Enhancing functional activities of daily living

in a stroke survivor

Learn about a personalized fitness approach to optimize a chronic stroke recovery journey

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This article reports on an aquatic exercise intervention used with Celia, whose stroke at age 40 left her severely disabled. With physical therapy delayed in the optimal recovery period, the likelihood of her regaining independence seemed poor. Her responses to the intervention show that, even after this period, it's possible for individuals to improve their function significantly over time with community-based exercise. Celia's results offer hope for stroke survivors and encouragement for those who support their health and wellness.

"The brain controls our movements, stores our memories, and is the source of our thoughts, emotions, and language," states an educational webpage from the United States Centers for Disease Control and Prevention. Noting that the brain "also controls many functions of the body, like breathing and digestion," the CDC's "About Stroke" webpage adds that "parts of the brain become damaged or die" during a stroke, which "can cause lasting brain damage, long-term disability, or even death."[1]

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Long past the optimal recovery period, stroke survivor Celia (foreground) began a community-based aquatic exercise program aimed at improving her functional abilities

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By adhering to her pool workouts, Celia saw 'positive transfer of in-water skills to land-based activities' over time

Stroke is the rapidly developing loss of brain function due to a disturbance in the brain's blood supply. Brain cell death can be due to ischemia (lack of blood flow) caused by a blockage or a hemorrhage in the blood vessels. Chronic stroke survivors are individuals whose symptoms persist 6 months or longer past the event. [**Ed.** See the sidebar on pages 40–41 to learn more stroke basics.]

Dromerick et al[2] have reported a sensitive and optimal period of 60–90 days post-stroke to be a time when neuroplasticity (the brain rewiring process) is heightened and motor rehabilitation achieves best results. When rehabilitation starts 30 days or longer past the optimal neuroplasticity window, rehabilitation progresses slower, with fewer improvements, and no changes are reported at 6 months or later.[2]

Studies reveal that when effective therapies *are* performed, chronic stroke recovery occurs faster than expected, minimizes the risks of permanent disability, and continues to progress decades after stroke.[3] Typically, physical therapy and occupational therapy are utilized for only 3–6 months following a stroke. However, the American Stroke Association recommends physical activity and exercise for stroke survivors across all stages of recovery.[4]

Post-stroke individuals may live with a range of disabilities that limit independence for activities of daily living (ADL). They also may experience long-term changes in mood and in neuromuscular and motor functions, muscle strength (weakened muscles), proprioception, muscle activation patterns, and postural control (impaired ability to control posture).[5]

Aquatic therapy (AT) programs, including methods such as Ai Chi, were found to provide safe, effective recovery modalities for individuals affected by neurological diseases including stroke.[6,7] Few studies, however, have reported aquatic exercise (AE) program outcomes that are clinically effective in long-term stroke rehabilitation in conjunction with a fitness-based program.

Aquatic exercise for stroke survivors

AE can be most effective for ADL learning and relearning when integrated into a comprehensive stroke rehabilitation and recovery program. The properties of water, coupled with exercising in the aquatic environment, may promote neuroplasticity processes and increase the brain's ability to form new neural connections that may enhance stroke recovery. For example[8]:

- Hydrostatic pressure and buoyancy stimulate unique sensory experiences compared to land-based exercises. The resistance and hydrostatic pressure, along with buoyancy, challenge the sense of body position and balance. These challenges stimulate sensory pathways and the brain's adaptive responses.
- Buoyancy reduces gravity's effect. This makes movements easier and less strenuous, providing opportunities for larger, more complex movements that increase neural connections.
- Learning and relearning patterns of movements and ADL task-specific patterns through water's resistance requires coordinated muscle contractions, which engages motor planning and control areas in the brain. Repetitive practice of these movements helps strengthen neural pathways for effective motor con-

trol of ADL such as walking, reaching, negotiating stairs, and balance.
- Warm water helps relax muscle spasms and reduce spasticity, enhancing effective movements while reducing pain.
- The calming and soothing nature of water reduces stress and anxiety, creating an environment conducive to learning and neuroplasticity where the individual can focus attention. This cognitive load can stimulate brain regions associated with attention, memory, and executive functions.
- After a stroke the brain can undergo reorganization as it adapts to the loss of function. The brain may recruit alternative pathways or regions to compensate for damaged areas. AE can facilitate this reorganization by providing a supportive environment for both practicing new movements and fostering adaptive neural connections.

In 2019 Dr. Lourdes Escobar Torres and Charo Belenguer Benítez received the Spanish Onda Cero Health Award as codevelopers of WaterFit®MITAF, the Comprehensive Functional Aquatic Work Method program

More evidence is needed, however, to support AE and specific aquatic strategies for stroke recovery.[5,6]

In this case report, we examine the efficacy of a nontherapeutic, community-based AE program designed to improve functional motor control and ADL for a chronic stroke survivor, whose recovery program was delayed 9 months. The case explores a potential connection between the aquatic environment and a program approach that could enhance neuroplasticity for improving ADL. Additionally, we hope to encourage others by sharing our program exemplifying how the dedicated participation and commitment of a trained active older adult positively impacted the life of a younger stroke survivor.

Celia's story

Before experiencing her stroke, Celia was a well-known mountain runner, swimmer, and competitive triathlete in Spain. She worked full time; she also cared for her family. At age 40, the mother of 2 suffered a stroke, presenting with left hemiplegia (paralysis of one side of the body) and a fluctuating level of consciousness when she entered the hospital. Celia had little response to verbal stimuli and displayed gaze deviation (a shift in horizontal gaze toward the affected brain hemisphere). Inpatient hospital therapy started 2 months post-stroke.

During the first month of her hospital-based therapy, Celia participated in a land-based physical therapy program 2 days/week. Medical complications frequently interrupted therapy, however, allowing her to complete only 3 months of noncontinuous land-based therapy within a 9-month period. The Barthel Index (BI)[9] and Modified Barthel Index (MBI)[10] assessed her independence for ADL and a variety of personal care tasks.

At 10 months, hospital healthcare providers used the BI[9] to assess Celia's functional independence, personal care, and mobility in ADL, which included activities such as feeding, bathing, grooming, toileting, mobility, stair negotiation, and ambulation. Her score placed her in the category "severe disability."

In this same period, while still hospitalized, Celia met Charo, who offered to help. An active older adult, Charo was certified in AE and trained in methods tailored to individual needs. She collaborated with a physician, initiating a pre-aquatic assessment for Celia, followed by approximately 2.5 months of AE sessions one day/week at the community pool. [**Ed.** Tips for coaching stroke survivors in the pool appear in the sidebar on page 43.]

Once discharged from hospital, Celia attended only the AE program 3–6 days/week for approximately 7 months. Periodic follow-up assessments were conducted by hospital healthcare providers, with Celia's functional mobility progress documented in time-lapse videos. [**Ed.** These videos are posted on the International Council on Active Aging® website for reference. Learn where to access them at the end of the reference list on page 42.]

The community-based intervention allowed Celia to practice and progress movement in a supportive environment over time.

Applying a fitness approach

Celia's AE intervention was adapted from the WaterFit® Golden Waves[11,12] and the WaterFit®MITAF (Integral Method of

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Functional Aquatic Training) programs. These programs previously resulted in improved fitness and ADL among individuals with neurological disorders such as muscular dystrophy and Rett Syndrome.[13,14]

In Celia's case, the program methods applied a system of cueing to prompt progression or regression in order to vary ranges of motion, intensity, impact, and full-body ADL movements.

Intervals of higher and lower intensities were cued by adjusting the speed of full-body functional movements plus the surface area of the limbs to target muscular strength/endurance, cardiorespiratory fitness/endurance, and power training.[11,12,13,14] Intensity was monitored using the 1–10 scale, OMNI Aquatic Exercise Rate of Perceived Exertion (RPE).[11] Intensity-adjusted intervals were applied to traveling through water (walking) or vertical moves (jumping). Basic movements targeted muscle strength/endurance, postural control, gait, balance, agility, cardiorespiratory fitness/endurance, and power training.

The intervention's primary goals were safe, independent ambulation and functional ADL. When Celia arrived at the pool in a wheelchair, she required assistance to change and shower, and used a hydraulic lift to enter/exit the pool. Pre-session objectives were reviewed, followed by exercising in shallow water (xiphoid/chest depth) and progressing to deep water. Supportive buoyancy equipment reduced the energy cost of movement, allowing longer exercise duration.

Initially, Celia's left side was immobile, so the first sessions focused on extension and abduction of her affected leg. Trainers guided her limbs, teaching her coordinated skills for stabilization.

Webbed gloves increased vertical support, facilitating movement quality, balance, and core stabilization. New aquatic exercises were introduced progressively and performed as high- and low-intensity intervals.

a.
Horizontal posture cue with gloves

b.
Horizontal posture coaching bicycling

During the session's final 15–20 minutes, Celia exercised in the warm shallow pool (pelvis to umbilical depth), utilizing a buoyancy belt. Shallow-water exercises increased the specificity and intensity that approximated land-based movements. After the first few weeks, each session started either with a walking warm-up in shallow water or with bicycling suspended in deep water. Each session ended with a cooldown before Celia exited the pool.

As an athlete, Celia was passionate about training, and goal-oriented to improve performance. She challenged full-body movements further by reducing use of her hands and/or a buoyancy belt for stabilization and balance, increasing intensity with high-intensity interval training (HIIT), and utilizing overload equipment.

In-water assessments documented Celia's performance. Experiencing improvements in water powerfully motivated her adherence and progression, and over time she was able to see positive transfer of in-water skills to land-based activities. (See Table 1 on page 35 for a timeline and summary of aquatic exercises.)

Celia's achievements

After 2.5 months of the combined hospital land-based therapy plus the AE community training, Celia progressed to a Modified Barthel Index (MBI)[10] score of 89/100, indicating "moderate dependency." No adverse effects were noted during the program.

Celia's adherence was 100%, based on her familiarity with athletic training, enjoyment of the program, and motivation to recover quickly. After 10 continuous months performing the AE program 4 days/week, she achieved an MBI[10] score of 95/100: "slight dependency, almost independent." (Evaluations conducted both in the water and on land are detailed in Table 2 on page 39 and in time-lapse videos highlighting methods and progress, which are referred to on page 42.)

Initially, Celia's poor prognosis and slow inpatient, land-based recovery progress affected her mood. She was advised that starting recovery late after a chronic stroke was unlikely to result in her attaining independence. Soon after beginning the AE program, however, she experienced physiological improvements, and her mood improved. Motivated by evidence that her water- and land-based performances were improving, she trained with a high degree of determination.

Today, 7 years after the AE program ended, Celia's prognosis is good. She continues to exercise daily by combining land-based

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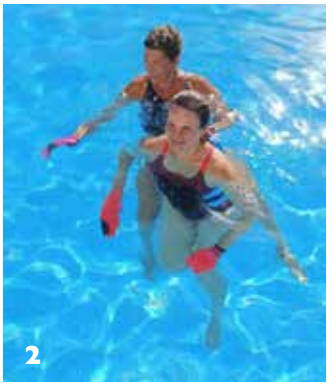

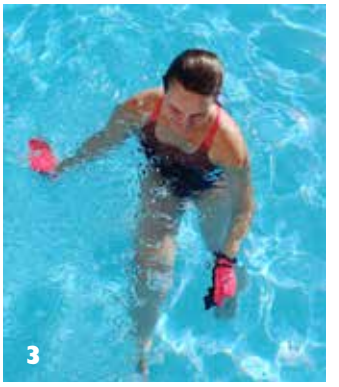

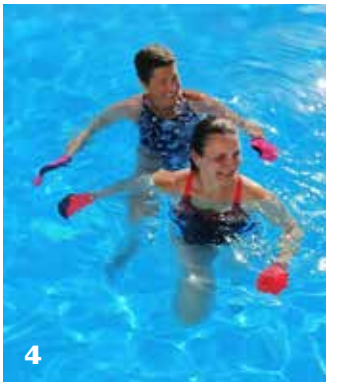

Timeline, frequency, and program exercises in Celia's case study

Timeline	**Weekly sessions (time in minutes)**	**Water depths, temperature** Deep (2 meters),[1] 28°C (82°F); Shallow (1 meter),[2] 31°C (88°F)	**Sample exercise descriptions & intensity** ***OMNI Aquatic Exercise Rate of Perceived Exertion (RPE)*** Intensity progressed by: • increasing exercise time, repetitions • accelerating movement speed • adding overload equipment (buoyancy, surface area, elastic bands)
2015			
October-December	1 (45–60 mins)	70% Deep, 30% Shallow	FLEX–EXT and ABD lower limbs + beginning to walk, bicycling (pedaling) supported by a foam belt or noodle, and aquatic step exercises with a LAB. Webbed gloves for stabilization. (See image 1.) *RPE: 1–3 (Easy to Somewhat easy)*
2016			
January-March	3–4 (45–60 mins)	50% Deep, 50% Shallow	Step + bicycling + walking + LAB + kicking + ABD and EXT upper limbs. Webbed gloves for stabilization and resistance. (See image 2.) *RPE: 3–6 (Somewhat easy to Somewhat hard)*
April-June	6 (45–60 mins)	30% Deep, 70% Shallow	Step + bicycling + walking + LAB + kicking + ABD and EXT upper limbs + jumping + jogging + scissors (cross-country ski movement) + coordinated ADL moves + balance exercises. Webbed gloves for stabilization and resistance. Elastic bands. (See image 3.) *RPE: 6–8–10 (Somewhat hard to Hard)*
July-September	4–5 (45–60 mins)	70% Deep, 30% Shallow	Step + bicycling + walking + LAB + kicking + ABD and EXT upper limbs + jumping + jogging + scissors + coordinated ADL + balance + swimming. HIIT training included. Webbed gloves for stabilization and resistance. Elastic bands. (See image 4.) *RPE: 8–10 (Hard)*

Abbreviations. *FLEX: flexion. EXT: extension. ABD: abduction. LAB: lumbo-abdominal buoyancy belt. HIIT: High-er Intensity Interval Training.*

Table 1. Timeline, frequency, and program exercises in Celia's case study.

[1] Deep depth: Full body suspension, completely offloaded. Support provided by a buoyancy device, and vertical stability centered at core.
[2] Shallow depth: Feet touched bottom as base of support. Buoyancy offloaded weight by 40% (pelvis) and 50% (navel)(7).

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gym and pool workouts; and she remains committed to maintaining autonomy.

Enhancing the stroke recovery journey

Celia's AE program, designed to engage water's properties for ADL recovery, encompassed strategies described by the late researcher and clinician Peter G. Levine in his book *Stronger After Stroke: Your Roadmap to Recovery* (3rd ed., 2018).[3] Levine's evidence-based recovery strategies are designed to stimulate neuroplasticity processes and enhance functional outcomes through intensity-based training, despite missing the optimal window of opportunity. Strategies include repetitive task-specific training, measurable goals, long and frequent training sessions to create new neuromuscular pathways, and by measuring progress.

Buoyant forces in the aquatic environment reduce the impact of gravity and falls risk when training. Water's viscosity ("thickness") increases reaction time and enables multidimensional resistance.[7,8] Recommended exercises focus on movement quality and bilateral movements simultaneously as full-body coordinated movements.[3] A number of investigations have shown that participants improve ADL during AE programs that include slower, good quality movements through functional range of motion (ROM), followed by variations in speed/intensity as interval training.[11,12,13,14]

Simple immersion, especially in warm water, provides benefits that include decreased spasticity and pain, for enhanced ROM and joint mobility. Other outcomes include vascular and cerebral blood flow changes, as well as a relaxation effect by balancing the sympathetic and parasympathetic nervous systems. These benefits may heighten neuroplasticity processes during recovery exercises.[7,8]

Studies reveal that aquatic therapy (AT) provides a safe treatment approach. AT results in similar improvements in functional balance as land-based stroke rehabilitation programs, while yielding greater gains in muscle strength and cardiorespiratory fitness.[6,7] A systemic review and meta-analysis by Veldema & Jansen[15] reported that AT methods improved independence for ADL. Further, when compared to land-based programs, the aquatics groups achieved better outcomes for an array of health-related, quality-of-life, physiological indicators.[15]

In this clinical case, we hypothesize there is a strong correlation between nontherapeutic AE and its potential to activate neuroplasticity processes, ultimately aiding ADL recovery. The main finding shows that, despite Celia's delayed start, the AE program resulted in "quick" improvements in gait, motor functions, ADL, and quality of life. Further investigations into how AT and AE affect physical/brain function could help identify optimal ADL progressions, exercise frequency and intensities, and water depths and temperatures that enhance neuroplasticity in stroke survivors.

Celia's reflections

Currently, Celia lives with her family. She navigates the city independently by public transportation, swims, and shares her experience by speaking to stroke survivors. She also enjoys both recreational and social activities, and trains regularly.

Reflecting on the recovery journey since her November 2014 stroke, Celia recalls leaving the hospital in a wheelchair in 2015 and being able to walk only a few steps using a tripod crutch. "This was when I realized the severity of my accident," she says. "I had always been a very active, sport-loving person, and now, I could hardly move." She continues, "I was unable to leave home alone, let alone imagine that I'd return one day to the swimming pool and regain my mobility and self-confidence."

Celia considers herself lucky to have met her AE trainers [Charo Belenguer Benítez and Dr. Lourdes Escobar Torres] and participated in the intervention. "In a short time, I was able to shower standing up at the pool (the first months I needed 2–3 people to help). In addition, I could walk from the shower room to the pool alone, without help, and best of all, I could enjoy moving freely in the water by controlling my body." She observes that, in the water, she could do all the movements she couldn't do on land—such as jumping, running, and bending her affected knee. "All these activities translated into my becoming independent once more, and only in a few months." Celia adds, "My life has changed dramatically! I started to live again in the pool."

Keywords: Chronic stroke, neuroplasticity, aquatic exercise, recovery, activities of daily living (ADL), rehabilitation

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Table 2. Clinical and ADL outcomes in Celia's case study: land- and aquatic-evaluations

Timeline	Program	Clinical evaluation/assessments/progress		Scores: *Barthel Index (BI)*[1]; *Barthel Modified Index (BMI)*[2]	BADL & ADL category
	2014				
~9 mos	*November-December* Hospitalized intermittent land-based therapy				
	2015	**Land-based ADL (L-ADL)**	**Aquatic exercise program (AE)**		
~12 mos	*January-December* Hospital land-based (2 days/wk) + community AE (1 day/wk)		• Assisted walking in water progressed from 1 set (3 m) to 3 sets (10 m each set)	35/90[1]	Severe dependency
	December 13: Discharged from hospital. Only AE (1 day/wk)	• Independent eating/drinking with adapted utensils • Showering using seat and safety bar for transfer from walker to seat • Sitting in front of mirror for personal care, dressing, toileting with assistance • Walker used for distances of 5–20 m; assistance to change directions and for stair negotiation with handrail • Continent • Wheelchair used for outside mobilization		89/100[2]	Moderate dependency
	2016				
~15 mos	*January-March* AE (3–4 days/wk)	• Assisted walking on land, 3 sets (10–12 m)	• Assisted walking: 5 sets (10–12 m each set) • Independent walking: 2 sets (2 m) to 3 sets (5 m) • Large pool ladder: 1 set to 3 sets ascending & descending • Independent kicking: 3 reps to 2 sets of 8 reps		
~18 mos	*April-June* AE (6 days/wk)	• Independent walking with walker and then with crutch (more than 50 m in street) • Ascending & descending stairs (3–6 steps) holding onto handrail (no longer needed help from another person)	• Large pool ladder: 5 sets ascending & descending • Small pool built-in stairs: 1–3 sets ascending & descending • Independent exercises: - kicking 3 sets of 10 reps - walking 3 sets of 15 m each set - jogging 3 sets of 2–5 m each set • All water exercises performed independently		
~19 mos	*July* AE (4–5 days/wk)	• Independent walking on land with no need of support • Ascending & descending stairs using the handrail • Using public transport • Performs all BADL independently	• Same exercises as June plus independent swimming: crawl, breaststroke and backstroke	95/100[1]	Slight dependency, almost independent
~21 mos	*August-September* AE (4–5 days/wk)	• Combined land-based gym workouts + AE (including swimming) beginning in September			Almost independent

Abbreviations. *Reps: repetitions. BADL: basic activities of daily living. ADL: activities of daily living.*

[1] Barthel Index (BI) yields total score/100, or in case of wheelchair patient, total score/90. Higher scores indicate greater independence(6).

[2] Barthel Modified Index (BMI) yields total score/100. Higher scores indicate greater independence(7).

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** Contact corresponding author Dr. Mary E Sanders at WaterFit711@yahoo.com for further information about this research.*

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There are two kinds of strokes. An ischemic stroke occurs when blood vessels to the brain become blocked due to blood clots or a blocked artery. This interrupted or reduced blood flow prevents brain tissue from receiving oxygen and nutrients. A hemorrhagic stroke, which occurs when blood vessels in the brain burst, can be caused by uncontrolled high blood pressure, anticoagulants, or weak spots in blood vessel walls (aneurysms). In any case, brain cells begin to die in minutes.[1,2,3]

Risk factors

Risks that can't be changed

For each decade of life after age 55, the chance of having a stroke more than doubles. Men are at increased risk along with African-Americans (due to hypertension). Other risk factors that can't be changed include history of prior stroke, living in an environment of temperature extremes or in the southeastern United States, and low-income status.[1,2]

Risk factors that can be changed or medically managed

Risks for stroke include overweight/obesity, sedentary lifestyle, poor diet, smoking, and medical conditions such as high cholesterol, history of TIS (transient ischemic attacks or mini strokes), hypertension, heart disease, high red-blood-cell count, excessive alcohol use, illegal drug use, abnormal heart rhythm (atrial fibrillation), chronic heart damage, and diabetes.[1,2]

COVID-19 risk

A review of individuals aged 65 years compared patients who were positive for COVID-19 (n=41) with controls who were not infected (n=81). Among the COVID survivors, 46% experienced an acute ischemic stroke compared to 18% in the control group. The study suggested that people infected with COVID had an increased risk for stroke compared to controls without COVID infection. Scientists propose that strokes are caused by immunity problems and by poor blood

flow to the brain triggered by infections, which results in damage to peripheral nerves.[4]

Rehabilitation and recovery

Stroke rehabilitation and recovery is highly individualized. A therapy and recovery program should be developed in collaboration with the individual's healthcare team.

According to the American College of Sports Medicine (ACSM),[5] exercise training should begin only with medical clearance; and it should be provided by qualified providers and a multidisciplinary team for comprehensive care and support. Some team members may include medical doctors, physical therapists, occupational therapists, exercise physiologists, kinesiologists, and specialty certified personal trainers, recreational therapists, speech and language pathologists, neurologists or physiatrists.

FITT recommendations and considerations

Exercise therapy should begin only after an individual is medically stable, progressing from in-hospital (acute phase), to rehab facility/home (subacute phase), to home (maintenance phase).

After completing acute rehabilitation, individuals may engage in aerobic, neuromuscular, and muscle strengthening exercises to further improve ADL function, prevent secondary events and improve fitness. Loss of physical stamina, mood disturbance and adoption of sedentary behaviors are common in stroke survivors, which can lead to increased falls and poor balance.

FITT recommendations

Frequency: 3–5 days/week for aerobics; 2 days/week for resistance training; and 2–7 days/week for flexibility training
Intensity: RPE of "easy to moderate to somewhat hard"
Time: progressively increase from 20 to 60 minutes, or as multiples of 10-minute sessions
Type: cycling, treadmill walking, aquatic exercise, balance training

Considerations

- Know the signs of stroke and how to respond.
- Be attentive to mood, motivation, frustration and confusion.
- Provide close supervision and individualized instruction until independent; involve family members, if possible.

Due to a stroke's impact on brain and body, individuals may experience emotional and physical fatigue. This fatigue is different than normal tiredness. A stroke survivor may find it difficult to perform daily ADL due to feeling a constant lack of energy, physically and/or mentally. Exhaustion can affect an individual's quality of life, independence, and ability to engage in rehabilitation activities.

Early-onset local muscle and general fatigue are common among stroke survivors. These types of fatigue should be considered when setting exercise intensity and progression. Increase activity slowly. Consider low-impact activities like water exercises that are self-paced, which reduces the fear of movement, and which boosts confidence through positive "wins" experienced by being able to do more.

American Stroke Association: Know the signs[6]

F.A.S.T. warning signs

Use the letters in F.A.S.T. to spot a stroke:

- **F=Face Drooping**–Does one side of the face droop, or is it numb? Ask the person to smile. Is the person's smile uneven?
- **A=Arm Weakness**–Is one arm weak or numb? Ask the person to raise both arms. Does one arm drift downward?
- **S=Speech Difficulty**–Is speech slurred?
- **T=Time to call 911**–Stroke is an emergency. Every minute counts. Call 911 immediately. Note the time when any of the symptoms first appear.

Other stroke symptoms

Watch for sudden:

- **Numbness** or weakness of face, arm or leg, especially on one side of the body
- **Confusion**, trouble speaking or understanding speech
- **Trouble seeing** in one or both eyes
- **Trouble walking**, dizziness, loss of balance or coordination
- **Severe headache** with no known cause

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Resource

(Also see the resources listed as references.)

After Stroke, a March of Dimes Canada website
Stroke survivor and caregiver information (particularly "Saluting Stroke Caregivers")
https://www.afterstroke.ca/resources/?category=caregiver-support

Enhancing functional activities of daily living in a stroke survivor *Continued from page 40*

Celia's stroke recovery progressed through a targeted aquatic exercise program. She could 'mov[e] freely in the water by controlling [her] body,' she says, and do movements she couldn't perform on land. The authors write, 'The community-based intervention allowed Celia to practice and progress movement in a supportive environment over time'

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Videos

Supplemental progress and outcome videos sessions 1–6 available from www.icaa.cc/strokerecovery.php

1. Supplemental Content 1: October 2015 (1 session/week)
2. Supplemental Content 2: December 2015 (2 sessions/week)
3. Supplemental Content 3: March 2016 (4 sessions/week)
4. Supplemental Content 4: May 2016 (6 sessions/week)
5. Supplemental Content 5: September 2016 (4 sessions/week)
6. Supplemental Content 6: July 2018 (4–5 sessions/week)

Images courtesy of WaterFit

Pool coaching tips for stroke survivors

by Mary E Sanders, PhD, CDES, FACSM, RCEP, and Cathy Maloney-Hills, DPT

The content below is from the "Golden Waves® Program: Responding to Medical Conditions," published originally in 2000 and updated in 2012.

Exercises in the Golden Waves program were adapted for stroke recovery. Videos are available to view or download on the ICAA website at www.icaa.cc/strokerecovery.php.

Screening

- Medical clearance from physician.
- Observe walking and pool entry/exit.
- Check for independence.
- Note site of weakness.
- Check for control of movement.
- Check in water for successful recovery from loss of balance forward, backward, and to the side.

Safety tips and suggested exercise modifications

- Use shallow water for increased stability/control.
- Focus on quality of movement, using slower speeds and appropriate-sized movements.
- Cue for posture and hand coordination for balance.
- Check for dizziness, cue neutral gaze stabilization, avoid quick direction changes, work in quiet/calm water, and minimize travel.
- Use teaching methods that address challenges in communication.
- Balance activities may need to start at a lower level and gradually progress.
- Participants with a flaccid arm (floppy/no voluntary movement or tone) should wear a sling to support the arm while in the water.
- Arm activities crossing to the opposite side of the body and forward are helpful to stretch tight spastic (increased muscle tone) muscles in the arm and shoulder blade area. Participants can be cued to clasp hands together to move a spastic arm that cannot move by itself (most practical for slow movements or stretching) and to help with neglect.
- Participants who wear a plastic foot brace in their shoe on land can be encouraged to wear it in their water shoes while exercising in the water.
- Walking activities in all directions are very helpful for general strengthening and balance.

Abnormal response to exercise

- Exhaustion or increased pain during or after exercise (including 24 hours or longer afterward).
- Pain in a joint (shoulder, knee, etc.), neck or back.

Recommendations after abnormal response

- Decrease intensity and duration.

Refer back to healthcare providers

- Progressive weakness.
- Decrease in functional activity.
- Any disorientation or confusion.
- Speech or visual disturbances, even if temporary.
- Complaints of joint or spinal pain.
- Stroke Symptoms—***get help immediately!***

1. Sudden numbness or weakness of face, arm or leg, especially on one side of the body
2. Sudden confusion, trouble speaking or understanding
3. Sudden trouble seeing in one or both eyes
4. Sudden trouble walking, dizziness, loss of balance or coordination
5. Sudden severe headache

Progressions should target ADL, confidence, balance, coordination, agility, walking in all directions, cardiorespiratory endurance, and muscular endurance as tolerated if spasticity is present. Exercise is recommended for 60 minutes, 3 or more days per week. Strengthen hip flexors, quadriceps, and ankle plantar flexors. Stretch spastic muscles.