
Community-Based Rehabilitation After Brain Infarction in Japan: From the Acute Phase to Home

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Abstract: Cerebral infarction is one of the most common cerebrovascular diseases and can result in severe residual functional disabilities that permanently affect patients' activities of daily living and quality of life. Rehabilitation plays a significant role in reintegrating these people into society and enabling them to return home. Due to the growing aging population in Japan, the financial and societal impacts of cerebrovascular diseases are expected to increase. Here, we review the rehabilitation process in Japan through the acute, recovery, and daily living stages while considering the pathological conditions of patients with cerebral infarction. In particular, we discuss the pathology of cerebral infarction and rehabilitation interventions, the timing and purpose of rehabilitation, the use of walking aids such as canes, braces, and walking-assistive robots, the benefits of providing support and guidance to family members and caregivers, the use of telostroke and telerehabilitation, the services provided by rehabilitation facilities, and recent legal changes in Japan.

Keywords: cerebral infarction; orthosis; rehabilitation; stroke; telerehabilitation

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INTRODUCTION

According to the World Health Organization, approximately six million people die from cerebrovascular disease worldwide annually, accounting for 11% of all deaths, making it the second leading cause of death (1). In Japan, cerebrovascular disease was the leading cause of death in the past, but improvements in diet and lifestyle habits, as well as advances in diagnostic techniques and therapeutic methods, have led to a sharp decrease in mortality (2). Nevertheless, cerebrovascular disease is currently the fourth leading cause of death among Japanese people. Even now, cerebrovascular disease still occurs in more than 230,000 patients per year, and more than 1.15 million patients are receiving ongoing treatment (2). Currently, 6.5 million persons require long term care in Japan, with about 20% due to cerebrovascular diseases (3). Due to the growing aging population, the social impact of cerebrovascular disease will become increasingly significant.

The treatment for cerebral infarction, among other cerebrovascular diseases, has made remarkable progress in recent years. In addition to developing the emergency medical care system, major changes have been made through technological advances in thrombolysis and endovascular treatment, team-based medical treatment in stroke units, and the formulation of stroke treatment guidelines (4). The indication for recombinant tissue plasminogen activator (rt-PA) therapy for cerebral infarction was prolonged from within 3 h to 4.5 h, and endovascular thrombectomy for cerebral arterial occlusion has been established. However, there have been many cases in which these therapies could not be performed and cases in which functional improvement could not be achieved even with therapy. Therefore, there are still many patients who live with the aftereffects of cerebral infarction. Due to the large elderly population in Japan, cerebral embolism caused by atrial fibrillation is one of the most common cerebrovascular diseases. It often results in severe residual functional disabilities that permanently affect patients' activities of daily living (ADL) and quality of life (QOL). Therefore, rehabilitation plays a significant role in reintegrating these people into society. Here, we review the rehabilitation process in Japan through the acute, recovery, and daily living stages while considering the pathological conditions of patients with cerebral infarction.

PATHOLOGY OF CEREBRAL INFARCTION AND REHABILITATION

Cerebral infarction occurs when cerebral blood vessels are occluded, and blood circulation is impaired, resulting in the death of neurons in brain tissue. Blood supply to the brain is usually ensured even if the supply to a part of the brain is interrupted because there are sufficient collateral blood channels via the circle of Willis arteries. However, if these compensatory mechanisms are also impaired and blood flow from the arteries is disrupted, the brain becomes ischemic, leading to neurological symptoms. If the blood supply is immediately restored, the brain tissue recovers, and the symptoms disappear, but the condition becomes irreversible if the ischemia lasts for several hours or more.

According to its pathogenic mechanism, cerebral infarction can be classified into three categories: thrombotic, embolic, and hemodynamic (5). Cerebral thrombi occur in the main arteries of the brain, perforating branches of the deep white matter and smaller cortical branches, but most commonly in the main trunk of the middle cerebral artery and its perforating branches. Atherosclerosis is involved in the formation of most thrombi and is likely to progress when there are risk factors such as hypertension, diabetes, and dyslipidemia. Large artery atherosclerosis occurs at the origin of the common carotid artery and vertebral artery. It may also form an embolus at the bifurcation of the carotid artery (artery-to-artery embolism). Cerebral thrombosis can be divided into two types: lacunar infarction, in which small blood vessels in the brain called perforating branches are clogged due to degeneration or necrosis, and atherothrombotic infarction, which is caused by atherosclerotic lesions in large cerebral arteries in or outside the skull. Lacunar infarction is relatively mild, and mobilization can often be started early. However, even if computed tomography or magnetic resonance imaging of the brain shows what appears to be a lacunar infarct, the possibility that the main artery is occluded or that it is a cerebral embolus caused by an intracardiac thrombus cannot be ruled out (6). Therefore, in the hyperacute stage, even what appears to be a small infarct must be evaluated by a thorough examination of the brain, neck, and cardiovascular system before proceeding with rehabilitation. In atherothrombotic cerebral infarction, neurological symptoms such as paralysis may progress gradually due to stenosis or occlusion of the main artery. In the first few days from onset, attention should be paid to changes in symptoms, and rehabilitation should be carefully planned.

Cardiogenic brain embolism is when a mural thrombus or clot in the heart is transported by the blood to occlude a small blood vessel in the brain. It is more likely to occur in patients with a history of arrhythmia such as atrial fibrillation, valvular heart disease, myocardial infarction, or cardiomyopathy. In rare cases, cardiogenic brain embolism is associated with fat embolism after a bone fracture, air embolism in decompression sickness, and paradoxical embolism in which a blood clot moves from right to left of the heart through the foramen ovale. In addition to identifying the source of the embolus in cardiogenic cerebral embolism, the condition of cardiac function should be checked before proceeding with mobilization. In addition to transthoracic echocardiography, transesophageal echocardiography may be required to confirm the presence of atrial thrombi. In some cases, such as paroxysmal atrial fibrillation, the patient may have a temporary arrhythmia even if it is absent at the visit, so it is important to review the patient carefully. If cryptogenic stroke (7) is suspected, inpatient electrocardiogram (ECG) monitoring, Holter ECG, and possibly implantable ECG should be considered. If there are no signs of heart failure, mobilization should proceed. Since a mural thrombus may become detached and cause recurrence, rehabilitation should be started only after the patient and family have given their fully informed consent. It is not uncommon for cardiogenic cerebral embolism to be associated with hemorrhagic infarction (8). Therefore, it is important to closely monitor patients' vital signs and neurological symptoms until they are medication-stabilized and follow-up imaging is performed.

Hemodynamic cerebral infarction is a condition in which there is occlusion or severe stenosis in the proximal portion of the artery perfusing the infarcted area, but cerebral blood flow remains at a level that does not normally cause symptoms.

The perfusion zone becomes ischemic in the event of a blood pressure drop, dehydration, anemia, or hypoxemia. When hemodynamic factors are involved in the manifestation of symptoms, care must be taken as the symptoms may progress with head lift. In this case, surgical procedures such as intra- and extra-cranial artery bypass, carotid endarterectomy (CEA), carotid artery stenting, and intracranial artery angioplasty should be considered.

Recently, many hospitals have started using thrombolytic therapy with tissue plasminogen activator (t-PA) for acute cerebral infarction (9). Some facilities attempt to retrieve thrombi using endovascular therapy. The half-life of t-PA is short, so it does not interfere with the patient's mobilization. No significant differences need to be made in the rehabilitation program with or without these treatments, and if the treatment is effective, neurological symptoms will dramatically improve, along with ADL. However, there is also a risk of hemorrhage in the early stage after treatment, and it is necessary to fully understand the treatment and its risks before proceeding with rehabilitation.

REHABILITATION IN THE ACUTE PHASE

During the acute phase of cerebral infarction, the main focus is on stabilizing the patient's general condition and implementing thrombolytic therapy while preventing secondary complications. Therefore, rehabilitation interventions (OT/PT/SLT) are often delayed. Until the latter half of the 20th century, it was common to refrain from raising the patient's head in the acute phase of cerebral infarction because it was considered dangerous (10). This was done because the autoregulation of cerebral circulation is impaired in extensive cerebral infarction in which the blood-brain barrier is destroyed (11), and a drop in blood pressure could cause cerebral ischemia, leading to further tissue damage. In addition, since orthostatic hypotension was often observed in the elderly due to autonomic nervous system disorders, they were often forced to lie in bed. However, because of the frequent occurrence of disuse syndromes, including muscle weakness and arthrogryposis (Table 1) due to continued bed rest, as well as the fact that there is no difference in recurrence or progression even if early sitting or standing is implemented, we began to ambulate patients carefully. In recent years, large-scale studies such as the AVERT study (12) have reported the safety and usefulness of early mobilization. In stroke rehabilitation, earlier and more frequent mobilization is reported to be associated with better functional outcomes (13).

Acute rehabilitation aims to prevent secondary complications such as arthrogryposis, muscle weakness, pressure ulcers, deep vein thrombosis, and orthostatic hypotension caused by bed rest and help patients resume their ADL as early as possible. It is possible to start rehabilitation the day after the onset if there is no deterioration of neurological symptoms, the general condition is stable, and there are no other complications. However, in the case of lacunar infarction or atherothrombotic cerebral infarction, symptoms may worsen after rehabilitation has started, so the patient must be fully informed about their condition. If the patient is placed in a stroke care unit, various monitoring systems and responses to sudden changes are available. If the patient does not have an alteration of consciousness, sitting tolerance and standing training should be started in addition to

TABLE 1**Symptoms of disuse and immobility syndromes**

Musculoskeletal system
Muscle weakness
Muscle atrophy
Contractures
Osteoporosis (hypercalciuria)
Skin symptoms
Skin atrophy
Decubitus ulcer
Cardiopulmonary function
Decreased cardiac output
Tachycardia
Orthostatic hypotension
Deep vein thrombosis
Decreased respiratory volume per breath
Gastrointestinal function
Loss of appetite
Constipation
Fecal impaction
Easy fatigability
Urinary function
Urinary tract stones
Urinary incontinence
Central Nervous system
Psychosocial changes
Sleep dysregulation
Decreased cognitive function

repositioning, good limb positioning, and joint mobilization training. A shorter hospital stay and early return to society can be expected if the patient is given a sense of purpose and enhanced motivation for training. Nevertheless, it is important to provide adequate explanations to the patient and their family as they may believe that it is best to rest. Family education leads to faster psychological recovery and has a positive impact on hospital discharge. In other words, family members' participation in patient care and rehabilitation for hospital discharge is necessary to ensure that patients have more comfortable physical and mental recovery and maintenance after discharge.

REHABILITATION IN THE RECOVERY PHASE

After the acute phase and when the general condition stabilizes, specialized rehabilitation is initiated. Many patients with cerebral infarction require further rehabilitation and are transferred to either a rehabilitation ward or rehabilitation hospital as soon as acute treatment is completed. This period in which functional recovery can be expected is called the recovery phase, and active training is conducted in a training room or ward with a view of the patient returning home. Physical therapy includes muscle reeducation of paralyzed upper and lower limbs, mat exercises, muscle strengthening exercises, gait, and balance training. Occupational therapy includes ADL training for daily living, handedness change, and finger dexterity exercises. Speech therapy includes aphasia training, dysarthria training, and swallowing training. The abilities that must be improved during this period are not ADL abilities that can be performed in the training room, but ADL abilities that can be used in daily life situations after discharge. Intensive training programs should be implemented by providing maximum assistance to the patient so they can prepare for life after discharge. In convalescent rehabilitation wards, a multi-disciplinary team is formed, and active rehabilitation is promoted to help the patient return home (14). The patient's house should also be evaluated, and suggestions should be provided to the patient and their family on how to improve the living environment. In the case of patients with severe paralysis, it is often necessary to renovate the entrance, toilet, and bathroom. For this reason, regular conferences should be held to set short- and long-term goals, and a detailed rehabilitation plan should be made that considers the patient's life after discharge. In convalescent rehabilitation wards, all daily life training and care provided should be conducted with the goal of the patient returning home in mind.

REHABILITATION IN THE MAINTENANCE PHASE

Rehabilitation in the acute and convalescent phases consists of active functional recovery training that focuses on risk management of the disease to prevent secondary complications after the onset of the disease and enable a smooth return to home. However, rehabilitation in the maintenance phase aims to support independent living of people with disabilities to help them maintain their physical strength and functions, improve their living environment, and participate in society. In addition to providing task-specific training tailored to activities such as sitting, standing, transfer, and gait, the program should actively incorporate stretching and exercises. At the same time, the practitioner should assist the patient in navigating the transition to a more community-based lifestyle that includes a return to work, leisure activities, and exercise for fitness. In other words, rehabilitation in the maintenance phase is not simply about maintenance but also about improving QOL by further improving abilities and finding fulfillment in life. The practitioner should seek to improve neurological symptoms and functions of people with disabilities, improve their physical fitness and create an environment where they can adapt to and live in society.

WALKING AIDS

Various walking aids have been implemented in Japan to improve ADL and QOF of patients. This section provides an overview of some of the walking aids such as braces, canes, and walking-assistive robots.

Lower extremity orthoses

Orthotic therapy is an important therapeutic tool for hemiplegic patients to improve their gait performance and ADL (15). Lower limb orthoses are essential for active exercise therapy, as they are expected to improve standing balance symmetry, cadence, gait speed, and gait performance (16).

In Japan, knee ankle foot orthosis (KAFO) has been used for hemiplegic stroke patients since prior to World War II (17). KAFO is an ankle foot orthoses (AFO) with a knee joint and thigh cuff and is used for patients with more severe hemiplegia. More specifically, it is used when (i) the patient's general condition is stable, and the patient is ready to start standing or gait training, but the knee and ankle joints are not stable due to severe paralysis, (ii) the patient shows flexor-dominant spastic patterns and cannot hold the knee in extension, and (iii) the patient shows abnormal knee joint movement patterns such as flexion contracture of the knee joint (18, 19). KAFO provides good support, making it easy for therapists and family members to assist with walking (20–22). If the affected limb can be supported and the patient can walk without fixing the knee joint by means of the KAFO ring lock knee hinge, the knee hinge should be cut down (Note: remove the thigh cuff to make a short leg brace) (23).

AFOs are used to support lower limbs for standing and walking, correct abnormal limb positions due to spasticity or contracture, and prevent deformity and contracture (24, 25). There are several types of AFOs, including bilateral metallic strut AFO (M-AFO), adjustable posterior strut AFO (APS-AFO), plastic AFO, and ready-made AFO (Figure 1). AFOs with bilateral metal struts are used when paralysis is severe, spasticity is high, and strong fixation is required. With regard to adjustable posterior strut AFOs, the level of fixation can be adjusted by replacing the posterior struts with aluminum or carbon ones, and the angle of the ankle joint can be adjusted with an attached tool, making them suitable for a wide range of patients with mild to severe paralysis. Plastic AFOs are light and inexpensive, but their fixation is inferior, so they are used in cases with relatively mild paralysis and spasticity. Ready-made AFOs are used in cases with drooping feet, mild medial pointy feet, and very mild spasticity.

Posterior flat strut AFOs with adjustable functions can adjust fixation by replacing the posterior strut with aluminum or carbon. Furthermore, the angle of the ankle joint can be adjusted with accessory tools, so the adaptation is wide from severe to mild paralysis. Plastic AFOs are light and inexpensive but inferior in fixation and are used in cases with mild paralysis and spasticity. Ready-made AFOs are used for cases with drooping feet, mild varus cusps, and very mild spasticity.



Figure 1. Orthoses using orthotic therapy. There are several types of ankle foot orthosis (AFO). A, Bilateral metallic strut AFO. B, Adjustable posterior strut AFO. C, Plastic AFO. D, Ready-made AFO.

Cane

Various types of canes can be used as walking assistive devices. For stroke patients, T-shaped canes and 4-prong canes are often used. T-shaped canes are the most commonly used, especially among patients with good balance ability when walking. With a large ground contact area, 4-prong canes and side canes (hemi walkers) provide better stability and hence are suitable for patients with poor balance ability. However, such canes are heavy and bulky. The length of the cane also affects how well it supports the patient's weight, so it is important to set the height for each patient. It is important to note that prosthetic devices (braces and canes) must be selected by specialists to suit each patient. Furthermore, patients must help select an appropriate cane; otherwise, they will not be used.

Robot therapy

Robots have been increasingly used for rehabilitation training, with promising evidence being reported (26, 27). Lokomat (Hocoma), Gait Trainer GT 1 (Reha Stim Medtec), and Welwalk (Toyota) are well known training assistive robots. In Japan, clinical trials of the Hybrid Assistive Limb (HAL, CYBERDYNE), a lower limb-mounted walking aid robot, are underway for hemiplegic stroke patients. The HAL monitors biopotential signals generated by voluntary muscle contractions and assists movements of the hip and knee joints accordingly, thereby achieving intended movements in unison with the patient. The Welwalk is a treadmill system with a suspension device that relieves body weight on a treadmill to assist hip and knee movements. In this system, the robot externally assists the movements of the hip and knee joints of the paralyzed lower limb to provide sufficient training for the patient to relearn accurate gait movements.

Typical functional training robots for the upper limb are InMotion ARM™ Robot (MIT-MANUS, Interactive Motion Technologies) and ReoGo (Motorika) (28).

To perform shoulder and elbow movements, assistance and resistance are applied according to the motion trajectory on the display to guide appropriate movements and perform repetitive exercises. ReoGo also allows the patient to practice three-dimensional movements, including vertical movements. These robotic training devices are expensive, and not every hospital can provide robots as a treatment option. Nevertheless, they are still a useful tool to reduce the burden on therapists and ensure a sufficient amount of training.

FAMILY-PARTICIPATORY VOLUNTARY TRAINING AND GUIDANCE FOR FAMILY MEMBERS AND CAREGIVERS

The primary purpose of family guidance in stroke rehabilitation is to help the family understand the patient's condition and learn care and assistance skills (29). Family guidance should be provided as early as possible in parallel with other treatments. In addition to the conditions of the patient, the family should be informed in advance of the patient's possible future disabilities and problems in daily life. The therapist should be able to explain medications, possible social difficulties, how to apply for economic and social support, support for housework, and respite, in a way that the key support person understands. In addition, in parallel with other treatments, voluntary training that can be carried out at home or exercise guidance under assistance should be provided. If training is incorporated into the patient's daily life, there is no need to go to the hospital for rehabilitation, and the patient can aim to maintain or improve their abilities after discharge.

Caring for stroke patients can have a significant impact on the psychosocial health of family members and caregivers. For example, depression is seen not only in patients but also in caregivers. Caregivers need to receive and maintain long term emotional and physical support from their families, friends, and health care providers (30). However, the needs of caregivers vary by age, with younger caregivers seeking information and training and older caregivers needing support to maintain positive thinking (31). Therefore, it is important to tailor support to the needs of the caregiver.

TELEMEDICINE: TELESTROKE AND TELEREHABILITATION

“Telemedicine” is the practice of health promotion and medical treatment using information and communication devices. It includes online medical care, telemedical health consultations, and diagnosis. Telemedicine has been widely used in Western countries to compensate for the shortage and uneven distribution of medical specialists. Telemedicine related to stroke care is called telestroke, and operational guidelines have been published focusing on the immediate response to stroke (32). This is primarily a 24 hours/7 days service provided by a hub facility, where a stroke specialist is consulted by physicians in the community using an image transfer system. In some cases, an order is given to administer rt-PA therapy, and then the patient is transported to a hub facility where endovascular treatment is provided (drip & ship). Although telestroke is used as a tool for time-sensitive acute care (33), it can also be applied to chronic and rehabilitative care (telerehabilitation).

Many post-stroke patients require rehabilitation therapy even after discharge from hospital, but therapists usually do this in the hospital or by therapists sent from the hospital to their homes. However, technological advances now enable patients to continue their rehabilitation without leaving their home by communicating with their therapist (34). This approach, called telerehabilitation, may provide rehabilitation in a more convenient and inexpensive way. Currently, we conduct weekly rehabilitation conferences with hospitals 1,000 km away without a rehabilitation specialist (35). This was instigated due to the COVID-19 pandemic, where travel to and from remote areas is restricted. It is expected that the use of telemedicine for patient education and rehabilitation will be further expanded in the future.

REHABILITATION HOSPITALS AND FACILITIES AND LEGAL IMPROVEMENT

In the United States, the duration of acute hospitalization for cerebral infarction is very short (median of four days) (36). After admission, patients are transferred to inpatient rehabilitation facilities for intensive rehabilitation or skilled nursing facilities for subacute rehabilitation, as needed. In contrast, in most hospitals in Japan, patients are discharged or transferred within two to four weeks of acute care. Rehabilitation is provided to many patients with cerebral infarction during their stay in acute care hospitals. Patients with dysphagia and relatively mild motor paralysis, which do not interfere with their daily activities, are often discharged directly to home (37). However, patients with moderate or greater motor paralysis, aphasia, or dysphagia are transferred to a convalescent rehabilitation hospital (or to a convalescent rehabilitation ward in the same hospital) for further improvement. Rehabilitation interventions to achieve the highest possible level of functioning are undertaken in these facilities with the goal of the patient returning home. Doctors who have taken a two-day rehabilitation course (regardless of whether they are rehabilitation specialists or not) are in charge of the ward, and rehabilitation care is provided by physiotherapist, occupational therapist, speech pathologist, care workers, dietitians, and maternity support workers. Medical insurance permits rehabilitation treatment for 3 h a day, seven days a week. The hospitalization period for stroke is limited to 150 days (180 days for patients with higher brain dysfunction). This system was established in Japan in 2000, with more than 90,000 hospital beds available. When patients are discharged home, they can receive home visit rehabilitation services covered by medical insurance for only three months. After that, they will only receive services covered by long term care insurance.

If the patient's disability is judged to be severe and that they are unlikely to recover, transfer to a nursing home should be arranged, or if the family prefers, treatment at home could be arranged. In both cases, the use of long-term care insurance is allowed, but there are usually many out-of-pocket expenses, so many families prefer the hospital setting. As for nursing care facilities, there are public facilities such as special nursing homes for the elderly/nursing care facilities (*kaigo-iryuin*), geriatric health care facilities, and care houses, as well as private facilities such as fee-based nursing homes with long term care services and group homes, each of which has different benefits. In addition, for those who wish to receive care at home, day care, day services, and other commuting services for

maintaining functions are provided under long-term care insurance. These rehabilitation services are covered by long-term care insurance, but due to the shortage of facilities and human resources, it is difficult to say that high-quality services like those provided in hospitals are being provided, and there is a need for high-quality, long term care services.

In recent years, regional cooperation using clinical pathways has been attracting attention as a measure for functional differentiation and coordination of medical care, seamless medical care, and early return to home (38). In particular, patients with cerebral infarction are often brought to emergency hospitals that can provide specialized treatment immediately, and they pass through rehabilitation hospitals and return to the community. Therefore, patients should receive coordinated and consistent medical treatment. Transfer from hospital to a convalescent rehabilitation ward is coordinated by a medical social worker who receives a request from the attending physician to introduce several cooperating medical institutions that provide services covered by health insurance (collaborating hospitals) that are close to the patient's residence. Then, the patient and/or their family members can decide on which the patient should be transferred to. The collaboration pathway is one of the ways of facilitating this medical flow. The regional collaboration pathway for stroke patients is a system that allows people involved in medical and nursing care in a region to share information by assigning their roles, clarifying goals and precautions for future medical care for stroke patients, and supporting them as a team. When a patient is admitted to an acute hospital and needs to be transferred to a convalescent rehabilitation hospital, the medical treatment plan and information of multiple professions such as doctors, nurses, and rehabilitation staff should be transferred to the new hospital. At primary hospitals, clinicians record basic information such as the date of onset and diagnosis of the disease, as well as neurological symptoms, details of medication, pathological behaviors, explanation of prognosis, date of discharge, evaluation of daily living functions at the time of discharge, ADL, modified Rankin Scale (mRS), and eating status. The patient is transferred to the collaborating hospital with the summary using the collaboration pathway. At the collaborating hospital, the physician should enter information about ADL, eating status, mRS, functional assessment, level of independence in daily life for the elderly with disabilities or the elderly with dementia, discharge date, and outcome after discharge using the collaboration pathway brought by the patient. After the patient is discharged, the pathway is returned to the planning and management hospital (primary hospital). In this way, the regional collaboration pathway for stroke patients is a valuable tool that allows medical institutions to work closely together and easily obtain patient information. The sharing of this information and outcomes among the collaborating facilities can improve the quality of rehabilitation medical services (39).

On the other hand, early supported discharge (ESD) services link inpatient care with community services. With the support of a rehabilitation team, they help patients return to their homes as early as possible and provide continuous rehabilitation in the community. ESD has been practiced mainly in Northern Europe as it is challenging to implement in places where community services are not well developed. It has been reported that ESD produces similar outcomes as inpatient rehabilitation in hospitals and reduces the length of hospital stay, increasing the likelihood of patients living independently at home (40, 41). Furthermore, ESD has been found to reduce total health care costs and the risk of institutionalization without a negative impact on functional recovery (42).

For a patient with cerebral infarction to live safely at home, the transition from medical care to nursing care must be made promptly, and a system must be in place in which patients can safely receive nursing care and rehabilitation. By 2025, Japan aims to establish a community-based comprehensive care system that integrates housing, medical care, nursing care, preventative care, and lifestyle support so that the elderly can live more independently in their community (43).

In addition, in Japan, the basic act on measures against stroke and cardiovascular diseases was enacted to clarify the roles of government, medical insurers, citizens, and health, medical, and welfare workers, and to implement measures to extend healthy life expectancy and reduce the burden of medical care and nursing care by disseminating preventive care and appropriate treatment for stroke and cardiovascular diseases (44). In addition, based on this law, the Cabinet approved the “basic plan for the promotion of cardiovascular disease countermeasures” (45). In the future, it is expected that prompt admission to medical institutions and high-quality, appropriate medical care, including rehabilitation, will be provided in the event of stroke or cardiovascular disease and that health, medical, and welfare services will be available to patients across Japan.

CONCLUSION

Rehabilitation plays an important role in reintegrating these people into society and returning them home. We reviewed rehabilitation through the acute phase, recovery phase, and life phase, taking into account the pathological conditions of patients with cerebral infarction. It is expected that patients with cerebral infarction would be promptly admitted to medical institutions and provided with high-quality and appropriate medical care, including rehabilitation, so that they can receive health, medical, and social welfare services in a seamless process.

Conflict of Interest: The authors declare no potential conflicts of interest with respect to research, authorship, and/or publication of this chapter.

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