iCAHE scores for each included clinical practice guideline
A2	An example of the clinical bedside assessment tool
A3	Texture of food
A4	Texture modification of fluids

Figure #	Description/Title
1	Care pathway of stroke patients after admission to hospital
2	Care pathway of stroke patients discharged from hospital
3	PARM writing guide in revising recommendations
A1	Example algorithm for assessment and management of new onset post-stroke pain
A2	Montreal Cognitive Assessment (MOCA)
A3	An example of a swallow screening procedure

Box #	Description/Title
1	PARM standard writing guide

Appendix 1. iCAHE critical appraisal tool for CPGs

Table A1. iCAHE scores for each included clinical practice guideline

CRITERIA	AHA-ASA 2013	AHA-ASA 2014	AHA-ASA 2016	CAME ROON 2013	CANA DIAN 2013	EBSRSR 2016
1. Availability						
Is the guideline readily available in full text?	1	1	1	1	1	1
Does the guideline provide a complete reference list?	1	1	1	1	1	1
Does the guideline provide a summary of its recommendations?	1	1	1	1	1	1
1. Date						
Is there a date of completion available?	1	1	1	1	1	1
Does the guideline provide an anticipated review date?	0	1	0	0	1	1
Does the guideline provide dates for when literature was included?	0	1	1	0	1	1
2. Underlying Evidence						
Does the guideline provide an outline of the strategy they used to find underlying evidence?	1	1	1	1	1	1
Does the guideline use a hierarchy to rank the quality of the underlying evidence?	1	1	1	1	1	1
Does the guideline appraise the quality of the evidence which underpins its recommendations?	1	1	1	1	1	1
Does the guideline link the hierarchy and quality of underlying evidence to each recommendation?	1	1	1	1	1	1
3. Guideline developers						
Are the developers of the guideline clearly stated?	1	1	1	1	1	1
Does the qualifications and expertise of the guideline developer(s) link with the purpose of the guideline and its end users?	1	1	1	1	1	1
4. Guideline purpose and user						
Are the purpose and target users of the guideline stated?	1	1	0	1	1	0
5. Ease of use						
Is the guideline readable and easy to navigate?	1	1	1	1	1	1
TOTAL	12	14	12	12	14	13

*1 = criterion met; 0 = criterion not met

Appendix 2. Guideline Implementation and Compliance Feedback Form

IMPLEMENTATION AND COMPLIANCE FEEDBACK FORM

PARM Clinical Practice Guidelines on the Diagnosis and Management of Low Back Pain (2nd Edition)

NAME: _____ AGE: _____ GENDER: _____

REGION OF PRACTICE: _____

TYPE OF PRACTICE: (Check all that apply)

- Hospital-based Rehabilitation Center
 Free-standing Rehabilitation Center

This survey will help the developers in assessing stakeholder acceptance and compliance of the guideline being evaluated. This will aid in further refinement and improvement of the CPG in future revisions.

Section 1. Guideline layout and construction

Description	Strongly agree	agree	Neither agree nor disagree	Disagree	Strongly disagree
The guideline is simple to navigate					
The layout of the guideline encourages physiatrists and other clinicians to use it					
The purpose of the guideline is clear					
The end-users are clearly specified					
The guideline group and their affiliations are provided					
The methodological processes are clear					
<ul style="list-style-type: none">• Guideline identification and selection• Inclusion and exclusion criteria• Patient journey construction• Guideline critical appraisal• Mapping relevant guideline recommendations to the patient journey• Summarising strength of the evidence underpinning the recommendations• Providing relevant references					

Section 2. Guideline uptake

Description	Strong agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
Use of this document promotes evidence-based practice in the care of patients with low back pain in the Philippines					
Any Filipino physiatrist could use this document					
Use of this document could improve the quality of care of patients with low back pain in the Philippines					
Use of this document could promote multidisciplinary practices in the care of patients with low back pain in the Philippines					

3. PARM Context Points

Description	Strongly agree	agree	Neither agree nor disagree	Disagree	Strongly disagree
The PARM Context Points deals with important issues which may impact the quality of care provided to Filipino patients with low back pain					
The PARM Context Points assists physiatrists to identify and deal with local issues which may impact on the quality of care provided to Filipino patients with low back pain					
The PARM Context Points supports better training at undergraduate and postgraduate levels regarding evidence-based practice					

Please provide comments and suggestions if you Strongly disagreed or Disagreed with any of the above statements

Appendix 3. Example of discharge/team care plan

(Taken from SIGN 2010)

Hospital Name:	
Hospital Address:	
Hospital telephone number:	

Patient Details	
Patient name	
CHI number	
Patient address	
Date of birth	

Hospital Details	
Hospital name	
Ward name or number	
Ward direct dial telephone number	
Patient's named nurse	
Patient's key worker	
Date of admission	
Date of discharge	

Diagnosis(es)	

Drug Name	Strength	Dosage	Duration	Amount Supplied	Pharmacy

In Patient Investigation		
Investigation	Date	Result

Current AHPs Treatment	
Allied Health Professionals	Current treatment Regime
Occupational therapy	
Physiotherapy	
Speech language therapy	
Other:	

Special Needs

Special Needs		

Investigation to be arranged by primary care

Primary care investigation needed	Date which investigation is needed	Comments

Investigation arranged as out/inpatient

Hospital investigation needed	Date for which investigation is arranged	Comments

Further Hospital attendance

Hospital attendance date	Reason for attendance	Transport arranged?

For details of transport arrangements, or if they are to changed contact

For details of transport arrangements, or if they are to changed contact		

Continuing care after discharge

Date	Comments

Record of level of achievement

Record of level of achievement		

Appendix 4. Fall risk assessment form

Taken from the Philippine Heart Center

PATIENT'S NAME: _____

BIRTHDATE: _____ ROOM/BED #: _____

FALL RISK ASSESSMENT CATEGORY <small>(N/A if comatose, complete paralysis, or completely immobilized)</small>	Equivalent points	DATE				
AGE						
<input type="checkbox"/> 0-6 years	4					
<input type="checkbox"/> 7-18 years	2					
<input type="checkbox"/> 19-64 years	1					
<input type="checkbox"/> 65-79 years	2					
<input type="checkbox"/> 80 years and above	3					
FALL HISTORY						
<input type="checkbox"/> Fall within 3 months before admission	5					
<input type="checkbox"/> Fall during this hospitalization	11					
<input type="checkbox"/> No history of fall	0					
MOBILITY						
<input type="checkbox"/> Visual or auditory impairment affecting mobility	4					
<input type="checkbox"/> Ambulation or transfers with unsteady gait and NO assistance or assistive device	2					
<input type="checkbox"/> Ambulates or transfers with assistance or assistive device	2					

<input type="checkbox"/> Ambulates without assistance	0						
ELIMINATION							
<input type="checkbox"/> Urgency/ nocturia	2						
<input type="checkbox"/> Incontinence	5						
<input type="checkbox"/> Normal Pattern	0						
MENTAL STATUS CHANGES	4						
<input type="checkbox"/> Affecting awareness of one's physical limitation							
<input type="checkbox"/> Affecting awareness of environment	2						
MEDICATIONS	5						
<input type="checkbox"/> Two or more present; or sedated procedure within the past 24 hours							
<input type="checkbox"/> Psychotropics (anti-depressants, hypnotics, antipsychotics, sedatives, benzodiazepines, some anti-emetics)							
<input type="checkbox"/> Anticonvulsants							
<input type="checkbox"/> Diuretics / Cathartics							
<input type="checkbox"/> PCA/Narcotics/Opiates							
<input type="checkbox"/> Anti-hypertensives							
<input type="checkbox"/> One present	3						
<input type="checkbox"/> No medication	0						
PATIENT CARE EQUIPMENT	2						
<input type="checkbox"/> ≥2 present							
<input type="checkbox"/> IV line							
<input type="checkbox"/> Chest tube							
<input type="checkbox"/> Indwelling catheter							

<input type="checkbox"/> Others _____							
<input type="checkbox"/> One present	1						
<input type="checkbox"/> No equipment / gadget attached	0						
TOTAL POINTS							
SCORE LEGEND: 0-5 points = low risk 6-10 points = moderate risk > 10 points = high risk	Risk Level →						
Signature of Staff Nurse							

Appendix 5. Morse fall scale

Sensitivity = 88%; specificity = 48%

Fall risk is based upon fall risk factors and is more than a total score. Determine fall risk, factors and target interventions to reduce risks. Complete on admission, at change of condition, transfer to a new unit, and after a fall.

Variables		Score	Admission Date	Review Date	Review Date
History of Falling	No Yes	0 25			
Secondary Diagnosis	No Yes	0 25			
Ambulatory aid	None/bedrest/ Nurse assist	0			
	Crutches/cane/walker	15			
	Furniture	30			
Gait	Normal/bedrest/wheelchair	0			
	Weak	10			
	Impaired	20			
Mental Status	Knows own limits	0			
	Overestimates or forgets limits	15			
Total					
Signature and Status					

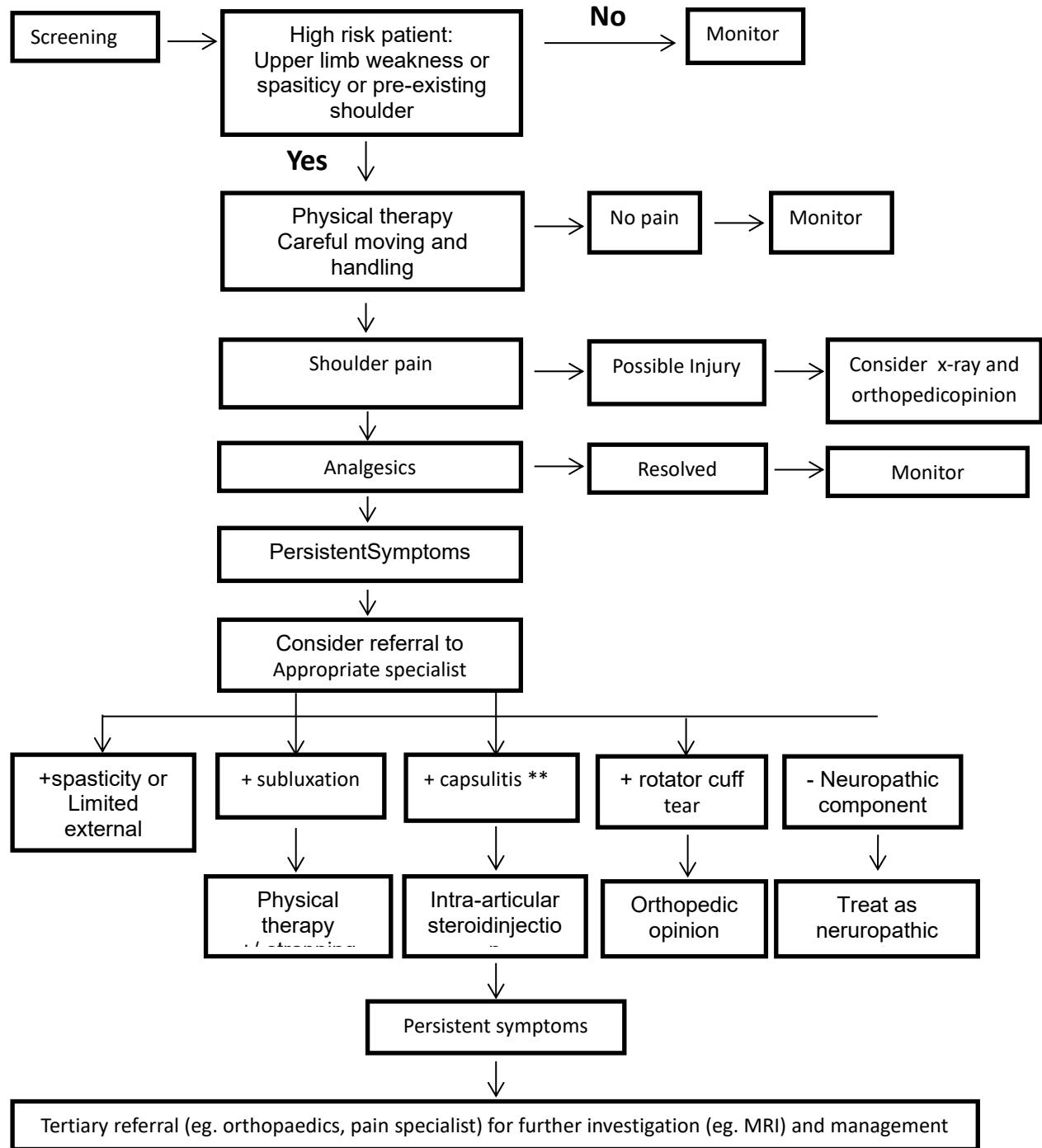
To obtain the Morse Fall Score add the score from each category.

High risk 45 and higher

Moderate risk 25 – 44

Low risk 0 -24

Appendix 6. Algorithm for post-stroke pain



*Applies to new-onset shoulder pain ie. no pre-existing condition. Conditions may co-exist.

** Limited external rotation due to adhesive capsulitis or spasticity may be difficult to distinguish clinically. In such cases specialist opinion is advised.

Figure A1. Example algorithm for assessment and management of new onset post-stroke pain.
Taken from SIGN (2010)

Appendix 7. Montreal cognitive assessment tool for cognitive impairment

MONTREAL COGNITIVE ASSESSMENT (MOCA)		NAME : _____		Date of birth : _____				
Version 7.1 Original Version		Education : _____		Sex : _____				
VISUOSPATIAL / EXECUTIVE		Copy cube		Draw CLOCK (Ten past eleven) (3 points)				
		[]	[]	[] Contour	[] Numbers			
		[]	[]	[] Hands	_____/5			
NAMING								
		[]	[]	[]	_____/3			
MEMORY Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.		FACE	VELVET	CHURCH	DAISY	RED	No points	
		[] 1st trial	[]	[]	[]	[]		
		[] 2nd trial	[]	[]	[]	[]		
ATTENTION Read list of digits (1 digit/sec.).		Subject has to repeat them in the forward order		[] 2 1 8 5 4				
		Subject has to repeat them in the backward order		[] 7 4 2			_____/2	
Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors		[] F B A C M N A A J K L B A F A K D E A A J A M O F A A B					_____/1	
Serial 7 subtraction starting at 100		[] 93	[] 86	[] 79	[] 72	[] 65		
		4 or 5 correct subtractions: 3 pts, 2 or 3 correct: 2 pts, 1 correct 1 pt, 0 correct: 0 pt					_____/3	
LANGUAGE Repeat: I only know that John is the one to help today. [] The cat always hid under the couch when dogs were in the room. []						_____/2		
Fluency / Name maximum number of words in one minute that begin with the letter F				[]	(N ≥ 11 words)		_____/1	
ABSTRACTION Similarity between e.g. banana - orange = fruit		[] train - bicycle	[] watch - ruler			_____/2		
DELAYED RECALL Has to recall words WITH NO CUE		FACE []	VELVET []	CHURCH []	DAISY []	RED []	Points for UNCUED recall only _____/5	
Optional		Category cue						
		Multiple choice cue						
ORIENTATION		[] Date	[] Month	[] Year	[] Day	[] Place	[] City	_____/6
© Z.Nasreddine MD		www.mocatest.org		Normal ≥ 26 / 30		TOTAL _____		_____/30
Administered by: _____								Add 1 point if ≤ 12 yr edu

Figure A2. Montreal Cognitive Assessment (MOCA). Taken from Nasreddine et al.

VERSION 2

ADMINISTRATION AND SCORING INSTRUCTIONS

The Montreal Cognitive Assessment (MOCA) was designed as a rapid screening instrument for mild cognitive dysfunction. It assesses different cognitive domains: attention and concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation. Time to administer the MOCA is approximately 10 minutes. The total possible score is 30 points; a score of 26 or above is considered normal.

1. ALTERNATING TRAIL MAKING

Administration: The examiner instructs the subject: "*Please draw a line, going from a number to a letter in ascending order. Begin here [point to (1)] and draw a line from 1 then to A then to 2 and so on. End here [point to (E)].*"

Scoring: Allocate one point if the subject successfully draws the following pattern:
1 -A- 2- B- 3- C- 4- D- 5- E, without drawing any lines that cross. Any error that is not immediately self-corrected earns a score of 0.

2. VISUOCONSTRUCTIONAL SKILLS (RECTANGLE)

Administration: The examiner gives the following instructions, pointing to the rectangle:
"Copy this drawing as accurately as you can, in the space below".

Scoring: One point is allocated for a correctly executed drawing.

- Drawing must be three-dimensional
- All lines are drawn
- No line is added
- The horizontal lines are relatively parallel.
- The object must be clearly rectangular (i.e., the shorter vertical sides cannot be more than $\frac{3}{4}$ of the length of the longer horizontal lines).

A point is not assigned if any of the above-criteria are not met.

3. VISUOCONSTRUCTIONAL SKILLS (CLOCK)

Administration: Indicate the right third of the space and give the following instructions: "*Draw a clock. Put in all the numbers and set the time to 5 past 4*".

Scoring: One point is allocated for each of the following three criteria:

- Contour (1 pt.): the clock face must be a circle with only minor distortion acceptable (ie. slight imperfection on closing the circle);
- Numbers (1 pt.): all clock numbers must be present with no additional numbers; numbers must be in the correct order and placed in the approximate quadrants on the clock face; Roman numerals are acceptable; numbers can be placed outside the circle contour;
- Hands (1 pt.): there must be two hands jointly indicating the correct time; the hour hand must be clearly shorter than the minute hand; hands must be centered within the clock face with their junction close to the clock center.

A point is not assigned for a given element if any of the above-criteria are not met.

4. NAMING

Administration: Beginning on the left, point to each figure and say: "*Tell me the name of this animal*".

Scoring: One point each is given for the following responses: (1) giraffe; (2) bear (or specific varieties of bears); (3) hippopotamus (or hippo).

5. MEMORY

Administration: The examiner reads a list of 5 words at a rate of one per second, giving the following instructions:

"This is a memory test. I am going to read a list of words that you will have to remember now and later on. Listen carefully. When I am through, tell me as many words as you can remember. It doesn't matter in what order you say them."

Mark a check in the allocated space for each word the subject produces on this first trial. When the subject indicates that (s)he has finished (has recalled all words), or can recall no more words, read the list a second time with the following instructions:

"I am going to read the same list for a second time. Try to remember and tell me as many words as you can, including words you said the first time."

Put a check in the allocated space for each word the subject recalls after the second trial. At the end of the second trial, inform the subject that (s)he will be asked to recall these words again by saying,

"I will ask you to recall those words again at the end of the test."

Scoring: No points are given for Trials One and Two. Scoring is based on the delayed recall trial.

6. ATTENTION

Forward Digit Span: Administration: Give the following instruction: "*I am going to say some numbers and when I am through, repeat them to me exactly as I said them*". Read the five number sequence at a rate of one digit per second.

Backward Digit Span: Administration: Give the following instruction: "*Now I am going to say some more numbers, but when I am through you must repeat them to me in the backwards order*." Read the three number sequence at a rate of one digit per second.

Scoring: Allocate one point for each sequence correctly repeated, (*N.B.: the correct response for the backwards trial is 2-5-8*).

Vigilance: Administration: The examiner reads the list of letters at a rate of one per second, after giving the following instruction: "*I am going to read a sequence of letters. Every time I say the letter A, tap your hand once. If I say a different letter, do not tap your hand*".

Scoring: Give one point if there is zero to one error (an error is a tap on a wrong letter or a failure to tap on letter A).

Serial 7s: Administration: The examiner gives the following instruction: “Now, I will ask you to count by subtracting 7 from 90, and then, keep subtracting 7 from your answer until I tell you to stop.” Give this instruction twice if necessary.

Scoring: This item is scored out of 3 points. Give no (0) points for no correct subtractions, 1 point for one correct subtraction, 2 points for two-to-three correct subtractions, and 3 points if the participant successfully makes four or five correct subtractions. Count each correct subtraction of 7 beginning at 100. Each subtraction is evaluated independently; that is, if the participant responds with an incorrect number but continues to correctly subtract 7 from it, give a point for each correct subtraction. For example, a participant may respond “82 – 75 – 68 – 61 – 54” where the “82” is incorrect, but all subsequent numbers are subtracted correctly. This is one error and the item would be given a score of 3.

7. SENTENCE REPETITION

Administration: The examiner gives the following instructions: “I am going to read you a sentence. Repeat it after me, exactly as I say it [pause]:
A bird can fly into closed windows if it's dark and windy.”

Following the response, say: “Now I am going to read you another sentence. Repeat it after me, exactly as I say it [pause]:
The caring grandmother sent groceries over a week ago.”

Scoring: Allocate 1 point for each sentence correctly repeated. Repetition must be exact. Be alert for errors that are omissions (e.g., omitting “easily”, “over”) and substitutions/additions (e.g., “Birds can easily fly into closed windows . . .”; substituting “stormy” for “windy”, altering plurals, etc.).

8. VERBAL FLUENCY

Administration: The examiner gives the following instruction: “Tell me as many words as you can think of that begin with a certain letter of the alphabet that I will tell you in a moment. You can say any kind of word you want, except for proper nouns (like Bob or Boston), numbers, or words that begin with the same sound but have a different suffix, for example, love, lover, loving. I will tell you to stop after one minute. Are you ready? [Pause] Now, tell me as many words as you can think of that begin with the letter S. [time for 60 sec]. Stop.”

Scoring: Allocate one point if the subject generates 11 words or more in 60 sec. Record the subject’s response in the bottom or side margins.

9. ABSTRACTION:

Administration: The examiner asks the subject to explain what each pair of words has in common, starting with the example: “Tell me how a carrot and a potato are alike”. If the subject answers in a concrete manner, then say only one additional time: “Tell me another way in which those items are alike”. If the subject does not give the appropriate response(vegetable), say, “Yes, and they are also both vegetable”. Do not give any additional instructions or clarification.

After the practice trial, say: “Now, tell me how a diamond and a ruby are alike”. Following the response, administer the second trial, saying: “Now tell me how a cannon and a rifle are alike”. Do not give any additional instructions or prompts.

Scoring: Only the last two item pairs are scored. Give 1 point to each item pair correctly answered. The following responses are acceptable:

diamond-ruby = gem stones, precious stones, jewels;

cannon-rifle = weapons, guns, used for hurting/killing people, used in war.

The following responses are not acceptable:

diamond-ruby = from the earth

cannon-rifle: fires/shoots; ammunition

10. DELAYED RECALL

Administration: The examiner gives the following instruction: "*I read some words to you earlier, which I asked you to remember. Tell me as many of those words as you can remember.*"

Make a check mark (✓) for each of the words correctly recalled spontaneously without any cues, in the allocated space.

Scoring: Allocate 1 point for each word recalled freely without any cues.

OPTIONAL

Following the delayed free recall trial, prompt the subject with the semantic category cue provided below for any word not recalled. Make a check mark (✓) in the allocated space if the subject remembered the word with the help of a category or multiple-choice cue. Prompt all non-recalled words in this manner. If the subject does not recall the word after the category cue, give him/her a multiple choice trial, using the following example instruction, "*Which of the following words do you think it was, CAR, TRUCK, or PLANE?*"

Use the following category and/or multiple-choice cues for each word, when appropriate:

TRUCK: category cue: mode of transportation multiple choice: car, truck, plane

BANANA: category cue: type of fruit multiple choice: pear, apple, banana

VIOLIN: category cue: type of musical instrument multiple choice: violin, harp, guitar

DESK: category cue: type of furniture multiple choice: chair, desk, bed

GREEN: category cue: a color multiple choice: green, yellow, black

Scoring: No points are allocated for words recalled with a cue. A cue is used for clinical information purposes only and can give the test interpreter additional information about the type of memory disorder. For memory deficits due to retrieval failures, performance can be improved with a cue. For memory deficits due to encoding failures, performance does not improve with a cue.

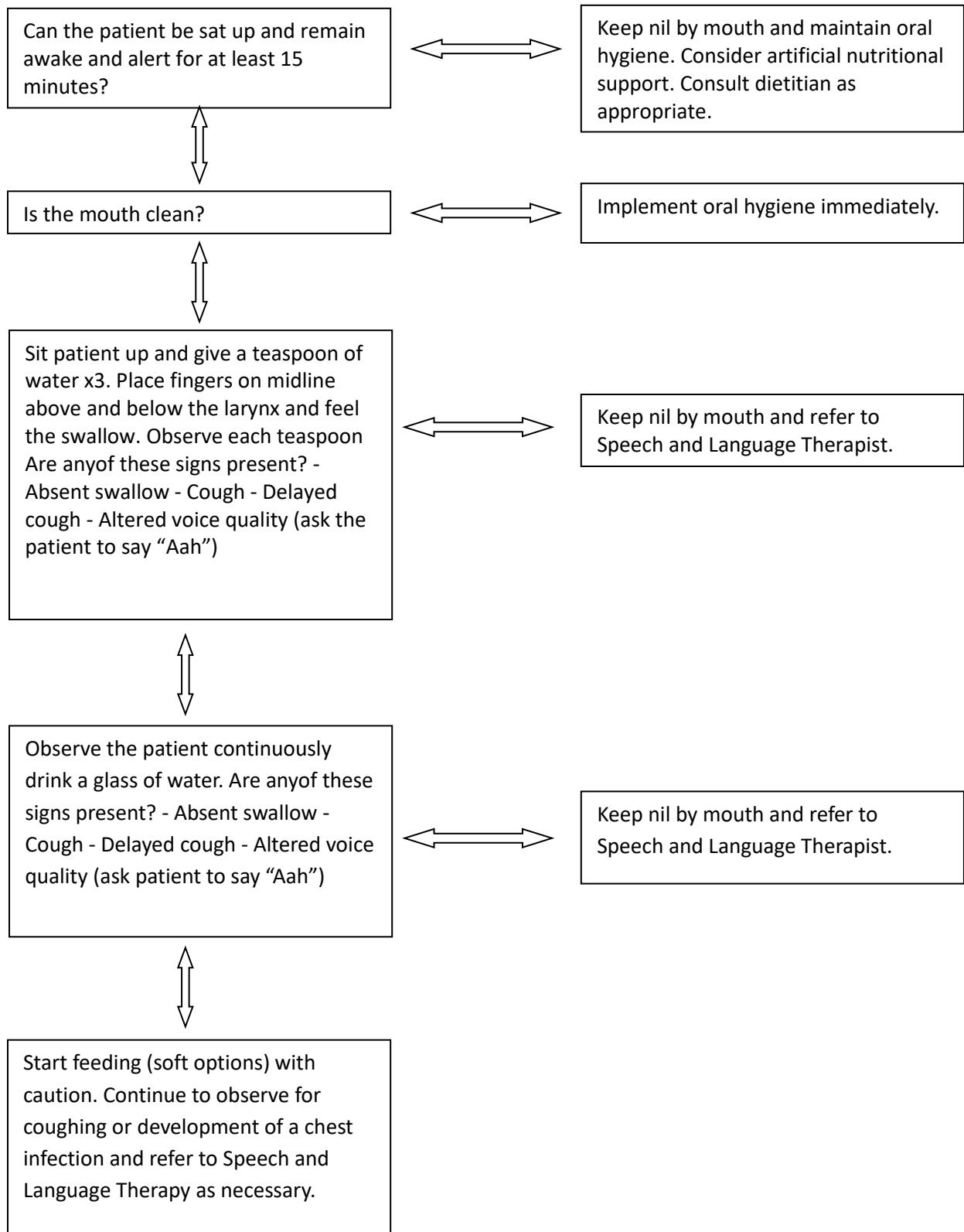
11. ORIENTATION

Administration: The examiner gives the following instructions: "Tell me the date today". If the subject does not give a complete answer, then prompt accordingly by saying: "*Tell me the [year, month, exact date, and day of the week].*" Then say: "*Now, tell me the name of this place, and which city it is in.*"

Scoring: Give one point for each item correctly answered. The subject must tell the exact date and the exact place (name of hospital, clinic, office). No points are allocated if subject makes an error of one day for the day and date.

TOTAL SCORE: Sum all subscores listed on the right-hand side. Add one point for an individual who has 12 years or fewer of formal education, for a possible maximum of 30 points. A final total score of 26 and above is considered normal.

Appendix 8. Swallow screening procedure



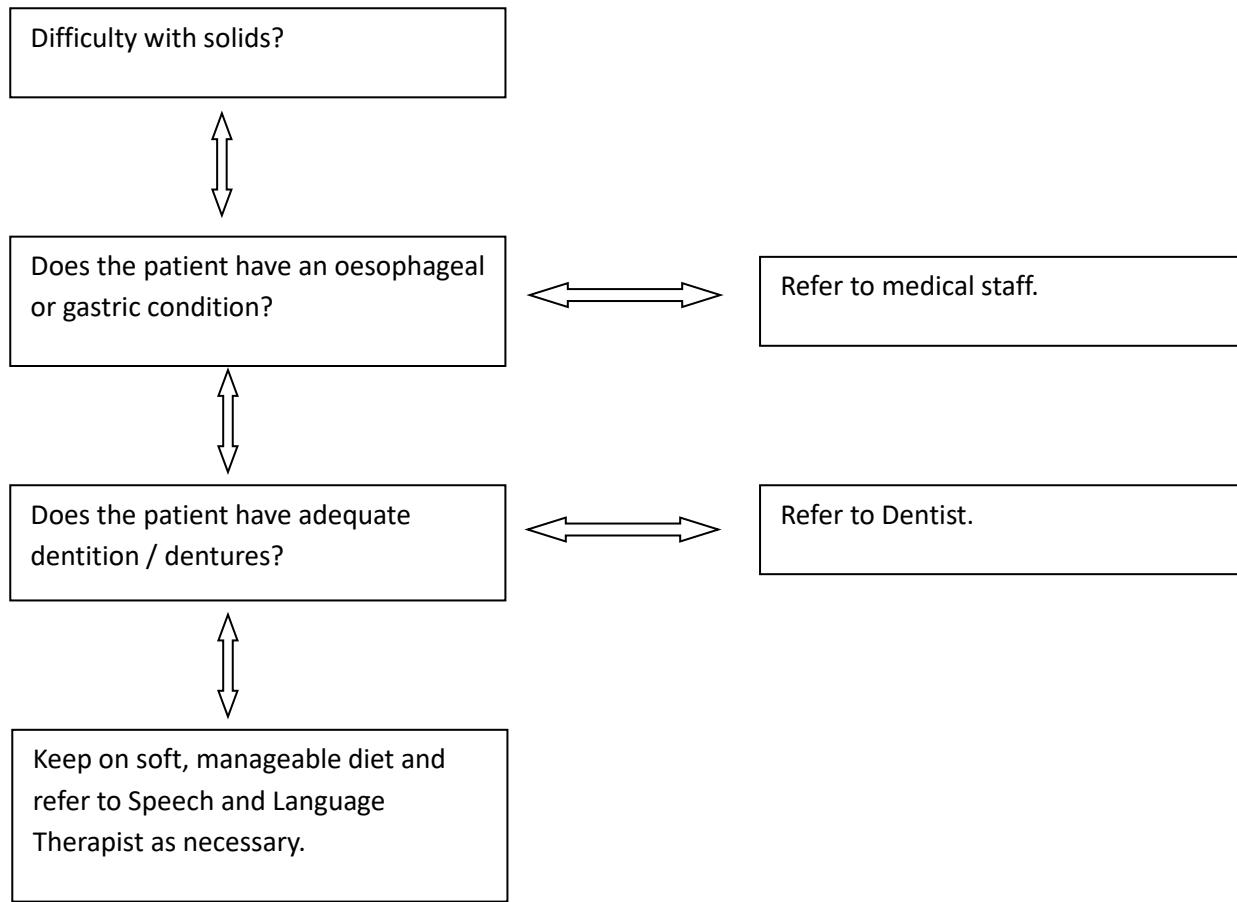


Figure A3. An example of a swallow screening procedure.

Appendix 9. Clinical bedside assessment for dysphagia

The following clinical bedside assessment, was taken from SIGN (2010). For further instructions and for interpretation of the results, refer to the original article 31 Categories of variables on the Northwestern Dysphagia Patient Check Sheet: each variable is rated as “safe” or “unsafe” for each patient.

Table A2. An example of the clinical bedside assessment tool

	Safe	Unsafe
Medical history variables		
1. History of recurrent pneumonia		
2. Frequent temperature spikes		
3. Question of aspiration pneumonia		
4. Long term intubation (+1 wk) or tracheostomy (+6 mo)		
Behavioral variables		
5. Alertness		
6. Cooperativeness/agitation		
7. Attention/interaction ability		
8. Awareness of problem(s) swallowing		
9. Awareness of secretions		
10. Ability to manage secretions		
Gross motor function		
11. Postural control		
12. Fatigability		
Oral motor test results		
13. Oral, pharyngeal, laryngeal anatomy and physiology		
14. Ability to follow directions		
15. Dysarthria		
16. Facial weakness		
17. Oral apraxia		
18. Oral sensation		
19. Pharyngeal wall contraction on gag		
20. Saliva swallowing		
21. Voluntary cough, throat clearing		
Observations during trial swallows: 1 cc thin liquid, 1 cc pudding, ¼ biscuit (if chewing were possible)		
22. Apraxia of swallow		
23. Oral residue		
24. Coughing/throat clearing		
25. Delayed pharyngeal swallow		
26. Reduced laryngeal elevation		
27. Gurgly voice		
28. Multiple swallows per bolus		
Three additional summary variables are created from the categories above:		
1.the total number of unsafe observations made on the 28 variables in all categories.		

- 2.the total number of unsafe observations made on behavioral and gross motor function variables.
- 3.the total number of unsafe observations made during oral motor testing and observations during trial swallows.

Appendix 10. Guideline on texture modification and fluid thickness

Taken from SIGN (2010)

Table A3. Texture of food (Taken from the British Dietetic Association and the Royal College of Speech and Language Therapists (2002))

TEXTURE	DESCRIPTION OF FOOD TEXTURE	FOOD EXAMPLES
A	<ul style="list-style-type: none"> • A smooth, pouring, uniform consistency • A food that has been pureed and sieved to remove particles • A thickener may be added to maintain stability • Cannot be eaten with a fork 	<ul style="list-style-type: none"> • Tinned tomato soup • Thin custard • Sabaw (tinola) walang laman* • Coffee without milk* • Tea* • Juice *
B	<ul style="list-style-type: none"> • A smooth, uniform consistency • A food that has been pureed and sieved to remove particles • A thickener may be added to maintain stability • Cannot be eaten with a fork • Drops rather than pours from a spoon but cannot be piped and layered • Thicker than a 	<ul style="list-style-type: none"> • Soft whipped cream • Thick custard • Yogurt* • Soft ice cream (mcdo vanilla ice cream)* • Condensed milk* • Milk shake* • Honey*
C	<ul style="list-style-type: none"> • A thick, smooth, uniform consistency • A food that has been pureed and sieved to remove particles • A thickener may be added to maintain stability • Can be eaten with a fork or spoon • Will hold its own shape on a plate, and can be moulded, layered and piped • No chewing required 	<ul style="list-style-type: none"> • Mousse • Smooth fromage frais • Unmelted ice cream without bits*
D	<ul style="list-style-type: none"> • Food that is moist, with some variation in texture • Has not been pureed or sieved • These foods may be served or coated with a thick gravy or sauce • Foods easily mashed with a fork • Meat should be prepared as c • Requires very little chewing 	<ul style="list-style-type: none"> • Flaked fish in thick sauce • Stewed apple and thick custard • Kalabasa* • Papaya*
E	<ul style="list-style-type: none"> • Dishes consisting of soft, moist food • Foods can be broken into pieces with a fork 	<ul style="list-style-type: none"> • Tender meat casseroles (approximately 1.5 cm diced pieces)

	<ul style="list-style-type: none"> Dishes can be made up of solids and thick sauces or gravies Avoid foods which cause choking hazard (see list of high risk foods) 	<ul style="list-style-type: none"> Sponge and custard Minatamis na saging* Saging in ginataan*
NORMAL	Any foods	<ul style="list-style-type: none"> Include all foods from "High Risk Foods" list

* Foods added based on the Filipino diet

HIGH RISK FOODS

Stringy, fibrous texture including pineapple, runner beans, celery, lettuce

Vegetable and fruit skins including beans (eg. broad, baked, soya, black-eye), peas, grapes

Mixed consistency foods including cereals which do not blend with milk, (eg. muesli), mince with thin gravy, soup with lumps

Crunchy foods including toast, flaky pastry, dry biscuits, crisps

Crumbly items including bread crusts, pie crusts, crumble, dry biscuits

Hard foods including boiled and chewy sweets and toffees, nuts and seeds

Husks including sweetcorn and granary bread

Table A4. Texture modification of fluids (Taken from NHS Quality Improvement Scotland(2003))

TEXTURE	DESCRIPTION OF FLUID TEXTURE	FLUID EXAMPLES
Thin fluid	Still water	Water, tea, coffee without milk, diluted squash, spirits, wine
Naturally thick fluid	Product leaves a coating on an empty glass	Full cream milk, cream liqueurs, Complan, Build Up (made to instructions), Nutriment commercial sip feeds
Thickened fluid	Fluid to which a commercial thickener has been added to thicken consistency	Commercial food thickener
Stage 1	<ul style="list-style-type: none"> Can be drunk through a straw 	
Stage 2	<ul style="list-style-type: none"> Can be drunk from a cup if advised or preferred Leaves a thin coat on the back of a spoon 	
Stage 3	<ul style="list-style-type: none"> Cannot be drunk through a straw Can be drunk from a cup Leaves a thick coat on the back of a spoon Cannot be drunk through a straw Cannot be drunk from a cup Needs to be taken with a spoon 	

Appendix 11. Hamilton depression rating scale (HAM-D)

Sensitivity 88%; specificity 78% (Weintraub et al, 2006).

INSTRUCTIONS FOR USE:

The Hamilton Depression Rating Scale should be administered by Clinicians. For each item, write the correct number on the line before the item. There should be only one response per item.

Patient's Name: _____

Date of Assessment: _____

1. DEPRESSED MOOD

0 = Absent

1 = These feeling states indicate only on questioning

2 = These feeling states spontaneously reported verbally

3 = Communicates feeling states non-verbally (i.e. through facial expression, posture, voice, and tendency to weep)

4 = Patient reports VIRTUALLY ONLY these feeling states in his spontaneous verbal and non-verbal communication

2. FEELINGS OF GUILT

0 = Absent

1 = Self reproach, feels he has let people down

2 = Ideas of guilt or rumination over past errors or sinful deeds

3 = Present illness is a punishment. Delusions of guilt

4 = Hears accusatory or denunciatory voices and/or experiences threatening visual hallucination

3. SUICIDE

0 = Absent

1 = Feels life is not worth living

2 = Wishes he were dead or any thoughts of possible death to self

3 = Suicidal ideas or gesture

4 = Attempts at suicide (any serious attempt rates 4)

4. INSOMNIA EARLY

0 = No difficulty falling asleep

1 = Complains of occasional difficulty falling asleep (i.e. more than $\frac{1}{2}$ hour)

2 = Complains of nightly difficulty falling asleep

5. INSOMNIA MIDDLE

0 = No difficulty

1 = Patient complains of being restless and disturbed during the night

2 = Waking during the night (any getting out of bed rates 2, except for purposes of voiding)

6. INSOMNIA LATE

0 = No difficulty

1 = Waking in early hours of the morning but goes back to sleep

2 = Unable to fall asleep again if he gets out of bed

7. WORK AND ACTIVITIES

0 = No difficulty

1 = Thoughts and feelings of incapacity, fatigue or weakness related to activities, work or hobbies

2 = Loss of interest in activity, hobbies or work (either directly reported by patient or indirect in listlessness); indecision or vacillation (feels he has to push self to work or activities)

3 = Decrease in actual time spent in activities or decrease in productivity

4 = Stopped working because of present illness

8. RETARDATION: PSYCHOMOTOR (slowness of thought and speech; impaired ability to concentrate; decreased motor activity)

0 = Normal speech and thought

1 = Slight retardation at interview

2 = Obvious retardation at interview

3 = Interview difficult

4 = Complete stupor

9. AGITATION

0 = None

1 = Fidgetiness

2 = Playing with hands, hair, etc.

3 = Moving about, cannot sit still

4 = Hand wringing, nail biting, hair-pulling, biting of lips

10. ANXIETY (psychological)

0 = No difficulty

1 = Subjective tension and irritability

2 = Worrying about minor matters

3 = Apprehensive attitude apparent in face or speech

4 = Fears expressed without questioning

11. ANXIETY (Somatic): Physiological concomitants of anxiety (i.e. effects of autonomic overactivity, “butterflies,” indigestion, stomach cramps, belching, diarrhea, palpitations, hyperventilation, paresthesia, sweating, flushing, tremor, headache, urinary frequency).

***Avoid asking about possible medication side effects (i.e. dry mouth, constipation)**

0 = Absent
1 = Mild
2 = Moderate
3 = Severe
4 = Incapacitating

12. SOMATIC SYMPTOMS (gastrointestinal)

0 = None
1 = Loss of appetite but eating without encouragement from others. Food intake about normal
2 = Difficulty eating without urging from others. Marked reduction of appetite and food intake

13. SOMATIC SYMPTOMS GENERAL

0 = None
1 = Heaviness in limbs, back or head. Backaches, headache, muscle aches. Loss of energy and fatigability
2 = Any clear-cut symptom rates 2

14. GENITAL SYMPTOMS (Symptoms such as: loss of libido, impaired sexual performance, menstrual disturbances)

0 = Absent
1 = Mild
2 = Severe

15. HYPOCHONDRIASIS

0 = Not present
1 = Self-absorption (bodily)
2 = Preoccupation with health
3 = Frequent complaints, requests for help, etc
4 = Hypochondriacal delusions

16. LOSS OF WEIGHT

When rating by history

0 = No weight loss
1 = Probably weight loss associated with present illness
2 = Definite weight loss (according to the patient)
3 = Not assessed

17. INSIGHT

0 = Acknowledges being depressed and ill
1 = Acknowledges illness but attributes cause to bad food, climate, overwork, virus, need for rest, etc
2 = Denies being ill at all

18. DIURNAL VARIATION

Note whether symptoms are worse during morning or evening. If NO diurnal variation, mark none

0 = No variation

1 = Worse in A.M.

2 = Worse in P.M.

When present, mark the severity of the variation. Mark “None” if no variation

0 = None

1 = Mild

2 = Severe

19. DEPRESSION AND DEREALIZATION (such as feelings of unreality, nihilistic ideas)

0 = Absent

1 = Mild

2 = Moderate

3 = Severe

4 = Incapacitating

20. PARANOID SYMPTOMS

0 = None

1 = Suspicious

2 = Ideas of reference

3 = Delusions of reference and persecution

21. OBSESSIVE AND COMPULSIVE SYMPTOMS

0 = Absent

1 = Mild

2 = Severe

SCORING INSTRUCTIONS:

Sum the scores from the first 17 items:

0-7 Normal

8-13 Mild Depression

14-18 Moderate Depression

19-22 Severe Depression

>23 Very Severe Depression

Appendix 12. Montgomery-Asberg depression scale

Sensitivity 75%; specificity 84% (Leontjevas et al, 2009)

Taken from Montgomery&Asberg (1979).

NAME _____

DATE _____

INSTRUCTIONS

The ratings should be based on a clinical interview moving from broadly phrased questions about symptoms to more detailed ones which allow a precise rating of severity. The rater must decide whether the rating lies on the defined scale steps (0, 2, 4, 6) or between them (1, 3, 5). It is important to remember that it is only rare occasions that a depressed patient is encountered who cannot be rated on the items in the scale. If definite answers cannot be elicited from the patients, all relevant clues as well as information from other sources should be used as a basis for the rating in line with customary clinical practice. This scale may be used for any time interval between ratings, be it weekly or otherwise, but this must be recorded.

1. APPARENT SADNESS

Representing despondency, gloom and despair, (more than just ordinary transient low spirits) reflected in speech, facial expression, and posture. Rate on depth and inability to brighten up.

- 0 No sadness
- 1
- 2 Looks dispirited but does brighten up without difficulty
- 3
- 4 Appears sad and unhappy most of the time
- 5
- 6 Looks miserable all the time. Extremely despondent

2. REPORTED SADNESS

Representing reports of depressed mood, regardless of whether it is reflected in appearance or not. Includes low spirits, despondency or feeling of being beyond help without hope. Rate according to intensity, duration and the extent to which the mood is reported to be influenced by events.

- 0 Occasional sadness in keeping with the circumstances
- 1
- 2 Sad or low but brightens up without difficulty
- 3
- 4 Pervasive feelings of sadness or gloominess. The mood is still influenced by external circumstances
- 5
- 6 Continuous or unvarying sadness, misery or despondency

3. INNER TENSION

Representing feelings of ill-defined discomfort, edginess, inner turmoil mounting to either panic, dread or anguish. Rate according to intensity, frequency, duration and the extent of reassurance called for.

- 0 Placid. Only reflecting inner tension
- 1
- 2 Occasional feelings of edginess and ill-defined discomfort
- 3
- 4 Continuous feelings of inner tension or intermittent panic which the patient can only master with some difficulty
- 5
- 6 Unrelenting dread or anguish. Overwhelming panic

4. REDUCED SLEEP

Representing the experience of reduced duration or depth of sleep compared to the subject's own normal pattern when well.

- 0 Sleeps as usual
- 1
- 2 Slight difficulty dropping off to sleep or slightly reduced light or fitful sleep
- 3
- 4 Sleep reduced or broken by at least two hours
- 5
- 6 Less than two or three hours sleep

5. REDUCED APPETITE

Representing the feeling of loss of appetite compared with when well. Rate by loss of desire for food or the need to force oneself to eat.

- 0 Normal or increased appetite
- 1
- 2 Slightly reduced appetite
- 3
- 4 No appetite. Food is tasteless
- 5
- 6 Needs persuasion to eat

6. CONCENTRATION DIFFICULTIES

Representing difficulties in collecting one's thoughts mounting to incapacitating lack of concentration. Rate according to intensity, frequency, and degree of incapacity produced.

- 0 No difficulties in concentrating
- 1
- 2 Occasional difficulties in collecting one's thoughts
- 3
- 4 Difficulties in concentrating and sustaining thought which reduces ability to read or hold a conversation

5

6 Unable to read or converse without great initiative

7. LASSITUDE

Representing a difficulty getting started or slowness initiating and performing everyday activities.

0 Hardly no difficulty in getting started. No sluggishness

1

2 Difficulties in starting activities

3

4 Difficulties in starting simple routine activities which are carried out with effort

5

6 Complete lassitude.Unable to do anything without help

8. INABILITY TO FEEL

Representing the subjective experience of reduced interest in the surroundings, or activities that normally give pleasure. The ability to react with adequate emotion to circumstances or people is reduced.

0 Normal interest in the surroundings and in other people

1

2 Reduced ability to enjoy usual interest

3

4 Loss of interest in surroundings.Loss of feelings for friends and acquaintances

5

6 The experience of being emotionally paralyzed, inability to feel anger, grief or pleasure and a complete or even painful failure to feel for close relatives and friends

9. PESSIMISTIC THOUGHTS

Representing thoughts of guilt.Inferiority, self-reproach, sinfulness, remorse and ruin.

0 No pessimistic thoughts

1

2 Fluctuating ideas of failure, self-reproach or self-depreciation

3

4 Persistent self-accusations, or definite but still rational ideas of guilt or sin. Increasingly pessimistic about the future

5

6 Delusions of ruin, remorse or unredeemable sin. Self-accusations which are absurd and unshakable

10. SUICIDAL THOUGHTS

Representing the feeling that life is not worth living, that a natural death would be welcome, suicidal thoughts, and the preparations for suicide. Suicidal attempts should not in themselves influence the rating.

0 Enjoys life or takes it as it comes

1

- 2 Weary of life. Only fleeting suicidal thoughts
- 3
- 4 Probably better off dead. Suicidal thoughts are common, and suicide is considered as a possible solution, but without specific plans or intention
- 5
- 6 Explicit plans for suicide when there is an opportunity. Active preparations for suicide

SCORE _____

Appendix 13. Suggested Assessment tools for Pre-Driving Screening

Motor Free Visual Perception Test – 4 (MVPT-4)

The MVPT was designed and standardized for adults for the normal population and the brain-injured population. It has norms for people aged 18-80.

This test provides a profile of basic visual perceptual skills needed to drive, as well as an indication of a client's speed of processing visual information, and has been correlated to driving performance for the stroke population.

Domain: overall visual perceptual ability-spatial relationships, visual discrimination, figure ground, visual closure, and visual memory.

Trail-making Test

This test has been highly correlated with driving performance. Norms are available for persons aged 18-89 years, and it has been noted that scores decrease for individuals with advanced age or lower education levels.

Domain: Tests of visual conceptual and visuomotor tracking.

Clock Drawing Test

Preliminary research indicates an association between specific scoring elements of the clock drawing test and poor driving performance.

Domain: Executive Function (planning/organization), memory, visual perceptual skills, visuo-spatial skills

Useful Field of View Test (UFOV)

The UFOV has been shown to be a strong predictor of crash risk in older drivers.

It is recommended for people who are age 55 years old or older, who have suffered health problems that cause deficits in thinking skills, who are concerned about their driving ability, and who have had multiple vehicle crashes.

Domain: Tests visual memory, visual attention, and divided attention with structured and unstructured components. The concept of "useful field of view" refers to the brain's ability to comprehend visual info with the head and eyes in a stationary position. This test is administered on a computer.

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