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Research Article

Interdisciplinary Research and Applications in Modern Science and Emerging Technologies

Improvement of Function Is Possible Even in the Late Period After a Stroke

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Submitted: 27 October 2025 **Accepted:** 03 November 2025 **Published:** 10 November 2025

https://doi.org/10.63620/MKIRAMSET.2025.

Citation: *Kuchta, K. (2025). Improvement of Function Is Possible Even in the Late Period After a Stroke. Interdiscip Res Appl Mod Sci Emerg Technol 1(2), 01-03.*

Abstract

Assessment of the functional status of the patient before procedures. Patient with progressive deficits of the musculoskeletal system. In the late post-stroke phase – 14 years after the incident. Self-care: A person with a disability who, due to their life situation, must be as independent as possible (shopping, preparing and eating meals, using the toilet, cleaning, leaving the house). The patient has right-sided hemiplegia.

Keywords: Stroke Rehabilitation, Chronic Stroke, Neuroplasticity, Bobath Concept, Physiotherapy. Functional Recovery.

Introduction

Stroke is one of the leading causes of long-term disability worldwide, often resulting in persistent motor, sensory, and functional impairments that significantly reduce quality of life. Although early rehabilitation is widely recognized as essential for recovery, patients in the chronic phase after stroke are frequently considered to have limited potential for further improvement. This perception may lead to reduced therapeutic intensity or discontinuation of structured rehabilitation programs.

Recent evidence, however, highlights the lifelong capacity of the human brain for neuroplastic changes, suggesting that meaningful functional recovery remains possible even many years after a stroke. Advances in neurorehabilitation emphasize individualized, task-oriented, and functionally meaningful therapeutic approaches that target motor control, postural stability, and participation in daily activities.

The Bobath concept, also known as neurodevelopmental treatment (NDT), is a widely applied therapeutic approach focusing on the facilitation of normal movement patterns, inhibition of abnormal tone, and enhancement of functional activity through sensorimotor integration. This concept places strong emphasis on patient-centered goals, clinical reasoning, and adaptability throughout the rehabilitation process. The present case study aims to demonstrate that targeted physiotherapy based on the Bobath concept can lead to significant functional improvements even in the late chronic phase following stroke. By analyzing changes in balance, gait, pain, and activities of daily living in a patient 14 years post-stroke, this article contributes to growing evidence that long-term rehabilitation remains both relevant and effective.

Description of the Patient

International Classification of Functioning (ICF)

ICF (International Classification of Functioning, Disability and Health) is a system of codes and medical definitions adopted in 2001 by the World Health Organization to describe the patient's health status in the context of physiotherapy treatment—both before and after therapy.

(W oryginale znajdują się tabele — przetłumaczono je poniżej.) [1].

ICF functioning classification – selected items

- b730 – Muscle power functions: 4 – severe problem → 2 – moderate problem
- b280 – Sensation of pain: 4 – severe problem → 3 – significant problem
- b455 – Exercise tolerance functions: 4 – severe problem → 2 – moderate problem
- d230 – Carrying out daily routine: 4 – severe problem → 2 – moderate problem

- d415 – Maintaining a body position: 4 → 2
- d410 – Changing basic body position: 4 → 2
- d450 – Walking: 4 → 2
- d510 – Washing oneself: 4 → 3
- d530 – Toileting: 4 → 2
- d550 – Eating: 2 → 1 Scale:

0 – no problem,
1. – mild problem,
2. – moderate problem,
3. – significant problem,
4. – severe problem,
5. – not specified,
6. – not applicable.

Worksheet – Model of Bobath Clinical Practice

Personal Factors

Mrs. Ewa, 61 years old.
Right-handed.
Mother of two adult children. Employment: unspecified.
Medical history: ischemic stroke on 17.12.2007; ICD-10: I63.9 unspecified cerebral infarction; no speech impairment; spasticity of the right lower limb; persistent right-sided spastic hemiparesis; mild cognitive impairment [2].

Rehabilitation history

- 7.02–30.08.2008 inpatient rehabilitation;
- Repeated outpatient rehabilitation over following years;
- Most recent rehabilitation: 6.12.2024–7.01.2025.

Client goals

- Reduce right calf pain
- Improve gait quality
- Improve balance
- Improve functional performance

Functional Movement Analysis

(Skrócono opis tabeli – oddano treść merytoryczną.)
Sensorimotor performance:

- Decreased A/P stability, limited ROM, weak trunk control, compensatory patterns.

Postural control:

- Poor trunk activity, decreased COG control, excessive tension in lower limb.

Selective movement sequences:

- Limited ability to initiate movement, excessive global patterns.

Skilled Facilitation

Manual Cues

- Soft tissue mobilization, facilitation of trunk activation, lower limb alignment, gait patterning.

Verbal Cues

- Instruction to reduce compensations, support balance strategies.

Environmental Cues

- •Adjustment of room, chair, step height; safe transitional strategies.

Movement Diagnosis

- Impaired right foot dorsiflexion
- Impaired basic postural reactions
- Impaired gait pattern
- Excessive muscle tension in right lower limb
- Balance disorders

Working Hypotheses

1. If deep muscles of the right foot are strengthened, compensatory calf pain will decrease.
2. If the peroneal muscle is strengthened, foot drop will decrease.
3. If gait improves, functional independence will improve.
4. If trunk stability increases, general functional capacity will improve.

Identification of Potential

- High motivation
- Good cognitive function
- Ability to understand instructions
- Supportive family environment

Treatment

1. Patient positioning to reduce tension
2. Foot preparation: soft tissue, joint mobilization
3. Activation of deep foot muscles
4. Peroneal muscle activation
5. Trunk stabilization
6. Gait re-education
7. Transfer training
8. Balance exercises
9. Functional tasks adapted to home environment
10. Education and home recommendations

Evaluation – Movement Efficiency / Quality / Quantity

Goal: to improve functional capacity during physiotherapy long after the stroke incident.

Materials and Methods

61-year-old woman, 14 years post-stroke; 20 therapy sessions (90–150 min each) using the Bobath concept [3-5].

Tests

Test	Start (6.12.2024)	End (6.01.2025)
Berg Balance Scale	28	43
Timed Up & Go	26 s	12 s
ADL scale	4	6
Barthel Index	60	85
VAS pain scale (calf)	6	3

Results

Significant improvement in balance, mobility, ADL, and pain reduction.

Reflections (personal conclusion)
(Przekład pełnej treści refleksji.)

I conducted this therapy completely differently than I would have before the course. Previously, I would have prescribed and performed a standard set of exercises.

Now I create an individualized treatment plan tailored to the patient, not to the general diagnosis. I approach the patient holistically [6].

I no longer force anything — I wait for the patient's acceptance and cooperation.

My goal now is to achieve the best possible functional outcome within the limitations caused by the neurological damage [7].

Examples

- Before the course: "Squeeze the ball."
- Now: I know this reinforces the primitive grasp reflex, increases spasticity and leads to a claw hand.
- Before: passive stretching.
- Now: I know that in spastic muscles, forced stretching triggers violent contraction and may cause fiber tearing.
- Before: Lovett test.
- Now: Strength testing triggers primitive reflexes and increases abnormal tone; strength alone is only one small component of movement.
- Before: use of aids (tripod cane, rails).
- Now: Pulling up with the healthy arm reinforces extensor reflexes and harmful compensations.
- Before: belief that current ability predicts future function.
- Now: I know stroke patients can improve indefinitely, even in the late chronic phase.

I am ashamed of my previous lack of knowledge, but grateful that I was shown a new therapeutic pathway.

Discussion

Although effects of therapy become more difficult to achieve as time passes after a stroke, evidence-based medicine shows that physiotherapy remains effective even in the chronic phase.

Stroke is a major life-threatening condition among adults. Mortality in Poland: 44% women, 40% men. A large proportion of survivors remain dependent for life. Studies indicate 15–30% remain permanently disabled. Every stroke patient should receive comprehensive, individualized rehabilitation [8].

Studies by Skorupińska, Kostorz, and Bojarska-Hurnik confirm the effectiveness of the Bobath concept in adults. The method enables functional restoration of lost activities. I agree with their conclusions entirely.

Further studies (Drużbicki, Przysada, Rykała, etc.) show that even in the late period after stroke, rehabilitation significantly improves balance and gait. I fully agree with this.

Conclusion and Reflections

1. Improving right foot structure and deep muscles reduced calf pain from VAS 6 → 3.
2. Strengthening the peroneal muscle improved dynamic balance and gait (TUG: 26 s → 12 s).
3. Improving gait enhanced functional independence (ADL 4 → 6; Barthel 60 → 85).
4. Strengthening the trunk improved overall functional capacity (Berg: 28 → 43).
5. Physiotherapy even 14 years after stroke can improve physical capacity, balance, gait, and quality of life.
6. Short-term therapy produced meaningful, measurable improvements.

Stroke-related CNS damage causes motor and cognitive impairment, limiting independence and participation.

Physiotherapy focuses on restoring lost functions and can be effective even many years after stroke.

The brain changes throughout life — neuroplasticity never ends.

We should never stop fighting for recovery.

Recovery requires support from a therapeutic team: physiotherapists, speech therapists, psychologists, nurses, and doctors.

Regardless of whether 5 or 14 years have passed since a stroke, there is always hope for improvement.

We should use every opportunity — every transfer, position, activity — as a chance for rehabilitation.

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