



# THE APPLICATION OF ASSISTIVE DEVICES FOR HELPING INDEPENDENT ACTIVITY DAILY LIVING IN STROKE PATIENT

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**Abstract:** Stroke is a leading cause of disability worldwide; Stroke remains the second-leading cause of death and the third-leading cause of death and disability combined (as expressed by disability-adjusted life years lost - DALYs) in the world; the incidence of stroke is 150-200/100.000 individuals/ year. One of every seven individuals suffers from a stroke in their lifetime, often resulting in physical impairments that impact an individual's ability to perform daily activities. Motor impairments after stroke are often persistent and disabling, and women are less likely to recover and show poorer functional outcomes. Rehabilitation assistive devices are increasingly integrated into clinics to regain motor function after stroke. The devices fall into devices designed to compensate for lost skills (i.e., assistive devices). Assistive devices are an integral component of occupational therapy interventions in stroke cases. These devices compensate for physical limitations, promote mobility, and support engagement in meaningful occupations. This abstract explores a case study of the application and benefits of incorporating assistive devices in occupational therapy interventions for stroke survivors, and further research on the application of this tool has not been developed much in occupational therapy in Indonesia in the future. Additionally, the abstract highlights the importance of individualized assessment using the Canadian Occupational Performance Measure and selecting appropriate assistive devices based on the patient's specific needs and goals. Furthermore, in this case, study, this successful assistive device can assist in improving functional outcomes and promoting independence in stroke patients.

**Keywords:** Stroke, Assistive device, Occupational Therapy, Canadian Occupational Performance Measure

## 1 Introduction

Stroke, also known as a cerebrovascular accident (CVA), occurs when there is a sudden interruption of blood flow to the brain, resulting in brain cell damage and loss of function in the affected areas. According to the World Health Organization (WHO), stroke is a major public health concern, with an estimated 15 million people experiencing a stroke each year, leading to 5.5 million deaths and a significant number of survivors with disabilities (WHO, 2022)

After stroke onset, the most reported deficiencies are related to motor dysfunction; 69% of the stroke patients admitted to the hospital experience upper limb deficits, of whom 32% have a severe paresis. Engaging in upper limb rehabilitation can restore some of the arm function. Previous work has provided evidence that upper limb rehabilitation

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for stroke patients is most effective if it consists of repetitive, task-specific movements. Task-specific training is characterized by training tasks that are meaningful to the patient, i.e., tasks that the patient would like to relearn (Rozevink et al., 2021)

There are differences between women and men regarding stroke which are increasingly being recognized and have even led to specific guidelines for the prevention of stroke in women by the American Heart Association [3]. For instance, the incidence of stroke is different in men and women. During most of the lifetime, men are at a higher risk to experience a stroke compared to women. But in the young population, the risk for women is higher than in men of the same age, probably due to oral contraceptive use and pregnancy. Moreover, in postmenopausal women, a steep increase in the incidence of stroke occurs. Due to the higher life expectancy of women and much higher incidence of stroke in older ages, women suffer more strokes than men. Furthermore, there are more overall stroke deaths among women. Stroke is the second leading cause of death in women and only the fifth leading cause in men in the USA. But of note, women are on average 4.5 years older when they get their first stroke, and when adjusting for age, the death rates are similar between men and women (Klamroth-Marganska, 2018).

The consequences of stroke are diverse and can include physical impairments such as hemiparesis (weakness on one side of the body), motor function loss, and difficulties in coordinating movements. Cognitive impairments, such as memory loss, attention deficits, and difficulty with problem-solving, are also common after a stroke. Emotional changes, including depression and anxiety, further impact the overall well-being and ability to cope with daily life for stroke survivors (Nichols-Larsen et al., 2005).

Stroke survivors often encounter difficulties in performing ADLs due to the physical, cognitive, and emotional impairments resulting from the stroke. The loss of motor function, particularly on one side of the body, can significantly hinder their ability to dress, bathe, and groom independently. Cognitive deficits may affect their capacity to plan and execute tasks, leading to frustration and dependence on caregivers for daily activities. Furthermore, emotional changes can impact motivation and self-confidence, further complicating stroke survivors' ability to perform ADLs (Rahman et al., 2019).

In clinical practice, it is common for caregivers and therapists to develop and adapt simple and low-cost equipment that can assist in upright positions and facilitate handling. In Brazil, a device to assist the sitting position with polyvinyl chloride (PVC) was developed to maintain the sitting position and provide functional training in a critical care unit. Similar devices have been developed and used during hospitalization in many clinical settings. They can be associated with early mobilization protocols and other contemporary rehabilitation approaches, such as task-oriented training. However, these devices and their adaptations have not been reported in scientific literature. Therefore, the aim of this study was to implement the use of the device from, with modifications for bedside sitting, and observe its effects on clinical and functional outcomes in two stroke patients (Rodrigues et al., 2023).

Canadian Occupational Performance Measure (COPM) To effectively assess the impact

of assistive devices on stroke patients' ability to perform ADLs independently, standardized evaluation tools are crucial. One such tool is the Canadian Occupational Performance Measure (COPM), developed by Law et al. (1990). The COPM is a client-centered outcome measure that evaluates the performance and satisfaction of individuals with regard to their self-identified ADLs. The COPM involves a semi-structured interview with the stroke patient, where they identify specific ADLs they find challenging or wish to improve. These ADLs are then rated by the patient in terms of their performance and satisfaction levels. By using the COPM, therapists and healthcare professionals can tailor rehabilitation interventions to address the specific needs and goals of each stroke patient.

## **2 Case Study**

### **2.1 Clinical Presentation**

The patient was a local resident of Situsari village, a man Mr. A, aged 65, has been diagnosed with ischemic hemiparesis dextra due to a stroke. He experienced his first stroke attack in August 2018. Mr. A is at home and he walks using a cane while wearing a t-shirt, long pants, and sandals. He has a tan complexion, a lean body, and black hair with some gray strands. Vital sign examination revealed the following: Consciousness: Alert and oriented (Compos Mentis), Blood Pressure: 160/110 mmHg, Respiration Rate: 21 breaths per minute, Heart Rate: 67 beats per minute, Weight: 57 kg, Height: 170 cm, Gait Pattern: Circumduction Gait. Based on the results of occupational therapy examination, Mr. A has limitations in vestibular function, joint range of motion, muscle strength, endurance, postural control, crossing the midline, bilateral integration, fine motor coordination, and hand skills. Currently, Mr. A's daily activities have shifted to the left side, allowing him to become more independent. However, he still faces difficulty in transferring during activities such as bowel movement. Based on the COPM assessment on May 5, 2023, the top priority scale was obtained in the toileting activity with a scale of 10, performance with a score of 7 out of 10 and satisfaction with a score of 5 out of 10.

### **2.2 Occupational Therapy Program**

A long-term goal was set that patient Mr. A is would be able to independently perform transfers from squatting to standing during toileting activities using a grab bar in 7 sessions. To attain this objective, the program was fragmented into several short-term goals. First, Patient is able to learn the proper use of the assistive device (grab bar) for the activity of transferring from squatting to standing in just one meeting this session is performed as a support in toileting activities using an assistive device during transfers from a squatting to a standing position on the squat toilet after toileting activities. Second, The patient is able to perform the transfer from squatting to standing during toileting with maximum assistance using a grab bar in 3 sessions This activity aims to facilitate the patient in squat-to-stand movements during toileting activities and prevent the risk of falls in the bathroom. Third session, The patient is able to perform the transfer from squatting to standing independently during toileting using a grab bar in 3 sessions

This activity aims to familiarize and facilitate the patient in toileting activities and prevent the risk of falls in the bathroom.

The home program that the patient can perform to optimize the therapy goal of being able to transfer during toileting activities is by providing the patient with the opportunity to try independently in toileting activities using a grab bar as an assistive device to stand up from a squatting position while maintaining balance.

### 2.3 Result

During the first session, the therapist conducted an examination of vital signs and physical assessment of the patient. Based on the examination results, the patient's blood pressure was quite high at 150/100, so the therapist avoided activities that could cause fatigue for the patient. The therapist conducted a physical examination of the range of motion and muscle strength in the patient's upper extremities. Interviews were also conducted with the patient and family members regarding the patient's medical history and disease progression. It was revealed that the patient has been suffering from stroke since 2018. Currently, the patient is experiencing subluxation in the right shoulder. Additionally, the therapist also analyzed the patient's living environment. In the second session, the therapist measured the toilet area to create the grab bar. The measurement results are as follows: Maximum length of the handle: 62 cm, Width of the toilet seat: 78 cm.

During the implementation of Short Term Goal (STG) 1, which was conducted in the third session, the therapist informed Mr. A about how to use the assistive device, the grab bar, which is used in the toilet. The therapist also asked if Mr. A knew the function and purpose of the grab bar that would be installed and used in the bathroom. Mr. A was aware of how to properly use the grab bar. During the implementation of STG 2, which was conducted in the 3rd, 4th, and 5th sessions, the therapist asked the patient to simulate the transfer from squatting to standing on the porch of the house using the grab bar. It was found that the patient was able to perform the transfer from squatting to standing successfully. During the implementation of STG 3, which was carried out along with STG 2 in sessions 3, 4, and 5, the therapist asked the patient to perform a simulation in the bathroom. The simulation involved transitioning from a squatting position on the toilet to standing while holding the grab bar. The results showed that the patient was able to perform the simulation successfully, transitioning from squatting to standing while maintaining a grip on the grab bar.

In the COPM assessment, there were differences in the level of satisfaction and performance observed in the patient after the intervention. Based on the reassessment conducted on May 16, 2023, during toileting activities, there were changes in both the performance and satisfaction scores perceived by the patient. The satisfaction score increased from 5 to 9, indicating a higher level of contentment, and there was also an improvement in the performance score, which increased from 7 to 8.

Based on the assets and limitations possessed by the patient, they can be re-optimized in the implementation of the therapy program, particularly in transfers during toileting activities. Prior to the therapy program, the patient faced difficulties in transitioning

from a squatting to a standing position during toileting due to limitations in joint range of motion, endurance, muscle strength, and postural control. However, after several intervention sessions, the patient became more cooperative in following and understanding the given instructions, and they were able to apply the provided assistive device effectively.

By utilizing a rehabilitative framework such as the use of a grab bar, the patient's toileting activities were significantly facilitated, leading to an improvement in their overall independence. The grab bar served as a valuable tool to aid the patient during transfers, promoting safety and stability. As a result of this intervention, the patient's ability to independently perform toileting activities increased, positively impacting their daily living skills and quality of life.

### **3 Discussion**

A man Mr. A, aged 65, has been diagnosed with ischemic hemiparesis dextradue to a stroke. Mr. A has limitations in vestibular function, joint range of motion, muscle strength, endurance, postural control, crossing the midline, bilateral integration, fine motor coordination, and hand skills. Currently, Mr. A's daily activities have shifted to the left side, allowing him to become more independent. However, he still faces difficulty in transferring during activities such as bowel movement. Stroke survivors often face challenges in relearning motor skills and regaining lost functional abilities. Occupational therapy interventions that incorporate grab bars can accelerate the rehabilitation process and promote motor recovery. Therapists can design specific exercises and tasks that involve the use of grab bars, such as standing up from a seated position or stepping into and out of the bathtub. These activities stimulate neural pathways, encouraging the brain to adapt and rewire itself, leading to improved motor function over time.

Grab bars are versatile assistive devices that offer support and stability, particularly during standing, transferring, and balance-related activities. In the context of stroke rehabilitation, these devices play a critical role in helping individuals regain functional mobility and perform ADLs more safely. Grab bars are commonly installed in bathrooms and other areas where fall risk is high, as they provide a secure handhold for users during transfers and movement.

One of the primary concerns for stroke survivors is the increased risk of falls due to balance and coordination challenges. Grab bars offer valuable support and can significantly reduce the risk of falls during bathroom-related activities, such as toileting and showering. By providing a stable handhold, grab bars give stroke survivors the confidence and security to perform these tasks with minimal assistance. The installation of grab bars in strategic locations around the home can create a safer environment for stroke survivors, allowing them to navigate with greater ease and independence.

## 4 Conclusion

Occupational therapy, with the rehabilitative frame of reference and the use of assistive devices like grab bars, has proven to be successful in stroke rehabilitation. By focusing on the individual needs of stroke survivors and their goals, occupational therapists can facilitate meaningful and functional improvements in ADLs. The incorporation of grab bars as an assistive device optimizes patient performance in toileting activities, promoting independence, safety, and an enhanced quality of life. The success of occupational therapy in stroke rehabilitation reinforces its vital role in helping patients regain their functional abilities and return to active participation in daily life.

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