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Pioneering an Integrated Rehabilitation System and Human Resource Development to Improve Rehabilitation Services

in Cambodia, Lao People's Democratic Republic, and Viet Nam

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Abbreviations

ADL	activity of daily living
AHWIN	Asia Human Wellbeing Initiative
ASEAN	Association of Southeast Asian Nations
BI	Barthel index
BRS	Brunnstrom recovery stage
CPTA	Cambodian Physical Therapy Association
CT	computed tomography
GCS	Glasgow Coma Scale
ID	identification
ICU	intensive care unit
JICA	Japan International Cooperation Agency
KMSI	Kitahara Medical Strategies International
KNI	Kitahara Neurosurgical Institute
Lao PDR	Lao People's Democratic Republic
MMSE	Mini Mental State Examination
MRI	magnetic resonance imaging
mRS	modified Rankin Scale
NGO	non-governmental organisation
OT	occupational therapist
PET	positron emission tomography
PT	physical therapist
QOL	quality of life
SAH	subarachnoid haemorrhage
ST	speech-language-hearing therapist

TLSI	total life support industry
UHS UHC	Universal Health Coverage
VSSVSS	Viet Nam Social Security
WCPT	World Confederation of Physical Therapy

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Chapter 1
Introduction

1.1. Background and Objective of the Study

The working-age population in the Association of Southeast Asian Nations (ASEAN) Member States is estimated to peak in 2050 and then decrease (United Nations, 2017), followed by the ageing of the population. These countries are facing challenges in systematic collaboration models in medical and nursing care and in the development of regional systems and industry to support ageing societies, including rehabilitation and long-term care. Specialist human resources are insufficient.

Japan has the most ageing population (World Bank, 2017) and has a great deal of experience, knowledge, and lessons on population ageing, which can be shared with other Asian countries, including the introduction of long-term care insurance and advancement of industries related to long-term care. Many issues remain, however, such as prevention of diseases, self-care, collaboration between medical and nursing care operators, and rehabilitation for patients transitioning from an acute to a chronic stage. Long-term care operators have difficulty providing services sustainably because of human resource shortages and insurance finance restrictions. Policies are, therefore, necessary to ensure that the medical and nursing care industry is developed and reformed by 2030, when it is expected to overtake manufacturing as the largest employer in Japan (The Japan Institute for Labour Policy and Training, 2018).

Japan's government launched the Asia Human Wellbeing Initiative (AHWIN) in 2016. It aims to promote bilateral and regional cooperation to foster sustainable and self-reliant healthcare systems. AHWIN's goal is closely related to Sustainable Development Goal 3: 'Ensure healthy lives and promote well-being for all at all ages', and particularly universal health coverage that ensures all people have access to quality essential healthcare services without suffering financial hardship. This study was conducted in line with the concept of AHWIN.

In Japan, where universal and compulsory medical insurance was introduced in 1961 and advanced medical treatment procedures, equipment, and drugs are widely covered by the insurance system, national medical care expenditure is skyrocketing as the population ages. Older people generally have more diseases and ailments, while advances in technology and science increase medical costs. ASEAN Member States can expect similar dramatic increases in medical care expenditure as their birth rates decline and their populations age. ASEAN Member States can meet social challenges by learning from Japan's experience in, for example, establishing the medical and nursing care system, which can be adapted to the realities of each country and the level of human resources in medical and nursing care. The

system can be the basis for a healthcare industry, including prevention, rehabilitation, and self-supporting long-term care, in anticipation of the extent of population ageing.

We investigated the rehabilitation environment for patients with brain injuries in Viet Nam, Cambodia, and Lao People's Democratic Republic (Lao PDR). We collected information on the provision of rehabilitation, establishment of a rehabilitation system, and education for rehabilitation staff members. We aimed to provide education for patients' family members at counterpart hospitals. Finally, we recommend ways to provide rehabilitation, considering the countries' situations.

1.2. Why Is Rehabilitation Important?

First, acute-stage rehabilitation aims to prevent disuse syndrome, improve activities of daily living (ADL), and achieve social rehabilitation. Active rehabilitation should be implemented as soon as possible after the onset of events that cause patients' physical deterioration. Early rehabilitation requires risk control, as patients in the early stages are generally unstable. A systematic review in 1991 showed that early intervention and longer training improved motor function after paralysis, and the group given 1.5-fold more intense rehabilitation than standard practice within 1 week after onset improved significantly, with the effect retained for 12 months (Wagenar and Meijer, 1991a, 1991b). Early rehabilitation achieves satisfactory trunk function, improved functional prognosis, and marked suppression of the risk of relapse (Wagenar and Meijer, 1991a). The addition of early supported discharge – intensive rehabilitation support at the patient's home for several weeks – resulted in shorter hospitalisation (Saka et al., 2009).

The acute stage of stroke may be followed by recurrent stroke or accompanied by symptoms such as convulsions, delirium, and depression, as well as complications such as aspiration pneumonia, respiratory tract infections, urinary tract infections, decubitus ulcers, cholecystitis, arrhythmia, cardiac failure, and deep vein thrombosis. Complications can increase the chance of mortality and deteriorate functional outcome (Johnston et al., 1998; Davenport et al., 1996; Langhorne et al., 2000; Martino, 2005; Sellars et al., 2007), but complications caused by a prolonged bedridden period could be prevented by early gait rehabilitation (Raicevic, 2000).

Seamless intervention – from acute-stage rehabilitation to early supported discharge – improves physical function and ADL, prevents disuse symptoms, shortens hospitalisation, and lowers the cost of inpatient medical care and improves its efficiency (Saka et al., 2009). Some studies show that if hospitals and long-term care providers collaborate closely, early rehabilitation for stroke patients can reduce the inclusive cost of medical care and welfare by 20%–40% compared with 6-month hospitalisation in general hospitals without rehabilitation (Langhorne et al., 2000; Martino, 2005; Sellars, 2007). A cohort study in Switzerland shows that the long-term cost for stroke patients is significantly reduced by careful triage from the early stage and by acute stage rehabilitation (Mahler, 2008). A review of the cost of general care of stroke patients (Tummers, 2012) shows that early supported discharge reduces cost more than conventional care.

The commencement of rehabilitation should be carefully timed for every case, considering the severity of conditions. Earlier rehabilitation does not necessarily produce better outcomes. The result of a randomised controlled trial in 2015 suggested that intensive rehabilitation in the ultra-acute stage resulted in poor prognosis (Bernhardt et al., 2015), whilst practising the sitting position as early as within 24 hours of the onset of stroke was likely to improve ADL 3 months after the onset without any adverse events (Herisson and Godard, 2016). Studies show that careful assessment of the target disorder, detailed planning of interventions, including the duration as well the timing of commencement, must be considered to maximise the effect of rehabilitation.

The prognosis of ADL is related to age, ADL before the stroke, presence of dementia, and severity of physical dysfunctions. Even the simplest models consisting of only six variables – age, living alone, independent ADL before stroke, verbal function, ability to lift arms, and walking ability – can predict the prognosis of 'independent' at 6 months as accurately as other models using other detailed variables such as patients' history or results of examinations (Counsell et al., 2002). Amongst the variables entered in the simplest model, 'independent before stroke' has the highest odds ratio: 15.55. Simple background information of patients can be useful in predicting their prognosis.

Chapter 2

Importance of Rehabilitation Focusing on Patients' Lives

2.1. Importance of Capacity Building Regardless of Rehabilitation Expertise

Rehabilitation specialists are classified as physical therapists (PTs), occupational therapists (OTs), speech-language-hearing therapists (STs), rehabilitation doctors, and prosthetists and orthotists (World Health Organization, 2017). Physical therapy is applied to patients with physical dysfunctions and includes therapeutic and exercises and/or the application of other physical procedures such as electrotherapy, massage, and heat, and aims for recovery of basic physical movement. Occupational therapy is guidance and support in medical care, public health, welfare, education, and employment, to promote human health and well-being. 'Occupation' refers to daily activities that are purposeful and meaningful to each person (Fujita, 2007). Speech therapists work to prevent, assess, diagnose, and treat speech, language, social communication, cognitive-communication, and swallowing disorders in children and adults (American Speech-Language-Hearing Association, 2019).

Rehabilitation in Cambodia and Viet Nam emerged as support for invalids and those injured during war (Fujita, 2007; Japan Association of Occupational Therapists, 2019). In Thailand, rehabilitation became widespread through the treatment of patients with sequelae of poliomyelitis (Chavasiri, 2002; Handicap International Thaïlande, 2019). When rehabilitation was first introduced in these countries, it focused on recovery of physical function and only PTs were engaged in rehabilitation. Physical therapy remains dominant in the study countries – Cambodia, Lao PDR, and Viet Nam – and they have not yet established officially approved training courses for OTs and PTs, who are supposed to provide rehabilitation after head trauma stroke.

In most countries that can provide advanced medical services, PTs, OTs, and STs are highly specialised and their job descriptions clearly differentiated because advanced medical services require highly skilled staff to secure the expected standards. In countries with a shortage of medical human resources and where the concept of rehabilitation is not commonly recognised, however, efficient and effective medical personnel with a wide range of medical knowledge and techniques are required more than highly specialised personnel. A discussion of building the capacity of rehabilitation personnel in such countries, therefore, requires an understanding of the status of medical care and how to introduce rehabilitation systems suitable for the available medical resources.

2.2. Seamless Provision of Rehabilitation

In Japan, the population aged 65 years and above made up 27.7% of the total population (ageing rate) in 2017. The ageing rate is steadily increasing in Japan (Government of Japan, Cabinet Office, 2017). The difference between full life expectancy and healthy life expectancy is 8.84 years for males and 12.35 years for females (Government of Japan, Ministry of Health, Labour and Welfare, 2017), and other statistics show that about half the population aged 85 years and above are beneficiaries of long-term care insurance services (Government of Japan, Ministry of Health, Labour and Welfare, 2017). This indicates that the number of people with various needs, not only for long-term care but also for medical care and lifestyle support, is rapidly increasing. Needs include disease prevention, acute-stage care, home care, and prevention of recurrences. These needs must be covered efficiently through close cooperation between medical care and nursing care facilities.

Acute-stage rehabilitation aims to prevent disuse syndrome and its ultimate goal is social rehabilitation. Short social rehabilitation is encouraged because it can shorten hospitalisation and reduce medical expenditure (Sakaet al., 2009). Quick social rehabilitation and inclusion requires cooperation amongst and seamless intervention from acute-care facilities, recovery-care facilities, homes, communities, or long-term care institutions.

In any country, hospitals are generally classified into several categories according to their referral levels, functions, or specialties. When a patient still undergoing rehabilitation leaves an acute-care hospital, he or she will usually not be traced to recovery-care facilities or homes, for example, because of the difference in staff and functions of facilities. A patient summary is commonly sent to the next facility but it cannot transfer patient information sufficiently because required information may differ amongst facilities (such as acute care and recovery care) as well as amongst occupation categories (Koyama et al., 2013).

Lao PDR and Viet Nam face this challenge. Rehabilitation centres there provide continued rehabilitation when patients leave acute-care hospitals (Phoummalaysith, 2005; Government of Lao PDR, Ministry of Health, 2016), but such hospitals are incapable of tracking the patients' destinations. Cooperation between acute-care hospitals and rehabilitation centres is not sufficient.

Since its foundation, the Kitahara Neurosurgical Institute (KNI) has provided integrated and seamless medical care, from acute care (emergency and surgery) to rehabilitation and home care. The KNI has several facilities for acute care and recovery care. Both facilities' staff members routinely visit each other as part of the single Kitahara system and share patient information. The KNI has a unique personnel assignment policy to break the barriers of occupation categories (within the law), for example, assignment of rehabilitation therapists to the emergency department to intervene simultaneously. The Kitahara system makes efforts to trace patients after discharge from acute-care hospitals, to continue intervention at rehabilitation centres, and to understand the lifestyle of patients at home. The KNI believes in seamless rehabilitation and cooperation between institutions for ASEAN Member States, especially where ageing is expected to occur more rapidly than in Japan (United Nations, 2015). Acute care must be provided for how patients will live at home and in their communities. Guidance and education for family members should be provided before the patient is discharged so that social rehabilitation is smooth.

Chapter 3

Rehabilitation in the Study Countries

Table 1. Background Information on Medical Services and Rehabilitation in Viet Nam, Cambodia, Lao People's Democratic Republic, and Japan

	Viet Nam	Cambodia	Lao People's Democratic Republic	Japan
Number of doctors (per 10,000 persons)[a]	11.9	1.7	1.8	23
Number of beds (per 10,000 persons)[a]	20	7	15	137
Mean number of persons per household[b]	4.8	4.7	5.9	2.47
Number of physical therapists in the country[b]	4,839	235	1,072	129,942

[a] World Health Organization (2014).

[b] Government of Japan, National Institute of Population and Social Security Research (2005); Government of Cambodia, National Institute of Statistics Ministry of Planning (2008); Government of Japan, Ministry of Foreign Affairs (2009); and Government of Japan Ministry of Health, Labour and Welfare (2016), Ung (2008), and Uchiyama (2016).

Table 2. Basic Information on Leading Hospitals Accepting Brain Injury Patients in Viet Nam, Cambodia, and Lao People's Democratic Republic; and on Kitahara International Hospital

	Viet Nam: Viet Duc University Hospital	Cambodia: Kossamak Hospital	Lao People's Democratic Republic: Mittaphab Hospital	Japan: Kitahara International Hospital
Number of beds	1,500	350	150	98
Acceptance of inpatients exceeding officially registered capacity	Yes	Yes	Yes	No
Discharge for financial reasons	Yes	Yes	Yes	Rarely
Rate of stroke patients in severe condition[a] at discharge	Unknown	Unknown	79%	13%

Complete or incomplete nursing care[b]	Incomplete*[2]	Incomplete	Incomplete	Complete
Criteria for rest level according to patient's condition (from bed rest to walking by oneself)	No	No	No	Yes
Criteria for timing to start rehabilitation according to patient's condition	No	Unknown	No	Yes
Rehabilitation staff	PT	PT	PT	PT, OT, ST
Physical therapists	10	5	15	9
Rehabilitation conference[*3]	No	No	Once a week	Once a week
Rehabilitation ward round	No	No	No	Daily
Rehabilitation fee	US$7–20/40 min	US$5/30 min	US$2.5–6/30 min	US$21–24/20 min
Public medical insurance coverage on rehabilitation	80% covered	Not covered	100% covered for outpatients; coverage is varied for inpatients	70% covered

OT = occupational therapist, PT = physical therapist, ST = speech-language-hearing therapist.

[a] Patients in severe condition are those with a score of 4 or higher on the modified Rankin Scale.

[b] Complete nursing care is the hospital nursing system where only registered nurses or nurse assistants can provide nursing care to patients, including support for daily activities, and hospitals must not depend on care provided by families, relatives, or private caregivers. In Japan, this system is strictly applied to all medical facilities authorised use public medical insurance, whilst in the study countries, hospitals largely depend on non-professional care to support daily activities of patients because of the limited number of professional staff members such as registered nurses.

[*3] A rehabilitation conference is a discussion amongst staff members of several occupational categories related to rehabilitation, including PTs, nurses, and doctors, on the rehabilitation plan for each patient.

Source: Authors.

3.1. Rehabilitation Environment for Patients with Brain Injury in Viet Nam

Viet Nam's population was about 94 million in 2016 (World Health Organization, 2016). In recent years, however, the rural population has decreased notably and the urban population has rapidly increased.

Life expectancy at birth is 76 years. Statistics on cause of death showed a decreasing trend of infectious disease cases and an increasing number of non-infectious disorders, accidents, injuries, and poisoning in 2010 compared with 1986. The most common cause of death is stroke, followed by ischemic heart disease and chronic obstructive pulmonary disease. Cancers and lifestyle diseases are also common causes of death (Government of Japan, Ministry of Economy, Trade and Industry (2016); UNDP Vietnam, 2011).

Viet Nam introduced a public healthcare referral system, where patients in severe condition are referred and transported to an advanced medical care facility. Medical care, if provided under the referral system, is covered by the public insurance system, making consultation affordable. A remarkable number of patients, however, particularly rich ones, ignore the referral system and directly consult the central medical care institutions without a reference. The Viet Nam Social Security system, founded in 1992 and still effective, is a compulsory universal insurance system and covers about 64 million people (about 70% of the national population, as of 2014). At designated medical institutions, 85%–100% of medical costs are covered by insurance (UNDP Vietnam, 2011). Rehabilitation is covered by insurance (Socialist Republic of Viet Nam, 2011).

Under the 2009 law, the compulsory universal insurance system was to cover all citizens by 2014, but about 27 million people remain uninsured. Employees of formally registered firms and public servants are covered under the compulsory employees' insurance system. Special populations, including low-income people, children under 6 years, and veterans, benefit from social assistance systems that subsidise medical care cost. Other populations, such as people affiliated with companies that are not formally registered or self-employed workers, including farmers, are uninterested in medical insurance and are often uninsured (The Japan Institute for labour Policy and Training, 2017).

As described in the Viet Nam Sustainable Development Strategy for 2011–2020 (Socialist Republic of Viet Nam, 2011), the government aims to reduce the bed occupancy rate in central hospitals and to improve the quality of rehabilitation in all regions.

Viet Nam has 1,087 public hospitals and 102 private hospitals. Bachmai Hospital, Cho Ray Hospital, and Hue Central Hospital are the three major ones (Government of Japan, Ministry of Economy, Trade and Industry, 2016). All urban hospitals have rehabilitation departments and about 90% of provincial general hospitals provide various methods of rehabilitation.

The rehabilitation association was founded in 1991 and has more than 4,000 active members. About 20 volunteer members such as students are affiliated with the society. The members consist of doctors (35%), PTs (55%), and nurses (10%), with a 7:3 ratio of members from the north and the south.

More than 20 non-governmental organisations (NGOs), including Humanity & Inclusion, Viet Health, and Medical Committee Netherlands Vietnam, provide rehabilitation with support from the United States Agency for International Development (USAID).

PTs are attempting to establish a national association. Ho Chi Minh City has a regional association. It had about 800 members as of July 2018 and hosts an academic conference once a year to improve public awareness of physical therapy and improve PTs' knowledge and skills.

3.2. Rehabilitation Environment for Patients with Brain Injury in Cambodia

Cambodia, with a population of about 15 million people, borders Viet Nam, Thailand, and Lao PDR. The potential support ratio – the number of younger people (15–64 years old) per older person (65 years and older) – is 15.6, higher than the world average of 7.9. The reason is that civil wars killed off many people. In 1975–1979, many were massacred under the reign of Pol Pot, whose aim to achieve primitive communism led to the execution of many intellectuals, particularly doctors, teachers, and artists. The following civil war caused an absolute shortage of medical professionals, and medical equipment and pharmaceuticals remain insufficient. The standard of medical care remains low, particularly in rural areas and the outskirts of cities.

Because of the shortage of government funding, Cambodia does not have a national medical insurance system such as Japan's, and patients generally pay the total cost of medical consultation and medications. Wages of medical professionals are not necessarily high, which has led to low morale and the deterioration of the quality of medical care. Many people do not, therefore, trust medical care in the country and more than 200,000 travel abroad each year to seek medical services. Low- and middle-income people head to Viet Nam, whilst high-income people go to Thailand and the richest prefer Singapore (The Japan Institute for Labour Policy and Training, 2017).

Cambodia has 12 national rehabilitation centres but insufficient rehabilitation specialists, funds, and facility management. Because they lack public medical insurance, many patients return home for financial reasons before they complete rehabilitation. Rehabilitation is not popular because many Cambodians do not trust their country's medical care. Cambodia is still developing a reliable rehabilitation provision system, which requires a multifaceted approach involving providers and users. The issues of facilities, human resources (technical and management), finance, and people's ways of thinking are all associated with rehabilitation services (Cambodia HHRD Project Research Consortium, 2013).

Rehabilitation was first implemented during the 1990s, primarily for victims of mines and people injured during the civil war. Eleven rehabilitation centres were founded with the technical and financial support and cooperation of the Ministry of Social Affair Veterans and Youth Rehabilitation. Rehabilitation is gradually being integrated only into the ministry. The rehabilitation centres are mainly staffed with PTs, prosthetists and orthotists, and administrative staff members. Activities include provision of exercise therapy and prosthetic therapy (leg braces, walkers, crutches, sitting trainers, wheelchairs) as well as participation in social activities.

PTs work in diverse facilities, such as national and regional hospitals, schools for PTs, rehabilitation centres, facilities for disabled people, local and international NGOs, private clinics, and soccer teams. Those who graduated from schools of physical therapy must be approved by the Ministry of Health to start their own clinics. PTs are often affiliated with national and prefectural hospitals, but regional hospitals and health centres often have no affiliated PTs.

Challenges of rehabilitation are (i) improvement of the quality and quantity of regional rehabilitation services (there are 3 PTs per 100,000 people); (ii) establishment of provincial education systems for PTs; (iii) economic assistance for students and PT associations; and (iv) raising of awareness of the importance of rehabilitation amongst medical professionals, students in higher education, the public, and the elderly. Although the Ministry of Health strives to provide physical therapy in hospitals, there are no educational courses for OTs and STs. Orthopaedic surgeons and neurosurgeons are scarce.

Social protection measures include provision of medical care and rehabilitation services free of charge for people with disabilities or low-income people holding special identity cards (IDs) that categorise the holder as having poor financial capacity, corporate funding for those who do not hold the special ID, and provision of services under pension funds (membership fee is US$5 dollars a month, except for people with disabilities or holders of the special ID).

The Cambodian Physical Therapy Association (CPTA) was founded in 1994 and registered with the World Confederation of Physical Therapy in 2007. Of the 465 PTs who graduated from physical therapy school, 150 have joined the association (Many,2018).

3.3. Rehabilitation Environment for Patients with Brain Injury in Lao People's Democratic Republic

Lao PDR has a population of about 6.68 million, and 70% of the land consists of high plains and mountainous areas. Life expectancy is 67.8 years and healthy life expectancy is 57 years. The most common cause of death is lower respiratory tract infections at 11.9%, followed by diarrhoea disorders at 6.0%, ischemic heart disease at 5.8%, congenital anomalies at 5.4%, strokes at 5.2%, complications of premature birth at 4.9%, tuberculosis at 3.8%, traffic accidents at 3.0%, and neonatal encephalopathy at 2.7% (Institute for Health Metrics and Evaluation, 2010). Rehabilitation is provided for a wide range of conditions, such as neurological disorders in adults and children, orthopaedic disorders, respiratory disorders, and amputations, even for those in the very acute phase in intensive care units (ICUs), under the instruction of doctors. The Ministry of Health governs 7 prefectural health departments, 146 district health departments, and 860 health posts (Government of Lao PDR, Ministry of Planning and Investment, 2015). As of 2010, there were 0.8 beds per 1,000 people. Rehabilitation is available at central hospitals, district hospitals, and the national rehabilitation centre. After a patient is discharged, follow-up is performed at vocational training schools or outpatient rehabilitation clinics or by visiting rehabilitation specialists.

As of 2017, four public medical care security systems had been established: State Authority for Social Security, Social Security Organization, Community-Based Health Insurance, and Health Equity Funds (World Health Organization, 2014). In 2015, the membership rate was about 30% (Ohara, 2016). The National Socioeconomic Development Plan VIII targets a medical security membership rate of 50% by 2020 and universal insurance coverage by 2025. Total medical expenditure per capita is US$40/year, of which 49% is public expenditure, 40% is out-of-pocket, and 11% others. Total medical expenditure was 3% of gross domestic

product in 2012 (World Health Organization, 2012b). The fee for a physical therapy session ranges from US$2.50 to US$6 and is set according to devices used and services performed.

As of 2018, the country had more than 1,000 doctors and 5,000 nurses and midwives. Every year, about 150 doctors graduate but medical human resources are concentrated in the capital, with 10 times the number of doctors per population than for rural populations (World Health Organization, 2012a). As of 2018, there were 1,072 PTs and 20–30 PT graduates annually. The country has one school for PTs and the qualification is given at graduation. Although there are no schools for OTs and STs, staff members who completed training in Thailand are considered OTs and STs.

Our project helped PTs of several central hospitals in Vientiane organise regular conferences to discuss and share issues. Case studies and learning sessions are held to improve techniques and knowledge.

3.4. Institutions Visited by Study Members in Cambodia, Viet Nam, and Lao People's Democratic Republic

Table 3. Institutions Visited in Viet Nam, Cambodia, and Lao People's Democratic Republic

Cambodia	(i) Sunrise Japan Hospital, (ii) Preah Kossamak Hospital, (iii) Khema PolyClinic, and (iii) Cambodian Physical Therapy Association Physical Therapy Clinic
Viet Nam	(i) Viet Duc University Hospital, (ii) Hai Duong Medical Technical University, (iii) Ha Noi Rehabilitation Centre, (iv) Thien Duc Care Centre for the Elderly, (v) Nghe An Rehabilitation Centre, (vi) Cho Ray Hospital, and (vii) Ho Chi Minh Medicine and Pharmacy University
Lao People's Democratic Republic	(i) Mittaphab Hospital, (ii) National Rehabilitation Centre, (iii) Sethathirath Hospital, and (iv) Mahosot Hospital

Source: Authors.

3.4.1. Cambodia

Sunrise Japan Hospital Phnom Penh (Private)

The hospital opened in October 2016. It was founded and is managed by a joint venture of Japanese companies: JGC Corporation, Innovation Network Corporation of Japan (INCJ), and Kitahara Medical Strategies Institute (KMSI). The hospital has 50 beds and a staff of 146 (as of December 2018). Bed occupancy rate is unknown. Bed capacity is sufficient. The hospital has nine clinical specialties: CT scan, MRI, X-ray, bronchoscope, electrocardiogram, electroencephalograph, endoscope apparatus, angiography apparatus, and two operating rooms available 24/7. The hospital can provide several types of surgery, including chronic subdural hematoma drainage, craniotomy for removal of hematoma, external

decompression, cranioplasty, shunting, intracranial tumour resection, spinal cord tumour resection, cerebral aneurysm clipping, coil embolisation treatment of a cerebral aneurysm, cerebral vascular bypass, carotid stenting, carotid endarterectomy, and removal of cerebral arteriovenous malformation. Average hospital stay is 7 days. Nurses are supposed to provide all the care required, without support from nurse aides and families. A patient referral document for other hospitals is available to transfer medical information summaries. The hospital has an electronic clinical record system.

Eight PTs work in the rehabilitation department. Low-frequency electric stimulation system, thermotherapy, ultrasonic therapy, standing table, and therapeutic brace are available. Inpatient rehabilitation is administered in line with criteria that show the schedule of rehabilitation practices, depending on the status of the patient. For a mild stroke case, rehabilitation is started on the day of admission after building a consensus with the doctor in charge. For a severe stroke and postoperative case, rehabilitation starts 1 or 2 days after admission; consensus with the doctor in charge is required to start. Inpatient rehabilitation can be administered after an operation for digestive system disorders and spinal disorders if the doctors in charge recognise its necessity or order rehabilitation during ward rounds. Inpatient rehabilitation is performed 1 hour per session per day and can be provided 365 days a year. Two sessions per day may be applied if the patient or the family requests it. The duration of therapy may be shortened, depending on the patient's finances or general condition. Outpatient rehabilitation is performed 1 hour per session. Reservation is required, but not accepted on Sundays and public holidays. Follow-up rehabilitation sessions are provided 1 or 2 times per week. The frequency may be modified at the request of the patient or depending on severity. Speech and swallowing training are available in addition to physical therapy. The cost is US$40 for 1 hour and US$20 for 30 minutes. A rehabilitation conference is organised every week.

Preah Kossamak Hospital (Public)

The government hospital in Phnom Penh was founded in 1950. Many patients are low-income earners. Government aid is scarce, and the hospital receives support from foreign governments or private companies in China, Republic of Korea, and Japan. It has 350 beds, which are not enough; 15 clinical specialty areas of practice; and equipment, including CT scan, X-ray, electrocardiogram, and endoscope apparatus. The hospital provides surgery such as craniotomy for removal of hematoma, external decompression, cranioplasty, and intracranial tumour resection. Patients stay an average of 10 days. The lowest-income patients are exempted from co-payment. Discharge is determined by the doctor and the family. The hospital has an electronic clinical record system.

The rehabilitation department has five PTs. Patients might need more than one rehabilitation session per day but the hospital cannot meet all demand. Some patients cannot even have a single session. The cost per session is US$5.

Khema Polyclinic (Private)

The hospital cooperates with European hospitals. It accepts private insurance but not social security. An affiliated hospital was established in central Phnom Penh in February 2018. The facility has 14 beds and 96 staff members. Bed occupancy rate is about 70%. The hospital has an operating room, cardiopulmonary exercise testing facilities, and electrocardiography, and can provide orthopaedic, trauma, and gynaecological surgery. Patients stay an average of 7 days. Nurses are expected to provide all the care required, without support of nurse aides and families. The hospital has an electronic clinical record system.

The hospital has one PT. Patients cannot have more than one rehabilitation session per day, and services cannot meet all demand. Some patients cannot even have a single session. The cost per session is US$25.

Cambodian Physical Therapy Association Physiotherapy Clinic (Private)

The CPTA was founded in 1994 and accredited by the government in 1997. Its clinic opened in 2013 and focuses on outpatient and visiting care. Inpatients at the neighbouring Vissar Clinic, however, may also be treated at the clinic.

The clinic has two PTs, provides ultrasound therapy, and offers follow-up rehabilitation sessions once a week for patients discharged from acute-care hospitals. The first session costs US$25 per hour and the second US$15 per hour.

3.4.2. Viet Nam

Viet Duc University Hospital (Public)

Originally named Phu Doan Hospital, it was established in 1906. In 1973, supported by East Germany, it was renamed Viet Nam German Friendship Hospital. It has the largest surgical centre in Viet Nam and is directly under the Ministry of Health. The hospital has 2,000–3,000 staff members; over 1,500 beds, with over 100% occupancy; 25 clinical departments; 52 operating rooms; 2 MRIs; 5 CTs; PET; X-ray; ultrasonography; electroencephalography; surgical microscopes; angiography; and neurosurgical microscopes. The hospital can provide several neurosurgical procedures such as chronic subdural hematoma drainage, craniotomy for removal of hematoma, external decompression, cranioplasty, shunting, intracranial tumour resection, spinal cord tumour resection, cerebral aneurysm clipping, coil embolisation treatment of a cerebral aneurysm, and cerebral vascular bypass. Our study did not analyse the average length of hospital stay. Patient referral documents can be issued to transfer medical information summaries when patients move to other hospitals. The public medical insurance system requires accredited hospitals to issue referral documents so that patients remain eligible for public medical insurance after the transfer. The hospital has an electronic clinical record system for accounting and meal orders but uses paper charts for patient records.

The hospital has 4 rehabilitation doctors and 10 PTs. Five patient beds are allocated to the rehabilitation department, which has a low-frequency electric stimulation system, thermotherapy, ultrasonic therapy, traction therapy, and phototherapy. The hospital does not have criteria for deciding when patients should start rehabilitation. (In Japan, such criteria are required by the public medical insurance system.) As a result, patients with spinal cord injury (even after fixation), for example, are advised to stay in bed for 1 month without rehabilitation. If the national social security fund agrees that rehabilitation is part of the insurance benefit, co-payment is 0%–40%. Otherwise, patients must pay VND150,000–VND300,000 for 45 minutes.

Hai Duong Medical Technical University (Public)

The country's oldest education institute offering PT training, and the only one offering it in northern Viet Nam, the university has courses for nurses, medical technologists, and other health professionals. It was established in 1960 to produce medical professionals, including nurses, radiologists, laboratory technicians, and physiotherapists, through 2-year training courses. The physiotherapy department was established in 1978. Its programme was changed to a 3-year course in 2002 and a 4-year course has been available since 2007. This university has a medical school and eight departments: medicine, medical technology, radiology, physiotherapy, nursing, dental nursing, anaesthetic nursing, and midwifery. The university had 4,500–5,000 students as of 2015, and the physical therapy course had 50–70 students in each grade. The university has a school dormitory, housing about 30% of the students. The university offers 3- and 4-year courses in physiotherapy. Clinical training starts from the second term of the second year. Students are divided into three groups and assigned to practical training at local, provincial, and national hospitals in turn, and to clinical training for 4 months at a national hospital in the final year.

The university has a 1.5-year OT training course. It was established in 2017 with support from India and is provided for active physiotherapists. The physiotherapy department is supported by the World Confederation for Physical Therapy to develop a world standard curriculum.

Ha Noi Rehabilitation Centre (administered by Ha Noi City)

The hospital specialises in rehabilitation, is controlled by the Ha Noi Department of Health, has a paediatric ward initially established for child war victims, has an inpatient ward and outpatient services, provides rehabilitation for patients with cerebral palsy or developmental disorders, and has 150 beds and 158 staff members (27 doctors and 68 nurses). As for medical facilities, the hospital has a consultation room, laboratory room, and X-ray room, but no surgery or operating room because the hospital specialises in rehabilitation. The hospital has 2 rehabilitation doctors, 23 PTs, 5 OTs, and 6 speech therapists. Occupational and speech therapists attended courses in their specialty for a few weeks or a few months. The rehabilitation department has a low-frequency electric stimulation system, thermotherapy, ultrasonic therapy, traction therapy, and phototherapy. The hospital provides rehabilitation for inpatients 5 times per week. If the national social security fund agrees that rehabilitation is covered by insurance, co-payment is 0%–40%. Otherwise, patients must pay VND440,000 per session.

Thien Duc Care Centre for the Elderly (Private)

The centre was established in 2001 by a limited company as Viet Nam's first private nursing home. It provides long-term care and medical care. The company has three other elderly care centres in northern Viet Nam (Dong Ngac, Soc Son, Nhat Tao).

The centre has 90 beds and 68 staff members, including 2 part-time doctors and 30 nurses. The institution has a specialised-care ward for clients with disabilities caused by stroke and can provide oxygenation, suction, and tube feeding. All residents are cared for by nurses. Clients are encouraged to spend a few days at home when their family members are ready to take care of them, and some do so.

The rehabilitation department has one PT and one traditional-medicine practitioner. Clients can have 3–5 sessions per week. The monthly fee was VND6 million–VND20 million as of 2018.

Nghe An Rehabilitation Centre (Public)

A provincial medical institution, the centre is categorised as a hospital. Patients in the post-acute stage are hospitalised for rehabilitation. The centre has 230 staff members, over 400 beds, and an occupancy rate of 90%. The average hospital stay is 17 days. Patient referral documents can be issued to transfer medical information summaries when patients move to other hospitals.

The rehabilitation department has 30 PTs, a low-frequency electric stimulation system, thermotherapy, ultrasonic therapy, and traction therapy. Patients may undergo one session per day, including on Saturdays and Sundays. More than 80% of patients have orthopaedic disorders, whilst about 10% have a brain injury. If the national social security fund agrees that rehabilitation is covered by insurance, co-payment is 0%–40%. Otherwise, patients must pay VND80,000 per session.

Cho Ray Hospital (National)

Founded in 1900, the hospital was completely renovated with support from the government of Japan in the 1970s. Technical cooperation with Japan has continued since then. Cho Ray Second Hospital is being built under the Cho Rai Viet Nam–Japan Friendship Hospital Development Project loan and will be completed in 2020 at the earliest. The hospital is improving the quality of medical care to meet the global standard, and is promoting medical safety, clinical pathway, team medical care, infection control, and other measures under a technical cooperation project by the Japan International Cooperation Agency (JICA). The hospital has about 4,000 staff members, including about 1,000 doctors and 2,500 nurses. Bed capacity is over 2,000; the neurology department has 90 beds and the neurosurgery department 200. The bed occupancy rate is over 140%. The hospital has 36 clinical specialty departments, MRI, CT, X-ray, operating rooms, ICU, surgical microscope, angiography, neurosurgical microscopes, and ultrasonography. The average hospital stay is 7 days. Patient referral documents can be issued to transfer medical information summaries when patients move to other hospitals. Electric charts are available but the hospital uses mainly paper charts for patient records.

The rehabilitation department has 29 PTs, 3 OTs, and 3 STs; a low-frequency electric stimulation system; thermotherapy; ultrasonic therapy; traction therapy; and phototherapy. If the national social security fund agrees that rehabilitation is covered by insurance, co-payment is 0%–40%. Otherwise, the patient must pay VND150,000 per session; outpatients in a group session must each pay VND20,000 per session.

Ho Chi Minh Medicine and Pharmacy University (National)

Founded in 1941, the university is one of the best educational and medical institutions in Viet Nam and probably the best in southern Viet Nam. It has eight faculties: medicine, pharmacy, basic science, traditional medicine, public health, nursing, medical technology, and dentistry. The university has seven clinical departments and one hospital, about 3,000 staff members, about 1,000 beds, operating rooms, ICU, surgical microscopes, angiography, neurosurgical microscopes, MRI, CT, PET, X-ray, ultrasonography, and electroencephalography. The average hospital stay is 10 days. Patient referral documents can be issued to transfer medical information summaries when patients move to other hospitals.

The rehabilitation department has 1 rehabilitation doctor, 26 PTs, and 1 OT; a low-frequency electric stimulation system; thermotherapy; ultrasonic therapy; traction therapy; and phototherapy. If the national social security fund agrees that rehabilitation is covered by insurance, co-payment is 0%–40%. Otherwise, patients are charged VND150,000 per session.

3.4.3. Lao People's Democratic Republic

Mittaphab Hospital (National Government)

The biggest government hospital, it is the only hospital equipped with MRI. All four neurosurgeons in the country are affiliated with the hospital. It is one of two dialysis centres in the country. The hospital is the only one that can treat patients with severe acute respiratory syndrome (SARS). Construction commenced in 1985 and the hospital was opened in 1988. The MRI ward was opened in 2015 and a new ward equipped with CT and angiography rooms in 2018 with a loan from Austria. The hospital has 300 beds, 651 staff members, 18 clinical specialty departments, operating rooms, surgical microscopes, angiography, neurosurgical microscopes, MRI, CT scan, PET, X-ray, ultrasonography, and electroencephalograph. The hospital can provide neurosurgical procedures, including chronic subdural hematoma drainage, craniotomy for removal of hematoma, external decompression, cranioplasty, shunting, intracranial tumour resection, and spinal cord tumour resection. The average hospital stay is 14 days.

The rehabilitation department has 20 PTS and 4 acupuncturists, a low-frequency electric stimulation system, thermotherapy, ultrasonic therapy, traction therapy, and phototherapy. The hospital has criteria that doctors use to decide to start inpatient rehabilitation, which is provided once a day at most per patient.

National Rehabilitation Centre (National)

The centre has an outpatient clinic, neurology ward, orthopaedics ward, paediatrics ward, examination department, prosthetics and orthotics department, school for the visually impaired, and sports facility for the disabled. Inpatient facilities accept patients with stroke or spinal cord injury, paediatric patients, and patients who have undergone amputation and have been discharged from acute-care hospital. The centre provides inpatient and outpatient rehabilitation services. It started as a prosthetics production centre, which was founded in 1962. The School of Prosthetics-Orthotics, Physical Therapy was founded in 1968. It became the National Rehabilitation Centre in 1990. It has 100 beds and an occupancy rate of 30%, 191 staff members, an operating room, and X-ray. Only amputation surgery is performed in the operating room. The average hospital stay is 60 days. The centre depends on the families of patients to care for them. It has an electronic clinical record system.

The rehabilitation department has 12 doctors, 45 PTs, 5 OTs, 60 prosthetists and orthotists, a low-frequency electric stimulation system, thermotherapy, ultrasonic therapy, traction therapy, and phototherapy. Inpatient rehabilitation is provided once or twice a day. If the national social security fund covers rehabilitation, the patient is exempted from co-payment. Otherwise, the fee is at least LAK10,000 per session. A rehabilitation conference is held once a week.

Sethathirath Hospital (National Government)

One of the three major hospitals in Lao PDR, the general hospital has 250 beds and provides clinical and postgraduate education to medical students of the University of Health Sciences. Since 1999, Japan's grant aid project has supported improvement of medical care services and training. In September 2004, the hospital was upgraded from a city hospital to a university hospital. An emergency department is planned with support from Japan.

The hospital has 250 beds and an occupancy rate of 53%, 480 staff members, an operating room, an X-ray room, electrocardiography equipment, and CT scanner. Surgical procedures requiring standard surgical skills and equipment can be carried out in the hospital, including appendectomy, caesarean section, gallstone removal, kidney stone removal, and liver stone extraction. The average hospital stay is 14 days. The hospital depends on families of patients to care for them. The rehabilitation department has 13 PTs, low-frequency electric stimulation system, thermotherapy, ultrasonic therapy, traction therapy, and phototherapy. Doctors order inpatient rehabilitation following certain criteria. It is performed up to once a day. If the national social security fund covers rehabilitation, it is free. Otherwise, the patient must pay LAK40,000–LAK50,000. The hospital does not hold rehabilitation conferences.

Mahosot Hospital (National Government)

Founded in 1903 in Vientiane by the French, the hospital was the first one to offer modern Western medicine in Lao PDR. The hospital provides 24/7 emergency care and has strengths in treating cardiac and tropical diseases. Patients who have had a stroke are admitted if they do not require surgery.

The hospital has 450 beds and an occupancy rate of 70%, 884 staff members, nine clinical departments, an operating room, CT scanner, X-ray room, and equipment for ultrasonography and electroencephalography. The hospital can provide surgery, including cleft lip, sinus, appendicitis, caesarean section, gallstone removal, kidney stone removal, and liver stone extraction. The average hospital stay is 4 days. The rehabilitation department has 11 PTs, a low-frequency electric stimulation system, thermotherapy, ultrasonic therapy, and traction therapy. If a case meets the criteria, a doctor orders inpatient rehabilitation, which is performed up to once a day. If the national social security fund covers rehabilitation, the patient pays nothing. Otherwise, the patient pays LAK20,000. The hospital does not conduct rehabilitation conferences.

Chapter 4

Results of Introducing Kitahara-style Rehabilitation in the Study Countries

4.1. Overview

This chapter discusses the effect of the introduction of Kitahara-style rehabilitation in the study countries (Viet Nam, Cambodia, and Lao PDR). Section 4.2 introduces the evaluation indicators used, and section 4.3 summarises the characteristics and general information on the patients who participated in this study. The results of rehabilitation will be shown in section 4.4 as case reports. Eighteen patients with brain or spinal cord injuries are included in the case reports. We conducted this study at the major medical institutions: Viet Duc University Hospital (Viet Nam), Sunrise Japan Hospital (Cambodia), and Mittaphab Hospital and National Rehabilitation Centre (Lao PDR). All patients who participated in this study stayed at these hospitals. Six patients were selected from each country for the case reports.

The Japanese PTs supervised the development of patient assessment and treatment programmes and communicated with local staff members through interpreters and in English.

4.2. Evaluation Indicators

The indicators used to evaluate the effect of rehabilitation are in Table 4.

Table 4. Evaluation Indicators

Indicators (abbreviation)	Indicator	Evaluation Criteria and Interpretation
BI[a]	Barthel index	Evaluates the extent of daily activities the patient can perform in daily life 10 items scored according to level of independence. Full score = 100 points A score of 20 points or lower means the patient needs total assistance Evaluation items: feeding, bathing, grooming, dressing, bowels, bladder, toilet use, transfer (bed to chair and back), mobility (on level surfaces) and stairs

mRS[b]	Modified Rankin Scale	Method of evaluating functional independence in stroke patients Score descriptions 0 – No symptoms 1 – No significant disability. Able to carry out all usual activities, despite some symptoms 2 – Slight disability. Able to look after own affairs without assistance, but unable to carry out all previous activities 3 – Moderate disability. Requires some help, but able to walk unassisted 4 – Moderately severe disability. Unable to attend to own bodily needs without assistance and unable to walk unassisted 5 – Severe disability. Requires constant nursing care and attention, bedridden, incontinent 6 – Dead
GCS[c]	Glasgow Coma Scale	Evaluation indicator of consciousness level, which is evaluated using three functions: eye response, verbal response, and motor response. Severity and urgency are determined from the total score. Lower scores indicate lower consciousness levels. Eye response (E) 1. No opening of the eye 2. Eye opening in response to pain stimulus 3. Eye opening to speech 4. Eyes opening spontaneously Verbal response (V) 1. No verbal response 2. Incomprehensible sounds 3. Inappropriate words 4. Confused 5. Oriented Motor response (M) 1. No motor response 2. Decerebrate posturing accentuated by pain 3. Decorticate posturing accentuated by pain 4. Withdrawal from pain 5. Localises to pain 6. Obeys commands
BRS[d]	Brunnstrom's recovery stage	Evaluation indicator for clinical motor function, which classifies recovery from hemiplegia due to stroke in six stages. Three evaluation sites are arms, hands and fingers, and legs. The level of recovery in each stage: Stage 1 No voluntary movement of affected limbs. They feel heavy when moved passively and little or no muscular resistance can be detected.

		Stage 2 Basic limb synergies or some of their components appear either as weak associated reactions or a voluntary attempt to move. Spasticity is developing but may not be very marked. Stage 3 Basic limb synergies or some of their components are preformed voluntarily and are sufficiently developed to show definite joint movements. Spasticity is present and, at one point or another, reaches its maximum. Stage 4 Spasticity decreases and an increasing number of movement combinations that deviate from basic limb synergies become possible. Stage 5 Relative independence of basic limb synergies and waning spasticity. More difficult movement combinations can be performed, and individual joint movements are comparatively well under control. But the patient may have to concentrate intensely on some tasks. Stage 6 Isolated joint movements are freely performed. In general, movements are well co-ordinated and appear normal or near normal. Spasticity almost disappears, although some interference resulting from spasticity may be noticed when rapid movements are required.
MMSE[e]	Mini Mental State Examination	Questionnaire-type test for dementia screening. Cognitive functions, including orientation, memory, and comprehension, are evaluated and scored using 11 questions. 30–24 points: No impairment 23–18 points: Mild cognitive impairment 17–0 points: Severe cognitive impairment The above classification is one of references. There are several previous studies for cut-off scores. We did not assess how the languages used in the three countries compare with our references edited in English.
ROM[f]	Range of motion	Measurement of the range of motion for each joint in the body The normal range of motion specified for individual joints is used to evaluate the extent and cause of restriction

MMT[g]	Manual Muscle Testing	Examination method which manually determines muscle strength in the primary muscles. Determination is made in six steps, depending on the strength of the muscle. Determination criteria: Normal. 5 = Max resistance Good. 4 = Mid resistance Fair. 3 = No resistance Poor. 2 = No resistance Trace. 1 = Palpable at muscle/tendon, no movement Zero. 0 = Nothing palpated
Superficial sensation[h]	Superficial sensation test	Evaluates the extent of impairment in tactile, pain, and temperature sensation in patients with hemiplegia due to stroke, in comparison with the non-paralysed side. The examination result is reported as normal, impaired (mild, moderate, severe), and disappeared.
Deep sensation[i]	Deep sensation test	Evaluates the extent of impairment in positional, motor, and vibration sensation in patients with hemiplegia due to stroke in comparison with the non-paralyzed side. The examination result is reported as normal, impaired (mild, moderate, severe), and disappeared.
10mWT[j]	10 Meter Walk Test	Evaluation method to measure walking speed and number of steps over 10 meters (m) It is frequently used as an indicator to confirm therapeutic effect as it is related to the improvement of capability in daily activities. The ability to walk 10 m in 12.5 seconds or less indicates independence in walking outdoors. The ability to walk 10 m in 25 seconds or less indicates independence in walking indoors.
Deep tendon reflex[k]	Deep tendon reflex	Evaluation used for motor and neurological diagnosis after a stroke Depending on the level of reflex to the hitting of skeletal muscle with a plexor, the result is recorded as + for normal reflex and ++ for slightly increased reflex.

[a] Matsuzawa (2001), The Internet Stroke Center (2019).
[b] Matsuzawa (2001), SITS OPEN Open (2019).
[c] Matsuzawa (2001), Brainline (2019).
[d] Matsuzawa (2001).
[e] Matsuzawa (2001), Monroe and Carter (2012).
[f] Matsuzawa (2001, American Physical Therapy Association (2019).
[g] Matsuzawa (2001), Ciesla et al. (2011).
[h] Matsuzawa (2001).
[i] Matsuzawa (2001).
[j] Matsuzawa (2001), Palmer (2015).
[k] Matsuzawa (2001), Walker (1990).
Source: Authors.

4.3. General Information on Patients Participating in the Study

Information on the 36 patients who participated in the study and underwent rehabilitation at least five times during the study period is in Table 5.

Table 5. Information on Patients

	Viet Nam	Lao People's Democratic Republic	Cambodia
Hospital that participated in the study	Viet Duc University Hospital	Mitthaphab Hospital	Sunrise Japan Hospital Phnom Penh
Study period	August 2017–July 2018		
Number of patients	12	12	12
Conditions requiring rehabilitation	Cerebrovascular disease (cerebral infarction, cerebral haemorrhage, subarachnoid haemorrhage) Head trauma, subdural hematoma, spinal cord injury, brain tumour	Cerebrovascular disease (cerebral infarction, cerebral haemorrhage, subarachnoid haemorrhage)	Cerebrovascular disease (cerebral infarction, cerebral haemorrhage, subarachnoid haemorrhage) Head trauma, subdural hematoma, normal pressure hydrocephalus
Age (average)	52.5	56.4	65.2
Sex	Male 7, Female 5	Male 7, Female 5	Male 9, Female 3
Independence level before hospitalisation[a]	Independent: 92% Partial assistance required: 0% Total assistance required: 8%	Independent: 100%	Independent: 75% Partial assistance required: 17% Total assistance required: 8%
Hospitalisation period (average)	25.2 days	8.4 days	37.3 days
BI at initial evaluation	16.2/100 points	14.58/100 points	10.0/100 points
BI at final evaluation	53.7/100 points	40.0/100 points	35.8/100 points
mRS at final evaluation 0: Asymptomatic 1: Very light 2: Mild 3: Moderate 4: Moderate to severe 5: Severe (bedridden) 6: Death	0:0% 1:0% 2:16% 3:17% 4:50% 5:17% 6:0%	0:0% 1:0% 2:0% 3:8% 4:50% 5:42% 6:0%	0:0% 1:0% 2:33% 3:0% 4:42% 5:25% 6:0%

Number of rehabilitations at hospital (average)	18.6 times	6.1 times	40.6 times
Main caregiver after discharge	Family: 92% Non-family (hired nurse, etc.): 8%	Family: 92% Non-family (hired nurse, etc.): 8%	Family: 75% Non-family (hired nurse, etc.): 25%
Occupation of main caregiver	Housework: 25% Nurse: 8% Others: 67%	Housework: 33% Nurse: 0% Others: 67%	Housework: 58% Nurse: 25% Others: 17%
Frequency of visit by main caregiver	Almost every day: 75% Once every few days: 25% Rarely: 0%	Almost every day: 85% Once every few days: 15% Rarely: 0%	Almost every day: 92% Once every few days: 8% Rarely: 0%

BI = Barthel index, mRS = modified Rankin Scale.

[a] The condition before admission was selected from three items describing the patient's capability in daily life: (i) independent: able to look after oneself completely independently; (ii) partial assistance: requiring assistance partially; and (iii) total assistance: bedridden and requiring assistance in all aspects of daily life.

4.4. Case Reports

The study examined 18 patients, 6 from each country, of whom 3 achieved positive outcomes and 3 whose outcomes were unfavourable.

Table 6. Summary of Case Reports

Case 1	Viet Nam	Brain tumour resection. The patient received comprehensive rehabilitation from the early post-operative stage and was provided support up to living at home after discharge, resulting in a positive outcome.
Case 2	Viet Nam	Head trauma. The patient became bedridden due to prolonged bed rest but showed improvement after continuous rehabilitation by the family.
Case 3	Viet Nam	Severe quadriplegia and severe consciousness disturbance after brain haemorrhage. The patient received eating and swallowing training and became able to eat orally.
Case 4	Viet Nam	Head trauma. The patient showed strong signs of emotional control disturbance (irritability, social behaviour disorder, violence against people) and had undergone continuous rehabilitation combined with family guidance, but it failed to reduce the care work required for the patient.
Case 5	Viet Nam	Spinal cord tumour resection. The patient had been bedridden 2 years since the resection and underwent motor function training, but it failed to reduce the required care work due to delayed rehabilitation.
Case 6	Viet Nam	Cerebral haemorrhage. Rehabilitation was delayed due to fever and the patient did not have enough time for ambulation training.

Case 7	Cambodia	Cerebral haemorrhage. The patient showed severe disturbance in consciousness and motor paralysis at the time of onset but eventually was able to walk a short distance.
Case 8	Cambodia	Cerebral infarction. The patient received continuous rehabilitation, which resulted in improvement of activity of daily living (ADL) to an independent level despite severe hemiplegia remaining as sequelae.
Case 9	Cambodia	Severe subarachnoid haemorrhage. The patient had undergone rehabilitation suitable for the stage of recovery, leading to recovery in ADL to an independent level.
Case 10	Cambodia	Prolonged hospitalisation due to discrepancy between the request of the family and the medical prognosis.
Case 11	Cambodia	Too-early discharge for financial reasons. The initial goal for ADL could not, therefore, be reached.
Case 12	Cambodia	Unsatisfactory recovery of oral food intake function, in spite of the family's wish for greater recovery.
Case 13	Lao People's Democratic Republic (Lao PDR)	Stroke. The patient had undergone seamless intervention from early rehabilitation to home rehabilitation, resulting in a positive outcome.
Case 14	Lao PDR	Chronic motor paralysis. PT went beyond the job description, which resulted in improvement of ADL at home.
Case 15	Lao PDR	Stroke. Home-visit rehabilitation and continuous guidance to family resulted in the reduction of required care work although severe sequelae of stroke remained.
Case 16	Lao PDR	Haemorrhagic infarct, which caused deep vein thrombosis (DVT) as a complication. It made early rehabilitation difficult, resulting in great struggles to improve ADL.
Case 17	Lao PDR	DVT caused by prolonged bed rest. It made active implementation of rehabilitation difficult. The patient had severe hemiplegia.
Case 18	Lao PDR	Wallenberg syndrome. The patient had severe dysphagia but the condition was not recognised as needing rehabilitation due to lack of knowledge of staff. The patient was discharged with no remarkable recovery and post-discharge rehabilitation was not administered.

Source: Authors.

4.4.1. Case 1

[Basic Information]

[Age] 52 [Sex] Female [Diagnosis] Brain tumour (right pons, cerebellum) [Symptom] Ataxia, left hemiplegia, dysphagia [Date of surgery] 23 February 2018 [Current medical history] Headache, nausea, and vomiting occurred starting late November 2017. The patient went to Viet Duc University Hospital due to the gradual exacerbation of the symptoms. Resection of brain tumour was performed on 23 February 2018. Tumour was removed but left hemiplegia and dysphagia were observed post-operatively. [Background] Occupation: Administrative. Family: Living with her husband (two people in total) [Goal] Return to work and recover swallowing function

[Progress]

Day 3	Commenced rehabilitation. Practised sitting position in a wheelchair. GCS: E3 V4 M6, BI: 10/100, mRS: 5, left BRS: arm II – finger II – leg II
Day 4	Ataxia in the limbs and trunk. Patient had difficulty taking food orally and was fed through a nasal tube.
Day 11	Bronchial drainage performed due to large amount of sputum. Positioning training and oral care were performed. Left BRS: arm IV – finger V – leg IV Commenced practice of standing position.
Day 13	Feeding changed from nasoenteric feeding to oral feeding.
Day 15	Commenced walking practice. Moderate level of assistance required when walking.
Day 19	MMSE: 19/30 Discharged GCS: E4 V5 M6, BI: 50/100, mRS: 4, left BRS: arm IV – finger V – leg IV Patient moved around the house using a cane and with a moderate level of assistance.
Day 20	Guidance provided to the husband regarding the method of assistance. Family was also advised about the residential environment.
Day 21	Outpatient rehabilitation commenced.
Day 26	Patient able to walk without cane under supervision.
Day 34	Patient able to walk about 200 meters under supervision. Outpatient rehabilitation terminated. GCS: E4 V5 M6, BI: 85/100, mRS: 3 Left BRS: arm IV – finger V – leg IV, MMSE: 23/30

[Discussion]

Difference between Viet Nam and Japan

The symptoms of this patient required the involvement of all rehabilitation professional categories: PT, OT, and ST. In Japan, the patient would have been discharged from hospital after he or she achieved the maximal improvement of physical functions led by rehabilitation either in an acute-care hospital or in a recovery-phase rehabilitation hospital, which usually accepts patients from acute-care hospitals and is clearly differentiated from acute-care hospital under Japanese regulations.

Why was the patient discharged even though she needed care by family members?

Viet Nam has rehabilitation centres but networking amongst medical and care facilities is limited, so information on patients and progress of rehabilitation is not shared well amongst institutions. Patients and their families are more likely to hope to be discharged as early as possible even if nursing care and rehabilitation are still necessary. This patient was not the exception and we switched from inpatient to outpatient rehabilitation.

Rehabilitation and result

Severe right paralysis was observed. It affected the motor function associated with swallowing and resulted in dysphagia. Rehabilitation was commenced at the early post-operative stage. At the initial stage of rehabilitation, bronchial (postural) drainage was encouraged to prevent pneumonia. The status of dysphagia was assessed and the treatment plan developed by the PT. During intervention, task sets were assigned in accordance with improvement levels of swallowing function and other physical functions. Prior to discharge, guidance was provided to the family on how to assist the patient in daily life and the self-training that can be performed even at home to prepare for life after discharge. At the time of discharge, the patient was able to walk with assistance but care by family was still required. Outpatient rehabilitation was continued for 2 weeks after discharge. This case shows that appropriate rehabilitation at home by the family is effective, leads to steady recovery, and eventually enables the patient to live independently at home. We learned from this case that early discharge whilst still needing nursing care soon reveals the issues of home life and eases the modification of rehabilitation targets. Function was recovered through outpatient rehabilitation by setting clear goals.

4.4.2. Case 2

[Basic Information]

[Age] 24 [Sex] Male [Diagnosis] Head trauma [Disorder] Consciousness disturbance, quadriplegia, dysphagia [Current medical history] Patient had head trauma from a traffic accident on 11 September 2017. On 12 September 2017, craniotomy for the removal of hematoma and external decompression were performed at Viet Duc University Hospital. The patient was then transferred to another hospital 13 days after the injury. On Day 42 after the injury, the patient was discharged and confined to bed. On 21 December 2017, cranioplasty was performed at Viet Duc University Hospital and Kitahara-style rehabilitation was commenced from Day 2 after the cranioplasty. [Background] Occupation before onset: Car painter. Family: Wife and two children (four people in total)

[Progress]

Day 92	(Day count starts from the day of injury.) Rehabilitation commenced. GCS: E4 V1 M5, BI: 0/100, mRS: 5 quadriplegia. The limbs were severely affected by contracture and spasticity associated with palsy caused by head trauma. Voluntary movement was difficult. Total assistance was required for daily activities. Food was taken through the nasoenteric tube.
Day 95	Patient had been confined to bed for 3 months after the injury and had not tried to sit.
Day 98	Tracheal cannula removed; tracheotomy hole closed. Commenced training for sitting position.
Day 99	Commenced training for standing position (rehabilitation performed twice daily, 60 minutes per session).
Day 104	Commenced training for oral feeding (patient was able to ingest one piece of jelly). Family purchased a wheelchair and the patient was encouraged to get out of bed even when he was not undergoing rehabilitation.
Day 116	Patient able to rise by himself and take food orally. Guidance provided to the family regarding rehabilitation at home and the method of assistance in daily life. GCS: E4 V2 M6, BI: 10/100, mRS: 5
Day 117	Discharged.
Day 200	Continued rehabilitation at home by the family. Patient able to walk with moderate level of assistance. GCS: E4 V4 M6, BI 60/100, mRS: 4

Day 257	Mild left paralysis, memory disturbance, and frontal lobe symptoms remain, but the patient was able to walk inside the home partially by himself. GCS: E4 V4 M6, BI 70/100, mRS: 4, MMSE: 12/30

[Discussion]

Difference between Viet Nam and Japan

In Viet Nam, rehabilitation guidelines are not as established as in Japan, and the importance of rehabilitation is not fully recognised. The quality and quantity of rehabilitation staff are insufficient, especially in rural areas. The patient was not provided an opportunity for rehabilitation and remained confined to bed for more than 3 months after receiving the head injury.

Involvement of family

Viet Nam's tradition, culture, and social norms strongly encourage taking care of older people within their family or community. This case utilised such a long-term care system and we provided the family with guidance on how to support the patient to continue rehabilitation at home. We believe instructing the family led to the positive outcome.

Rehabilitation and result

Through 15 days of intervention, the patient was encouraged to leave the bed and helped to move actively with support from a suitable guide or therapist. The therapy was an intervention to realise the patient's potential capacity. Despite the short period of hospitalisation, the patient acquired the functions of oral ingestion and raising of the body. During hospitalisation, the family was provided guidance on helping the patient move to the wheelchair and operate it. Guidance was provided using training manuals to achieve a range of motion and to stand. Continued rehabilitation by the family in line with our guidance resulted in recovery from chronic confinement to bed. The patient showed remarkable improvement and finally became able to walk despite being bedridden for a long time.

4.4.3. Case 3

[Basic Information]

[Age] 26 [Sex] Female [Diagnosis] Intracerebral haemorrhage

[Disorder] Consciousness disturbance, quadriplegia, dysphagia

[Date of onset] May 2017

[Current medical history] Patient developed right intracerebral haemorrhage at 28 weeks of pregnancy. Craniotomy for removal of hematoma and external decompression were performed at another hospital. The patient gave birth by caesarean section 10 days after the neurosurgery. Cranioplasty was performed 5 months after onset. Rehabilitation was conducted at another hospital for 1 month, followed by visiting rehabilitation at home. The patient was hospitalised at Viet Duc University Hospital on Day 240 after the start of rehabilitation.

[Background] Patient did administrative work before onset and can speak English. She lived with her husband and eldest daughter before the onset. After the onset, the husband and eldest daughter lived at the husband's family home. The patient is living with her mother. The key person (main caregiver) is the patient's mother.

[Goal] Maintain sitting position without assistance and be able to take food orally

[Progress]

Day 240	Commenced rehabilitation at our facility. Nasoenteric nutrition tube was inserted. She had increased muscle tension of the whole body and difficulty in spasticity control. Total assistance required to stay in sitting position. Positioning guidance provided to the family. GCS: E4 V1 M3, BI: 0/100, mRS: 5, BRS: arm II – finger II – leg II (bilateral) Range of motion: Restricted range of motion in hip joint, knee joints, ankles, shoulder joints, elbow, and wrists
Day 247	Slight voluntary movement observed in the right arm and leg.
Day 249	Patient transferred to a wheelchair.
Day 254	Rehabilitation performed at the physical therapy room.
Day 261	Guidance provided to the family on changing the patient's diapers and clothes.
Day 304	Patient able to retain sitting position for 20 seconds.
Day 317	Patient able to answer simple questions with 'yes' or 'no' by moving the right arm.
Day 321	One family member can help raise the patient's body.
Day 353	Eating and swallowing training commenced.

Day 362	Patient able to eat 100 mL thickened jelly. Feeding changed from nasoenteric tube feeding to oral feeding. Discharge. GCS: E4 V2 M6, BI: 5/100, mRS: 5, BRS: arm II – finger II – leg II (bilateral)

[Discussion]

Speech-language-hearing therapy in Viet Nam

An education system for STs has not been established, and so sufficient rehabilitation cannot be provided for eating and communication. Because of the prolonged lack of therapy from the onset, strong muscle atrophy and restrictions in range of motion were present, and it was difficult to reduce the extent of assistance for ADL. However, improvement was observed in communication and eating through appropriate evaluation and treatment of swallowing functions. Continuous rehabilitation as an element of long-term care provided by the family is ongoing.

Rehabilitation and result

The PT evaluated the swallowing functions and performed eating and swallowing training in steps. Gradual improvement was observed in consciousness disturbance and spasticity control, and although the patient was unable to speak, simple communication using the right hand became possible. The patient became able to take food orally although this was not expected when our involvement started. The patient was discharged after guidance to the family on continuous training at home, especially safe methods of swallowing training, feeding, and positioning.

4.4.4. Case 4

[Basic Information]

[Age] 32 [Sex] Male [Diagnosis] Head trauma (injury extending over wide areas in the right frontal lobe, parietal lobe, and temporal lobe)

[Disorder] Compound fracture of the face (injury of right eyeball), left paralysis

[Current medical history] Patient received a head injury in a traffic accident on 23 January 2018 and had undergone a craniotomy for removal of hematoma and external decompression at Viet Duc University Hospital on the same day. The patient was then transferred to another hospital where rehabilitation was performed in bed for 1 month. However, fever occurred due to meningitis, which resulted in hospitalisation at Viet Duc University Hospital. General conditions improved and rehabilitation in our facility was commenced on Day 48 after onset.

[Background] The patient worked as a clerk in a government organisation and can speak English. The patient lives with his parents, his wife, and two sisters (elder and younger). The main caregivers are the patient's wife and elder sister.

[Progress]

Day 48	Rehabilitation commenced. Difficulty in retaining sitting position. Patient had low awareness of danger and resisted assistance. Total assistance required for daily activities. GCS: E4 V5 M6 BI: 5/100, mRS: 5, BRS: arm I – finger I – leg I
Day 49	Standing training was commenced but assistance from two people was required. Abnormal behaviours such as violence and verbal abuse were observed, hindering rehabilitation.
Day 59	The patient calmed down somewhat and was able to communicate. Consent to participate in rehabilitation was obtained.
Day 62	Exercise in bed was encouraged to control restlessness. Guidance was provided to the family on training in the range of motion.
Day 63	Patient was transferred to the wheelchair.
Day 76	Unable to provide rehabilitation service due to recurrence of meningitis.
Day 83	Training in range of motion in bed due to cerebrospinal fluid leakage.
Day 127	Patient trained to retain sitting position for 15 minutes but concentration did not last. Discharged to home. GCS: E4 V5 M6, BI 30/100, mRS: 5, BRS: arm I – finger I – leg I

[Discussion]

Difficulty of this case

The key persons are the patient's wife and elder sister who provided dedicated care every day. Although the family had strongly requested rehabilitation for the patient, it was difficult to grant their request due to the disturbance of the patient's higher brain function, including social behaviour disorder, which is a frontal lobe disorder. The specific symptoms were irritability, resistance to care provision, and decreased concentration. Complications such as meningitis and cerebrospinal fluid leakage that led to the repeated onset of fever made intervention difficult. In the second half of our intervention period, rehabilitation could not be performed for many days due to the patient's decreased motivation and irritability.

Family's concern

In Viet Nam, care is generally provided by the family, but doctors in charge often do not sufficiently explain the patient's physical condition and prognosis, and rehabilitation staff members do not provide sufficient guidance on the method of exercise. In this case, the

family of the patient did not sufficiently understand his physical condition or method of care. The family cared for the patient but were seriously concerned about his future.

Rehabilitation and result

We provided rehabilitation for the recovery of not only physical function but also cognitive function and higher brain function. We were sensitive in talking to the patient before exercise, in creating the rehabilitation environment, and in communicating with him. However, he was irritable so it was difficult to continue the rehabilitation. We came across many obstacles to controlling restlessness and performing the treatment. We provided his family with guidance on communication, transfer from bed to wheelchair, and training in range of motion, as well as the patient's emotional control, but it was not easy to take care of him. Rehabilitation services are generally provided to enhance the recovery of patients so that they can resume living as independently as possible, reducing the burden of caregivers (families and professionals). In this case, we could not achieve a satisfactory outcome. The extent of necessary assistance did not change between before and after rehabilitation. This case is an example where rehabilitation cannot necessarily result in a satisfactory outcome. He returned home and continues home-visit rehabilitation. His irritability gradually lessened.

4.4.5. Case 5

[Basic Information]

[Age] 31 [Sex] Female [Diagnosis] Spinal cord tumour (C1/C2)

[Disorder] Quadriplegia

[Current medical history] The patient had undergone resection of spinal cord tumour 2 years before. Numbness was present before surgery but the patient was able to walk with assistance. She developed a fever for 10 days post-operatively and was confined to bed for 1 month. Leg muscle weakness after the operation made it difficult for her to get out of bed. At the hospital where she was operated on, she received rehabilitation for 2 months and continued after transfer to the rehabilitation hospital. Before the introduction of Kitahara-style rehabilitation by an acquaintance, most rehabilitation services were in bed.

[Background] The patient had her own clothing shop before onset. She has a husband and two children (son and daughter) but no longer lives with them. She lives with her parents and her grandmother with a live-in housekeeper, who is her main caregiver.

[Progress]

Day 1 Start of Kitahara-style rehabilitation	Rehabilitation commenced. GCS: E4 V5 M6, BI: 0/100, mRS: 5 Paresis at C5 and below, muscle strength present for leg extension but spasticity control is difficult. Strong contracture in the limbs and trunk, and both arms are always flexed. Strong numbness in the limbs, and assistance is required to raise the body. Dizziness occurs when sitting, posing difficulty in prolonged sitting position.
Day 3	Rehabilitation in bed due to dizziness. Dizziness occurs when turning over in bed.
Day 7	Standing position achieved with moderate assistance. Extension pain in the posterior side of the right calf and the sole of the foot.
Day 8	Commenced eating whilst in the wheelchair. Abnormal sensation observed in the right leg.
Day 9	Started rehabilitation in the PT room. Patient can remain sitting independently for 30 seconds under supervision.
Day 19	Guidance on self-training (pushing of the knee, raising of the buttocks)
Day 25	Improved durability in standing position, with reduced pain
Day 28	Progress to ultra-short distance walking.
Day 34	Strong pain and leg spasticity. Intervention not sustained due to fatigability.
Day 37	Patient able to walk with two people assisting on either side. Abnormal sensation improving. Patient able to walk 3 meters with assistance by one person. Discharge. GCS: E4 V4 M6, BI: 15/100, mRS: 5

[Discussion]

Challenges of this case

Since the patient had not been given appropriate guidance for rehabilitation by previous facilities, she was not able to move her body and remained confined to bed at home for about 2 years. When Kitahara-style rehabilitation started, the patient had had no opportunities to take a sitting position. Strong contracture was present in the arms, spine, and around the pelvis, which caused difficulty in postural control and in retaining a sitting position.

In Viet Nam, the concept of spasticity is generally known but its mechanism and treatment are not. The rehabilitation staff is not familiar with the technique to control spasticity or motor learning. This patient had undergone continuous rehabilitation after surgery but

mostly massage and joint exercise in bed. She had not practiced sitting or standing. The patient could have quickly trained in walking if rehabilitation had started early.

Rehabilitation and result

Intensive rehabilitation was provided through two sessions daily, accompanied by guidance for self-practice, and ensuring opportunities to leave the bed. The patient recovered enough to stay in sitting position for a short period, although she had difficulty in spasticity control and abnormal sensation. She was unable, however, to regain her ability to sit up independently, probably because of the contracture of the arms, which failed to support her upper body. After she was discharged, we visited her home and organised the residential environment and provided guidance to the housekeeper on walking training. The patient became able to walk short distances with assistance, but it was difficult to significantly decrease the volume of care. The effect of rehabilitation was limited due to the patient being bedridden for a long time.

4.4.6. Case 6

[Basic Information]

[Age] 58 [Sex] Male [Diagnosis] Right cerebral haemorrhage [Disorder] Left hemiplegia, unilateral spatial neglect

[Current medical history] Onset on 1 April 2018. The patient was initially admitted to the prefectural hospital and then underwent removal of hematoma at Viet Duc University Hospital.

[Progress]

Day 4	Unable to start rehabilitation early due to fever.
Day 8	Rehabilitation commenced. GCS: E3 V4 M6, BI: 0/100, mRS: 5 Patient was able to sit for 7 minutes with assistance. Guidance provided to the family on training in the range of motion.
Day 9	Patient sat in a wheelchair for a short period for the first time but posture was not stable. Family was informed that the patient's body position must be changed, and patient must train to stay sitting.
Day 10	Sitting position training performed in the rehabilitation room.
Day 11	Patient practiced sitting and standing but was not alert.
Day 15	Patient was able to stay sitting for 5 minutes. Discharged on the same day, GCS: E4 V4 M6, BI: 35/100, mRS: 5, BRS: arm II – finger II – leg III, MMSE: 14/30

[Discussion]

Challenges of this case

Vital signs were not stable for 1 week after the onset so rehabilitation could not be commenced early. The patient had difficulty retaining sitting position due to consciousness disturbance and spatial neglect caused by cerebral haemorrhage. He slumped when sitting in a wheelchair. His neck lacked stability but we encouraged him to leave the bed as much as possible.

Importance of general conditions

Even though doctors instruct patients to start rehabilitation soon after onset, many patients develop fever or infections, which often leads to delays. Sometimes the failure to detect the cause of fever and the poor understanding of general conditions delay early rehabilitation. Apart from cerebral haemorrhage, head trauma caused by accidents is often accompanied by other physical injuries that pose high risk of infection. Unfavourable conditions in wards can make it difficult to control infections. We found several patients with head trauma who developed signs of infection and could not participate in continuous rehabilitation.

Rehabilitation and results

This patient failed to start rehabilitation early due to fever, despite the doctor's instructions. Rehabilitation was commenced 1 week after the onset. Guidance was provided to the family, but they did not sufficiently understand that the patient needed to get out of bed and continued to give him too much assistance. The result was the patient did not get out of bed enough. He did not recover from consciousness disturbance. We tried to train him to sit and stand but failed to reduce the required assistance and care.

4.4.7. Case 7

[Basic Information]

[Age] 64 [Sex] Male [Diagnosis] Left frontal subcortical haemorrhage, ventricular rupture, secondary acute hydrocephalus [Disorder] Right hemiplegia, aphasia

[Date of onset] 12 January 2018

[Surgical method] Indwelling ventricular drainage implantation (13 January)

[Current medical history]

The patient was transferred from the government hospital diagnosed with left frontal subcortical haemorrhage and ventricular rupture, which was first observed on 12 January 2018. On the same day, emergency ventricular drainage was performed and the patient diagnosed with acute hydrocephalus.

[Background] The patient lives with the family of his child. Malaysian national.

[Main complaint] Unknown due to severe aphasia. [Goal] Walking for a short distance, establishing a means of communication

[Progress] (After indwelling ventricular drainage implantation)

Day 1	Rehabilitation commenced with dependence on artificial ventilation. [Initial assessment] GCS: E1 V (not examined because the patient was under ventilation machine) M4, BRS: arm I – finger I – leg III, mRS: 5, BI: 0/100 Severe consciousness disturbance, severe right hemiplegia, and severe aphasia were present. Patient had difficulty eating orally and was fed through a nasal tube.
Day 3	Weaned from artificial ventilation.
Day 6	Commenced transfer to a wheelchair upon confirming the stability of vital signs.
Day 7-15	Time sitting and time away from bed were extended gradually. Consciousness disturbance improved. GCS: E4 V1 M5
Day 16-29	Eating and swallowing training and higher brain function training provided as basic movement training.
Day 29	Video-fluoroscopic examination of swallowing performed by the doctor, nurse, radiologist, and PT.
Day 30	Oral food intake started for the first time after the onset.
Day 31	Patient able to walk with a four-legged crutch as far as 10 meters.
Day 46	Discharged to home country, Malaysia. At discharge, GCS: E4 V1 M6, MMT: arm 4 – finger 3 – leg 4, able to take all 3 meals orally ADL wheelchair level, able to walk short distances using only a four-legged crutch

[Discussion]

Challenges of this case

The patient not only had motor paralysis but also dysphagia (swallowing disorder) and severe aphasia as symptoms of parietal lobe haemorrhage. The family was concerned that the patient might have to continue tube feeding at home after discharge. The patient had difficulty in verbal communication, including verbal comprehension. Limited communication caused the patient and his family mental stress.

Scarce rehabilitation resources in Cambodia

Not a few patients have swallowing disorder after stroke, but caregivers are not familiar with the impairment. Frequent aspiration pneumonia can occur due to feeding without adjustment of food form, resulting in repeated admission and discharge. This patient had higher brain dysfunction. In Cambodia, it is almost impossible to find facilities that can provide rehabilitation for both swallowing disorder and higher brain dysfunction, so many patients are left at home with severe sequelae.

Rehabilitation and results

The patient showed severe disturbance of consciousness and hemiplegia caused by cerebral haemorrhage. He was dependent on artificial ventilation for several days after the onset, but rehabilitation was provided to prevent disuse syndrome and improve the level of consciousness. After being weaned from artificial ventilation, the patient was trained to sit and was transferred to a wheelchair for prolonged sitting so that he was able to leave his bed as soon as possible. Simultaneously, direct and indirect swallowing training was provided. Direct training entails oral food intake, whilst indirect training entails tongue massage and muscle strengthening. Speech training was given as well for the patient to acquire a means of communication as he had severe aphasia. All functional training was provided by PTs. The detailed method of assistance was shared with the ward nurse, and the ward environment was modified to be part of rehabilitation. After the patient succeeded in leaving the bed using a wheelchair without difficulty, family guidance on how to assist him in eating, moving, toileting, and other ADL was offered.

At the time of hospital discharge, the patient showed mRS: 4 and BI: 30/100, and the family achieved the skills to assist the patient in moving and toileting without the support of hospital staff.

Multidisciplinary approaches that involve not only physical therapy such as strengthening of muscles and practice of basic movement but also occupational therapy and speech therapy were thought to have enabled improvement in the ADL of the patient. The involvement of other professionals such as nurses and caregivers in functional training and ADL training within the ward increased his activity when he was not in rehabilitation, and this was thought to have contributed to the positive outcome.

Way forward

Frequent medical examination after discharge was difficult as the patient returned to his home country, but regular outpatient consultations every few months is desirable so that the family can receive guidance on suitable means of assistance and self-rehabilitation, based on interviews about the patient's condition. Another lesson of this case is that we did not have enough time for speech therapy. Families must have opportunities to learn the self-practice method of speech therapy, the capacity of rehabilitation staff who have knowledge of speech-language-hearing therapy should be developed.

4.4.8. Case 8

[Basic Information]

[Age] 58 [Sex] Male [Diagnosis] Infarction of right corona radiata [Disorder] Left hemiplegia

[Date of onset] 12 October 2017

[Current medical history] On 12 October 2017, the patient became aware of weakness in the right half of his body and of facial palsy whilst driving and consulted another hospital. The patient was referred to Sunrise Japan Hospital Phnom Penh, with suspected stroke.

[Background] Japanese national. Lives with his wife.

[Main complaint] Weakness in the right half of the body [Goal] Independent walking indoors and outdoors

[Progress]

Day 2	Rehabilitation service commenced. Initial assessment, GCS: E4 V5 M6, MMT: arm 1 – leg 2, BRS: arm I – finger I – leg I, BI: 35/100 Normal sensory function, no remarkable higher brain dysfunction
Day 3	Commenced training for transfer to a wheelchair and walking. Transfer to a wheelchair with supervision without physical support, walking between parallel bars at supervision level with a brace.
Day 5	Commenced family guidance on the method of assistance.
Day 11	Discharged to apartment rented nearby instead of home. Assessment at discharge, MMT: arm 1 – leg 2, BRS: arm II – finger I – leg II, BI: 75/100, mRS: 3 Wheelchair was required for moving. Able to walk with a cane and brace for short distances indoors only. Daily outpatient rehabilitation continued after discharge.
Day 25	Patient able to walk supervised with a cane and brace for short distances indoors.
Day 31	Able to walk supervised for short distances outdoors.
Day 60	Independent walking with cane indoors and outdoors (including stairs).

[Discussion]

Challenges of this case

The patient had severe hemiplegia, affecting the arms and legs. The patient's wife was concerned about the burden of care as the patient lived only with her. The patient considered himself to be still young and desired to live independently. To fulfil their wishes, their living environment needed to be modified in line with the patient's physical functions.

Lack of comprehensive support in Cambodia

Rehabilitation is usually provided in a one-directional way, from therapists to patients. Therapists and facility staff rarely consider the current and future condition of the patient, and patients and facility staff rarely discuss current needs. Most families are unfamiliar with care needed by people with disabilities, so they have no choice but to provide care and assistance based on knowledge gained through self-learning. The result is the deterioration of the patient's condition and loss of opportunity for recovery.

Rehabilitation and results

The patient had no consciousness disturbance or higher brain dysfunction and was relatively young. Therefore, it was possible to implement sitting, standing, and intensive ADL training early on. Since the family was cooperative, an appropriate cane and brace could be selected and used for practice during hospitalisation, taking life after discharge into consideration. Since the patient was expected to live only with his wife after discharge and their residence had stairs, the rehabilitation plan was to intensively practise daily movement (gowning, bathing, stairs). We arranged the rehabilitation schedule so that the patient's wife, who was the main caregiver, could actively participate in training from the initial stage of rehabilitation, visualise life at home after discharge, and prepare for self-practice at home and for methods of assistance in walking and daily activities. When the patient came to outpatient rehabilitation after discharge, the new living arrangement was shared with the patient using photographs and videos, and we suggested modifying the living environment and assisting tools. The patient now enjoys an almost-independent life (mRS: 2) and continues regular outpatient rehabilitation as well as self-practice rehabilitation, which is encouraged.

The keys to success in this case are (i) early introduction of rehabilitation after the onset, (ii) constant and effective communication between the staff and the family about the need and effect of rehabilitation, and (iii) continuous outpatient rehabilitation after discharge.

Implications

The patient was relatively young and active and showed a positive attitude towards modifying life at home, but some cases are more challenging, involving elder patients or patients with more severe conditions. In such cases, living arrangements and transport considerations must be modified more from the time of onset and admission. Rehabilitation staff must visit the patient's home even during hospitalisation to (i) confirm the factors that promote or hinder the independent daily lives of patients at home, (ii) organise the residential environment, (iii) assess capacity to provide long-term care, and (iv) ensure the means of transport. We practise these activities as a part of pre-discharge guidance and visiting services.

4.4.9. Case 9

[Basic Information]

[Age] 72 [Sex] Male [Diagnosis] Subarachnoid haemorrhage (SAH) due to the rupture of anterior communicating artery aneurysm

[Date of onset and surgery] 13 December 2016, Surgical method: Clipping by craniotomy (14 December)

[Current medical history]

Early morning on 13 December 2016, the patient complained of headache, neck pain, and general discomfort. The patient's family recommended a visit to a nearby clinic in Phnom Penh. The patient consulted a doctor there but symptoms did not improve. The family then consulted another hospital with the patient, where a CT scan was performed and the diagnosis confirmed. The family then called Sunrise Japan Hospital for an ambulance to transfer the patient, who was admitted late at night on the same day.

[Family living together] Patient lives with his wife (key person) and other family members.

[Main complaint] Neck pain [Goals] Acquisition of walking and reducing the extent of assistance by the family

[Progress]

Day 1	Clipping of aneurysm with craniotomy performed at Sunrise Japan Hospital. After the operation, patient was dependent on artificial ventilation.
Day 4	Rehabilitation commenced. Training in bed. Almost no spontaneous movement.
Day 7	After the patient was weaned from artificial ventilation, supplemental oxygen was administered to keep blood oxygenation level normal.
Day 11	GCS: E3 V1 M6, BI: 0/100, MMT: arm 1 – leg 1, BRS: arm V – finger V – leg V The patient still could not eat food or drink water orally so the nasogastric tube remained.
Day 12	Patient's respiratory condition worsened due to airway obstruction related to low consciousness and difficulty in saliva management, so intubation was performed immediately. Artificial ventilation administered again. Rehabilitation continued.
Day 18	Weaned from artificial ventilation.
Day 29	Commenced practice of bedside sitting position.
Day 40	Commenced transfer to wheelchair and transfer to toilet. Commenced oral feeding.
Day 42	Discharged to home. GCS: E4 V5 M6, BI: 65/100, MMT: arm 4 - leg 5, BRS: arm VI - finger VI - leg VI Walking indoor supervised, moderate level of assistance required for

	toilet movement. Commenced combination of visiting rehabilitation and outpatient rehabilitation by Sunrise Japan Hospital. Follow-up three or four times a week
Day 79	Regular rehabilitation service terminated. Walking outdoor supervised.

[Discussion]

Challenges of this case

The case was highly severe SAH with unstable respiratory and circulatory conditions after the operation, which required prolonged bed rest and resulted in disuse syndrome. Hydrocephalus arose as a complication of SAH, causing concern about the probability of the patient's recovery because ability to resume pre-onset ADL depends on the severity of sequelae.

Prognosis of SAH

Mortality of SAH was said to be 26%–36% up to 2002. Epidemiologic research has since shown the death rate to range from 6% to 67%; the median rate was 32% in the United States, 43% to 44% in Europe, and 27% in Japan (American Heart Association, 2012). In the international Subarachnoid Aneurysm Trial (ISAT), 12% of patients show significant lifestyle restrictions (modified Rankin Scale 3) and 6.5% are functionally dependent (modified Rankin Scale of 4–5) 1 year after SAH (Molyneux, 2005). At the time of onset, Sunrise Japan Hospital was the only hospital in Cambodia capable of clipping by craniotomy for SAH. According to research and neurosurgical doctors at Sunrise Japan Hospital, cases of SAH often result in death or being bedridden in Cambodia. Patients diagnosed with SAH are often transferred from other hospitals to Sunrise Japan Hospital.

Rehabilitation and results

The clinical course of this patient is characterised by unstable respiratory and circulatory condition, which persisted until he was weaned from artificial ventilation on Day 18. He was under artificial ventilation for several days after the operation, but even after he was weaned from it, his condition deteriorated and artificial ventilation was started again on Day 12. He was placed in the ICU when his condition was unstable. ICU staff include rehabilitation personnel, nurses, and other professionals. They worked together well to stabilise the circulatory system, provide respiratory care, and encourage him to get out of bed. As a result, rehabilitation could be continued without interruption.

The information on prognosis and risk management was always shared amongst the staff, including doctors. We always encourage staff members to share the patient's prognosis made by different professionals, such as doctors and rehabilitation therapists, so that they arrive at a reliable medical decision to be presented to the family. Considering the severity of this acute SAH case, the medical staff members carefully observed the risks that could critically worsen the patient's general condition, for example, respiratory disorders or

hydrocephalus. The result was they prevented the worst case and continued rehabilitation. This case shows the importance of risk management early on, when many patients are in unstable condition.

The patient was discharged 42 days after the onset without major paralysis. Possible contributing factors include cooperation amongst various professionals, which prevented major complications and disuse syndrome, and the willingness of the family to learn how to care for the patient and establish a supporting environment after discharge. When the patient was admitted, the medical professionals told the family that rehabilitation would have to be continuous. The information enabled seamless transition to outpatient rehabilitation and functional and ADL training. We thought the patient needed continuous and careful follow-up from when rehabilitation started to when he could live independently. During the visiting rehabilitation, goals were set in accordance with the recovery level and shared with the patient's family. We believe goal setting prevented loss of motivation to continue rehabilitation. The case shows the importance of an integrated rehabilitation programme, from the ultra-acute stage to the recovery stage, then to discharge and life at home.

Awareness of rehabilitation

It must be widely publicised in Cambodia that even patients with severe SAH can recover if they receive appropriate medical treatment, i.e., skilled surgical procedure, careful monitoring, and proper medication, accompanied with continuous bedside care and rehabilitation. The case shows that the combination of medical treatment and supportive intervention is crucially important to restore patients' independence in ADL.

Continuous rehabilitation of patients who have sequelae from stroke is generally performed by local rehabilitation services, which mostly provide only massages and do not aid patient recovery. The field research report (Cambodia HHRD Project Research Consortium, 2013) says that even in national hospitals, many patients do not receive proper rehabilitation. They are kept in bed until they are discharged even though the hospital has a rehabilitation department. PTs say that because medical resources are poor in provincial areas, many people have no access to rehabilitation services, suggesting that many patients stay bedridden.

We conclude that awareness of stroke and rehabilitation must be raised and a system established that enables seamless transition from admission to discharge and life at home.

4.4.10. Case 10

[Basic Information]

[Age] 95 [Sex] Female [Diagnosis] Right thalamic haemorrhage, ventricular rupture, mild compression of the brainstem, pneumonia

[Date of onset] 12 August 2018

[Current medical history]

On 12 August 2018, the family of the patient discovered her disturbance in consciousness and weakness in the left half of the body. A CT scan was performed at a local hospital and the diagnosis was confirmed. The patient was hospitalised there for 4 days, but her condition did not improve and she was transferred to Sunrise Japan Hospital on the request of the family.

[Family living together] Lives with her daughter (key person) and niece

[Main reason of hospital transfer] Desire to be able to eat again

[Goals] Be capable of traveling in a wheelchair with the family and able to eat orally

[Progress]

Day 5	GCS: E1V2M5, Barthel Index: 0/100, MMT (Lt side): upper Limb 0 - lower Limb 0, BRS(Lt side): arm I – finger I - leg I, mRS: 5 Supplementary oxygen using oxygen mask was administered in ICU with 5L/minute flow. Fever present, abnormal breath sound detected in auscultation. Rehabilitation commenced to prevent disuse symptom and exacerbation of pneumonia.
Day 16	Patient transferred from ICU to general ward. Continued oxygen supply through the nasal cannula and frequent sputa suction due to large amount of sputum.
Day 23	Commenced trying to transfer to the wheelchair. However, the state of consciousness had not improved, and total assistance was required in ADL.
Day 31	Rehabilitation professionals explained to the family that recovery to the desired level would be difficult.
Day 41	Supplemental oxygen still required. The family requested to continue hospitalisation and rehabilitation until the patient was able to eat orally.
Day 55	Training for oral feeding was commenced with the assistance and supervision of the rehabilitation staff.
Day 62	Consciousness level remained low but the patient was able to swallow a few mouthfuls. Rehabilitation and oral feeding training were interrupted due to the exacerbation of respiratory conditions. Rehabilitation resumed with improvement in respiratory conditions,

	but oral feeding training could not be continued because of the patient's state of consciousness and respiration.
Day 75	Patient discharged as requested by the family. GCS improved slightly to E2 V2 M5 and continuous oxygen supply was no longer required, but the patient did not recover and remained confined to bed.

[Discussion]

Challenges of this case

The patient had severe left hemiplegia and consciousness disturbance due to acute thalamic haemorrhage. Repeated pneumonia kept her in unstable respiratory condition, and administration of antibiotics and supplemental oxygen were required during treatment in the hospital. Because of deteriorated swallowing function and risk of pneumonia, the patient had limited oral food intake and required nasoenteric feeding. The doctor and rehabilitation staff explained the prognosis that, considering the patient's age, damage to the brain, and the state of pneumonia, providing sufficient nutrition orally would be difficult and nasoenteric feeding necessary permanently. The family, however, did not give up and requested the continuation of hospitalisation until the patient was able to eat food orally. As the hospitalisation period was extended, the same explanation was provided repeatedly, but the family was not convinced. The patient was in the hospital for about 2.5 months.

Family factors

Many families hope that the patient under rehabilitation will be able to eat orally again, regardless of the patient's condition. In some cases, the family may refuse to accept the prognosis and ask for longer hospitalisation. Sometimes the family forces the patient to eat during hospitalisation or at home, even though they have been told that oral ingestion is difficult and dangerous from a medical perspective. In the worst-case scenario, the patient may develop pneumonia, which leads to deterioration of his or her condition.

Rehabilitation and results

The patient could not be trained to raise her body and leave the bed because her state of consciousness and respiration were poor. Severe motor paralysis was present and only passive training could be administered. The consensus was that no major improvement could be expected because of her age, brain damage, and respiratory condition. The patient was transferred to the general ward from ICU and we focused on guiding the family in caring for the patient at home. However, the family strongly requested oral feeding training and emphasised that feeding training should be performed in the hospital. We advised the family that oral feeding training could not be recommended due to the high risk of choking and mis-swallowing. Because the family insisted they would feed the patient themselves, however, the hospital staff agreed as long as the family would take responsibility for the consequences. The rehabilitation professionals repeated at the time

of discharge that oral ingestion was difficult and that the patient must not be forced to eat at home.

Lessons learned

More intensive and effective family guidance during hospitalisation are required to avoid prolonged hospitalisation. If the family refuses medically appropriate advice, the family should learn how to care for the patient safely and prepare for life at home under such circumstances. If the family knows how to create an optimal environment for care and rehabilitation and has a clear view of seamless transition from hospital to home life, needless hospitalisation can be avoided. A system to support the patient's daily living at home after discharge should be established.

4.4.11. Case 11

[Basic Information]

[Age] 40s [Sex] Male [Diagnosis] Left putaminal haemorrhage

[Onset] 13 September 2018

[Current medical history]

The patient complained of sudden headache and weakness of the right half body and was transferred to a local clinic because he lost consciousness. The patient was then transferred to Sunrise Japan Hospital Phnom Penh because of a suspected stroke. He had severe aphasia when he arrived at our clinic.

[Background] The patient lives outside the capital with his wife and child. Occupation: Bank clerk

[Goals] Establish alternative communication means and reduce ADL assistance by caregivers

[Progress]

Day 1	GCS: E4 V1 M5, MMT (Rt side): upper Limb 5 – lower Limb 5, MMT (Lt side): upper Limb 1 – lower Limb 1, ADL: full assistance in bed Higher brain dysfunction: Severe aphasia, apraxia. Other: Eye movement disorder. Nutrition: Nasogastric tube
Day 6	GCS: E2 V1 M5. Arousal level temporarily decreased because of exacerbation of cerebral oedema. There was no major change in the degree of motor paralysis or higher brain dysfunction.
Day 8	The patient started oral ingestion only at lunch with the help of a PT.
Day 14	The patient started oral intake at three meals with family assistance.
Day 15	The patient started to leave the bed using a wheelchair. Bed-leaving was postponed because blood pressure could not be controlled well at a safe level for moving despite medication.
Day 20	The family wanted the patient to be discharged earlier than standard for

	the hospital for economic reasons. Guidance was started in assistance in daily life, transferring the patient to a wheelchair, as was rehabilitation such as exercise range training.
Day 24	Discharged home GCS: E4 V3 M5, MMT (Rt side): upper Limb 5 – lower Limb 5. MMT (Lt side): upper Limb 1 – lower Limb 1. ADL: Full assistance with a wheelchair Higher brain dysfunction: Severe aphasia, apraxia. Other: Eye movement disorder remains. Nutrition: Oral intake at three meals

[Discussion]

Challenges in this case

Patient exhibited severe hemiplegia and a variety of higher brain dysfunctions due to intracerebral haemorrhage and associated cerebral oedema. He had a low arousal level and difficulty in understanding instructions due to aphasia, so ADL was at the full assistance level. We thought that ADL independence and communication skills should be improved as much as possible because he was still young.

Realities of Cambodia

Patients and their families often wish to leave the hospital as soon as possible, mainly because of economic circumstances. Therefore, it is impossible complete the rehabilitation period and the patient is often discharged still requiring a lot of assistance.

Rehabilitation and results

Initially, rehabilitation was undertaken to improve the arousal level and oral meal intake. Because the patient suffered from cerebral haemorrhage, strict blood pressure control was required and bed leaving had to be attempted carefully. As a result of continuous stimulus by staff and family, his arousal level gradually improved. Since the nutritional quantity that could be ingested orally increased along with the stabilisation of state of consciousness, we succeeded in switching the food intake route from nasal tube to oral intake for all three meals. In parallel, function training and ADL training were started. However, the interventions were switched to assistance and rehabilitation guidance for the family because the family wanted an early discharge.

Expected rehabilitation system

Many patients are estimated to be unable to continue long-term hospital rehabilitation because of economic circumstances. Solutions could include outpatient rehabilitation in the hospital, home-visit rehabilitation, or remote rehabilitation using a smartphone or tablet.

4.4.12. Case 12

[Basic Information]

[Age] 60s [Sex] Male [Diagnosis] Multiple lacunar infarction, arteriosclerotic parkinsonism

[Admission date] 21 August 2018

[Current medical history]

The patient's physical function gradually declined from about 1 month before hospitalisation and oral intake became difficult. He was admitted to Sunrise Japan Hospital Phnom Penh for treatment of serum electrolyte imbalance and swallowing training.

[Living arrangement] He lives with his wife and his child's family. He was a private nurse before hospitalisation.

[Chief complaint] Decrease in consciousness level

[Goal] Resuming ability of oral nutrition intake

[Progress]

Day 1	GCS: E3 V1 M5. MMT: upper Limb 2 – lower Limb 2. ADL: full assistance in bed. He had akinesia, muscle rigidity, and poor facial expression. He did not have resting tremors. Nutrition: Nasogastric tube The patient started to leave his bed using a wheelchair. Transfer was at the moderate assistance level. Guidance and facilitation were needed for all movement but he could use his own muscles slightly to stand up, so we did not have to support his whole body weight. He was sometimes cooperative, sometimes not.
Day 4	The patient started swallowing training. The swallow reflex was not lost but food could not be sent from the oral cavity to the pharynx.
Day 5	The doctor explained to the family that resumption of oral nutrition would be difficult permanently. His family agreed to have the patient undergo gastrostomy. Swallowing training continued in response to the strong desire of the family.
Day 10	The patient was discharged at the request of the family. Examinations at discharge. GCS: E4 V3 M6. MMT: upper Limb 3 – lower Limb 3. ADL: Full assistance with a wheelchair No other changes.
Day 25	Nutrition: Through gastrostomy tube

[Discussion]

Challenges in this case

The patient had difficulty with voluntary exercise due to parkinsonism, and the consciousness level was low. Oral food intake was difficult. He had severe muscle rigidity, and substantial assistance was required to help him roll over and get up. We tried to

improve his ability to perform these activities to reduce the burden of nursing care on the family.

Rehabilitation and results

At the beginning of the rehabilitation, the primary goal was oral nutrition intake, as the family wished. We provided rehabilitation services to improve the consciousness level and durability of sitting position retention. Gradually, the patient could keep his eyes open for longer periods. However, he had poor spontaneous exercise and seemed poorly motivated for oral intake. We continued as much rehabilitation as possible to respond to the family's wishes, but the patient did not achieve oral ingestion of nutrition.

Needs of swallowing training in Cambodia

Families often expect that patients can resume their ability of oral nutrition intake through rehabilitation, but the country does not have professionals specialising in rehabilitation for dysphagia. Considering the high demand for swallowing training, training staff to perform dysphagia rehabilitation is an urgent issue. We would like to raise the level of knowledge and technology throughout Cambodia in cooperation with the Rehabilitation Association and NGOs in Cambodia, so that training and education on swallowing disorder can be conducted at each hospital level.

4.4.13 Case 13

[Basic Information]

[Age] 44 [Sex] Male [Diagnosis] Cerebral haemorrhage [Failure] Left hemiplegia (left upper and lower limbs) and cerebellar ataxia

[Brain image] Right brainstem bleeding [Onset date] 27 February 2018

[Current medical history]

In the evening of 27 February 2018, the patient suddenly complained of feeling dizzy. He thought it was due to fatigue, so he did not go to any medical facilities that night. The next day, he went to a nearby district hospital because he was having difficulty breathing. He was transferred to a central hospital that day and to Mittaphab Hospital on 3 March for further treatment and intensive rehabilitation.

[Background] Family: The patient is living with his wife and two children. Job: Potato farmer. Residential area: Borikhane district

[Chief complaint] Unable to move his limbs or sit by himself.

[Goal of patient] Be able to sit independently.

[Progress]

Day 7	Rehabilitation started. Evaluation on admission: GCS: E3 V1 M5. BI: 0/100. mRS: 5. BRS: arm IV – finger IV – leg III Consciousness disorder remained. Dependent on tube feeding because of oral intake difficulties. The patient had left hemiplegia and ataxia and needed assistance in all aspects of daily life.
Day 12	Able to stay in sitting position (sitting on the edge of bed with legs down with manual support) for a few minutes as a result of rehabilitation.
Day 14	Continued practising staying in sitting position. Started to train to sit independently (on the edge of bed with legs down without manual support or backboard).
Day 19	Transferred to the National Rehabilitation Centre. Evaluation on transfer: GCS: E4 V5 M6. BI: 20/100. mRS: 5. BRS: arm IV – finger IV – leg III
Day 20	Rehabilitation started.
Day 21	Had difficulty sitting independently without manual support or backboard. Rehabilitation focused on exercises of upper limbs. Voluntary training was encouraged.
Day 23	Regained ability to sit up. Training with a walker started.
Day 26	Guidance on voluntary training to patient and family. Family was given guidance on assistance.
Day 28	Walking training was continued. Cane walking was started.
Day 33	Started training to walk on streets, accompanied by his wife. Guidance on such training was provided.
Day 38	Regained walking ability if assisted by his wife.
Day 48	Discharged to the home. GCS: E4 V5 M6. BI: 85/100. mRS : 2. BRS: arm IV – finger IV – leg IV He could walk independently indoors. He could sit in the bath under supervision and take a shower independently.
Day 60	The patient prepared to go back to work.

[Discussion]

Challenges in this case

This patient had ataxia as a unique symptom. Since he was younger than other cerebral haemorrhage patients and could still talk, he was expected to be able to live independently again after rehabilitation. However, both the patient and his family did not understand the importance of rehabilitation and did not know of the rehabilitation centre.

Lack of interprofessional collaboration and short hospitalisation period

At Mittaphab Hospital, rehabilitation services can be provided only under a doctor's instructions. This regulation and lack of cooperation and communication between doctors and nurses are the reasons why rehabilitation is often delayed. Even if patients could join rehabilitation early on, the short hospitalisation period often makes it difficult for patients to regain their ability to perform ADL to the maximum.

Rehabilitation and results

In the initial treatment plan, the patient was scheduled to be discharged on the third day after rehabilitation started (10 days after onset). We held a conference with the family, doctors, and nurses to explain the effect of rehabilitation on resumption of independent life at home. We insisted that even short rehabilitation would have medium- and long-term effects on the patient's ability to lead an independent life and suggested transferring him to the rehabilitation centre. All parties agreed. Since PTs from the Kitahara Group work at the Mittaphab Hospital, an acute-care hospital, and at the Rehabilitation Centre, a recovery-care hospital, the same PTs could provide the patient with rehabilitation services, which would achieve seamless transition from the acute phase to the home-care phase. The arrangement enabled us to efficiently modify the living setting and provide enough family guidance. As a result, the patient was able to live independently at home after about 1 month of hospitalisation.

Importance of sharing information

When transferring a patient from an acute-care hospital to the National Rehabilitation Centre, information on the patient and rehabilitation is not handed over. Therefore, staff members at the centre usually do not have information on the clinical history and services provided to the patient. Such information is crucial to achieve maximal functional recovery as well as to manage risk, so collaboration between the acute-care hospital and rehabilitation centre must be strengthened.

4.4.14. Case 14

[Basic Information]

[Age] 55 [Sex] Female [Diagnosis] Suspected rheumatic cervical spondylosis [Failure] Quadriplegia

[Onset date] 16 November 2017

[Current medical history]

The patient felt restricted joint mobility from around April 2017 and visited a hospital in Thailand. Motor paralysis gradually progressed, lower extremity weakness became prominent, and the patient was no longer able to walk by 16 November 2017. The patient visited the same hospital again but the cause of her condition was unknown. The patient began rehabilitation at the Lao PDR National Rehabilitation Centre from 5 December, but her physical functions and ADL did not improve, so she hoped to begin rehabilitation provided by the Kitahara Group at Mittaphab Hospital as an outpatient.

[Background]

Family: She lived with her husband. Two of her sons reside in the neighbourhood. Job: Office clerk

[Chief complaint] Her hands and feet shook and they could not move.

[Patient's wish] Be able to get up and walk.

[Progress]

Day 135	Rehabilitation started. MMT (Rt side): upper Limb 3 – hand 3 – lower Limb 2. MMT (Lt side): upper Limb 3 – hand 3 – lower Limb 2 Limitation of motion range of joints: Both shoulder joints, both elbow joints, both hip joints, knee joints, ankle joints Deep tendon reflex: Hyperreflexia of biceps tendon reflex and patellar tendon reflex Physical examination: Rheumatic deformities in both fingers. All cranial nerve tests were negative.
Day 150	BI: 30/100. Difficult to get up and walk. Movement of the hands and shoulders was very poor.
Day 180	When the patient came to our facility accompanied by the family, we asked them about her living arrangement and offered advice on modifying her living environment and how to conduct motion training at home, aiming to regain the ability to roll over, sit up independently, stand, and walk. The patient underwent training to roll over, sit, and stand. Reduction of required assistance for living was observed.

Day 200	The patient started practicing sitting to improve movement of the upper limbs. Assistance for eating was no longer required, and the ability to use a nail clipper was regained.
Day 220	MMT (Rt side): upper Limb 3 – hand 3 – lower Limb 2. MMT (Lt side): upper Limb 3 – hand 3 – lower Limb 2 Limited motion range of joints: Both shoulder joints, both elbow joints, both hip joints, knee joints, ankle joints Deep tendon reflex: Hyperreflexia of biceps tendon reflex, patellar tendon reflex Physical examination: Rheumatic deformities in both fingers BI: 65/100. Walking was still difficult, but because sitting balance and hand skills improved, the patient could eat independently without assistance.

[Discussion]

Challenges in this case

The cause of progressive paralysis was not specified when the patient consulted us about the possibility that our intervention could be effective. We conducted physical function tests and reached the most likely diagnosis of rheumatic cervical spondylosis. We discussed the differential diagnoses and the effect of exercise therapy with the patient, family, and doctors, taking into consideration her clinical course and possible examination to confirm the diagnosis. Then we set achievable goals and provided rehabilitation.

Importance of PT's involvement in diagnosis, and high cost of MRI

In Lao PDR and Japan, it is not common for a PT to make a diagnosis and to express an opinion on an examination to a doctor, but the PT's involvement in the diagnosing process led to effective intervention in this case. In Lao PDR, doctors cannot rely on MRI for diagnoses because of its high cost, so physical examination, which PTs excel at, is crucial. Since MRI costs as much as US$300 per image, it is used less frequently.

Covering the jobs of other professions

Because the patient suffered from progressive paralysis, and recovery of body function was unexpected, we focused on training to improve feeding activities, nail clipper use, and self-operation of a wheelchair. These are applied motions and training is usually provided by OTs. Lao PDR, however, does not have educational institutions for occupational therapy but only for physical therapy. In our project, PTs perform jobs usually performed by OTs. As a result, the patient regained the ability to eat without assistance after about 3 months of intervention.

In countries that have richer rehabilitation human resources, such as Japan, interventions are conducted by various professionals – PTs, OTs, and STs. Lao PDR has an absolute

shortage of OTs, so occupational therapy is not common. Training for applied motions such as feeding and dressing is not provided by Mittaphab Hospital, and probably not by any hospital in Southeast Asia. The experience of PTs providing rehabilitation beyond their professional expertise could be the basis of a model that could solve this common problem in Southeast Asia.

4.4.15. Case 15

[Basic Information]

[Age] 65 [Sex] Male [Diagnosis] Brain infarction [Failure] Left hemiplegia and dysphagia

[Onset date] 19 March 2018

[Current medical history]

When the patient went to visit a friend on 19 March 2018, his hands suddenly gave way and motor paralysis occurred. He was admitted to Mittaphab Hospital on 20 March 2018.

[Social background]

Family: He lived with his wife and son. Job: University instructor of French language Place of residence: Vientiane

[Chief complaint] No movement of limbs [Goal] Reduce required assistance.

[Progress]

Day 1	Rehabilitation started at bedside. Family guidance on sitting training and oral care and efforts to prevent aspiration pneumonia as a complication of dysphagia started. Voluntary movement was not seen in the patient and substantial assistance was necessary for all movements. GCS: E3 V1 M1. BI: 0/100. mRS: 5. BRS: arm I – finger I – leg II. Verbal communication was difficult due to aphasia.
Day 2	Family guidance on bed positioning and passive stretching of articulation was carried out to prevent contracture.
Day 6	Training to stay in sitting position was started.
Day 7	Family was given guidance on daily routine activities and staying in sitting position.
Day 13	Discharged. GCS: E4 V1 M5. BI: 5/100. mRS: 5. BRS: arm III – finger II – leg III. Total assistance for daily life was still required.

Day 20	Sitting up and staying in sitting position became possible for about 15 minutes with the family's assistance.
Day 30	In the home-visit rehabilitation, the patient trained to ride a wheelchair, shower, use the toilet, and groom himself. The family received guidance on how to assist in the patient's daily life.
Day 60	Able to stay in sitting position for a longer time under supervision. The patient could stand whilst gripping a handrail, under supervision. GCS: E4 V3 M6. BI: 45/100. mRS: 4

[Discussion]

Challenges in this case

The patient had severe hemiplegia and found it difficult to return to an independent life. Family assistance was absolutely required for him to resume life at home. Because his swallowing function deteriorated and he had difficulty turning over without help, the risk of secondary complications was high.

Family's positive involvement in intervention

In Lao PDR, care is mainly provided by families but most have poor knowledge of stroke and complications. Such information should be provided by nurses and PTs but they do not have it.

The patient's family had a very good understanding of what was advised during hospitalisation and was able to apply and adjust the information to ADL. Therefore, we spent more time on family guidance than on direct body function and motion training for the patient during the acute phase, when the patient's consciousness level was still low. We advised the family that the goal of rehabilitation was to reduce required assistance. The family shot videos of the practices conducted by Kitahara staff. We think the keys to maximise the effect of intervention as in this case are the following: (i) during family guidance, let the family watch the training provided by professional PTs and observe home or self-rehabilitation; and (ii) after the patient is discharged, continue follow-up by phone and home-visit rehabilitation.

Sharing information for seamless rehabilitation

Information sharing between the staff members of the acute-care hospital and home-visit rehabilitation is crucial to encourage the family's positive involvement in voluntary training and, as a result, achieve continuous and seamless service provision. When we started family guidance at the acute phase, we simultaneously tried to share patient information with staff members of the National Rehabilitation Centre, who were to conduct continued voluntary training at home because such guidance to the family should be provided by staff members in charge of home-visit rehabilitation. Unfortunately, our efforts failed.

Luckily, KNI staff members were affiliated with both institutions – Mittaphab Hospital and National Rehabilitation Centre – so we conducted family guidance on self-training throughout rehabilitation.

To establish an information-sharing system amongst local institutions which can be operated after our support ends, in cooperation with the local PT staff of Mittaphab Hospital and the PTs of related hospitals, we are beginning to operate a system where patients' clinical summary can be referred to by any stakeholder.

4.4.16. Case 16

[Basic Information]

[Age] 53 [Sex] Female [Diagnosis] Cerebral infarction of right middle cerebral artery region and haemorrhagic transformation

[Failure] Left hemiplegia

[Onset date] 11 March 2018

[Current medical history]

Paralysis suddenly appeared in half of the body in the morning of 11 March 2018. The patient was transferred to the county hospital by the family then to the prefectural hospital because the county hospital had difficulty providing treatment. However, since treatment was difficult even in the prefectural hospital, the patient was transferred to Mittaphab Hospital on 12 March.

[Social background] Family: She lived with five family members. Job: Housewife. Place of residence: Vientiane Prefecture (about 3 hours from central Vientiane)

[Chief complaint] No movement of left limbs [Goal] Be able to get up alone.

[Progress]

Day 16	Rehabilitation started at bedside. GCS: E4 V4 M5. BI: 0/100. mRS: 5. BRS: arm I – finger I – leg II Total assistance was required, and we provided family guidance, advising movement range training and massaging of each joint to prevent contracture of the joints.
Day 24	The patient's level of consciousness decreased. Haemorrhagic transformation was confirmed by CT in the same region as the infarct region. Rehabilitation was interrupted. We consulted the doctor about the estimated time to resume rehabilitation.
Day 31	Rehabilitation resumed. Family guidance was provided on assisting daily routine activities and retaining the sitting position. GCS: E4 V4 M5. BRS: arm I – finger I – leg II. There was no major change in the status of paralysis but sitting position practice was possible.

Day 33	Exercises to keep her in sitting position longer time were continued. Stability in sitting position was improved and sitting position was at the supervision level.
Day34	Discharged home. GCS: E4 V5 M6. BRS: arm I – finger I – leg II. mRS: 5. BI: 25/100

[Discussion]

Insufficient patient monitoring system

The patient was hospitalised due to cerebral infarction followed by haemorrhagic transformation, which was confirmed by CT imaging. She had severe motor paralysis and her ADL was supported mainly by the family. When haemorrhagic transformation took place 24 days after the onset of infarction, it was the family who noticed the decline in the level of consciousness and informed doctors and nurses.

In Lao PDR, it is not uncommon for vital signs to be measured and physical examination conducted only once a day even in the acute phase. Continuous monitoring of vital signs is not common.

In treatment of cerebral infarction, blood pressure control is crucial, and the target range of blood pressure has to be shared amongst staff and family members. In Lao PDR, such information sharing is rarely practised.

We suspect that there was a delay in diagnosing haemorrhagic transformation because of inflexible operation of CT and MRI, which are used only for diagnosis purposes at the time of admission. During hospital stays, CT or MRI can be used only if the family consents to their use at the time of a symptomatic change. Therefore, it is probable that, in many cases, medical staff cannot respond promptly to changes in the patient's condition, delaying necessary examinations and treatments.

Rehabilitation and results

The first rehabilitation was provided 16 days after the onset.

This delay occurred because rehabilitation was not permitted immediately after onset due to the large infarct size and the lower awareness level.

Until the doctor allowed rehabilitation, we advised the family to take measures to prevent disuse syndrome and to watch the patient’s condition carefully. The family well understood what physical findings and levels of consciousness required prompt reaction and that they had to report any symptomatic changes to the staff. Intensive rehabilitation could not be provided, however, because of poor blood pressure control. Blood pressure often exceeded the upper limit of the target range. We think the delayed rehabilitation and insufficient rehabilitation are the reason for the unsatisfactory outcome.

Future issues

In severe cases and cases with a high risk of complications, early detection of condition change is crucial to prevent deterioration of patients' general condition. Sharing disease information amongst staff and families is encouraged and to as is educating them about symptoms of critical and highly risky conditions. Physical examinations must be conducted and vital signs measured more frequently, especially if blood pressure is unstable. A system to facilitate information sharing and communication between medical staff and family must be established.

4.4.17. Case 17

[Basic Information]

[Age] 75 [Sex] Female [Diagnosis] Cerebral infarction in the right middle cerebral artery region [Failure] Left hemiplegia

[Onset date] 26 March 2018

[Current Medical history]

In the morning of 26 March 2018, she suddenly lost consciousness and collapsed. The family transferred her to Mittaphab Hospital.

[Social background] Family: She lived with four family members (son and three grandchildren). Job: Family-operated business. Place of residence: Vientiane Prefecture (about 2 hours from central Vientiane)

[Chief complaint] Could not get up. [Goal] Be able to get up.

[Progress]

Day 2	Rehabilitation began. Training to sit up and stay sitting up was carried out. Family guidance on how to support daily routine activities was carried out. GCS: E4 V5 M6. BI: 20/100. mRS: 5. BRS: arm II – finger II – leg II. mRS: 5
Day 9	Swelling was observed in the lower leg. Ultrasonography examination confirmed DVT. After consultation with a doctor, rehabilitation was suspended.
Day 10	The patient was discharged despite remaining DVT because of financial issues. GCS: E4 V5 M6. BRS: arm II – finger II – leg II. mRS: 5. BI: 30

[Discussion]

Unusual clinical course of this case

This patient had severe left hemiplegia. Her ADL was all supported by the family just after the onset, and it was difficult for her to stay in sitting position. In this severe case, we started rehabilitation only 2 days after the onset and until she developed DVT symptoms, steady recovery through rehabilitation was observed. Family guidance was carried out early. By the time DVT occurred, she had already started training to sit and transfer from bed to wheelchair. After consultation with a doctor, rehabilitation was suspended and the patient discharged the next day because of financial problems.

Information on detailed rehabilitation procedures is required to prevent secondary complications of DVT. Because such information was lacking, we failed to continue the rehabilitation or provide guidance on rehabilitation at home. After discharge, she still needed family support for ADL. She cannot walk by herself.

Lack of information sharing amongst staff

We detected early signs of DVT, which were confirmed using ultrasonography in cooperation with ward nurses and doctors. Even for DVT patients, rehabilitation does not have to be suspended if it is done carefully considering the swelling site's appearance and size, which can be revealed by specific examinations for DVT. In this case, however, we did not receive such detailed information and could not decide whether rehabilitation could be carried out. We could not discuss with medical staff, including doctors, the intensity and procedure of rehabilitation during the patient's bed-rest period. The lesson from this case is that a system should be established to share with staff the information (examination results) crucial for interventions to improve patients' ADL abilities.

4.4.18. Case 18

[Basic Information]

[Age] 82 [Sex] Male [Diagnosis] Left lateral medulla oblongata infarction [Failure] Dysphagia

[Onset date] 9 May 2018

[Current medical history] The patient suddenly became aware that he could not swallow saliva and came to Mittaphab Hospital on 9 May 2018. The doctor diagnosed left lateral medulla oblongata infarction based on MRI.

[Social background] Family: He lived with his wife, daughter and son-in-law, and three grandchildren. Job: Sales industry (details unknown). Place of residence: Vientiane Prefecture

[Chief complaint] Could not eat. [Goal] Be able to swallow.

[Progress]

Day 2	Rehabilitation started. Movements of the pharynx and tongue were evaluated and facial muscle training provided. Because of the swallowing disorder, nutrition was ingested through a nasogastric tube. The patient was independent in all ADLs except eating. GCS: E4 V5 M6, BI: 90/100. mRS: 2. BRS (Rt side): arm V – finger V – leg V
Day 6	Movements of the pharynx and tongue were re-evaluated. A voluntary training manual was provided and guidance implemented. The patient was discharged, still with difficulty in oral food intake. The nasogastric tube was periodically exchanged when the patient returned as an outpatient.

[Discussion]

Challenges in this case

Limb motor function and ADL except eating was almost intact. Dysphagia was his only symptom but rehabilitation for swallowing dysfunction was not implemented. The patient was discharged as soon as infusion therapy was completed.

Lack of expert on swallowing function in Lao PDR

Examinations of the swallowing function, such as videofluoroscopic (VF) or videoendoscopic (VE) swallowing, are indispensable to decide whether patients can resume oral intake or not. Lao PDR does not have swallowing function experts or rehabilitation, so neither VF nor VE is common practice. Evaluation of swallowing function depends on observation by patients' families and nurses.

Swallowing disorder can cause aspiration pneumonia. To prevent it, liquids to be ingested must be thickened, food texture changed, and swallowing function rehabilitated, but in Lao PDR, medical personnel do not explain the risk of aspiration or propose modifying food because of lack of knowledge and experts. As a result, patients with no other disorders except swallowing are usually allowed to leave the hospital after acute-phase treatment and not required to return for regular follow-up examinations.

We believe medical staff's awareness of swallowing disorder and the need for dietary modification must be raised to prevent aspiration pneumonia. Staff can then encourage families to practise dietary modification for patients.

Our intervention

We provided the patient with guidance in voluntary training and the family in texture modification of foods. We concluded that the patient had no other choice than total dependence on nasal tube feeding because his swallowing disorder hindered him from even swallowing saliva. We could not confirm the effect and eventual outcome of training and rehabilitation because hospitalisation was too short.

4.5. Summary and Discussion

Before starting this study, the Kitahara Group had established our own rehabilitation rooms within counterpart hospitals in Viet Nam and Lao PDR. In Viet Nam, since neurological rehabilitation was not provided adequately at Viet Duc University Hospital, we started by establishing a system that provides rehabilitation (for example, a rehabilitation ordering system from doctors and a tool to share information with doctors and nurses). The study provided rehabilitation for patients with brain and nerve injuries (Table 5). Since Viet Duc University Hospital is the largest hospital specialising in surgery in Viet Nam, it has many patients with head injuries and brain tumours. In Lao PDR, our counterpart is Mittaphab Hospital, where stroke patients make up a large portion of patients. In Cambodia, we conducted the study at Sunrise Japan Hospital Phnom Penh, which the Kitahara Group established in cooperation with local counterparts and where stroke patients are the most numerous.

Twelve patients from each country participated and met the following criteria: (i) they had been provided with rehabilitation services at least five times, and (ii) they left hospital still requiring nursing care. The average hospital stay was 25.2 days in Viet Nam, 6.1 days in Lao PDR, and 40.6 days in Cambodia. An mRS of 4 or more at the time of hospital discharge was 67% in Viet Nam, 92% in Lao PDR, and 67% in Cambodia. BI at discharge was 53.7% in Viet Nam, 40% in Lao PDR, and 35.8% in Cambodia.

Of the 36 patients who participated in this study, we selected 18 for case reports, 6 from each country: 3 who achieved good outcomes and 3 who did not achieve a favourable outcome as a result of the Kitahara Group rehabilitation. Rehabilitation was performed according to Japan's Stroke Guidelines 2015 (Supplement 2017) (The Japan Stroke Society, 2017) and Japan's Physical Therapy Guideline, first edition (The Japan Institute for Labour Policy and Training, 2017). However, we had to modify the guidelines and provide non-standard rehabilitation depending on the realities of each country, where a rehabilitation system had not been well established, and we realised that Japan's guidelines could not be universally applied to other settings.

This case report is designed to show the attempts to respond to diverse patient needs in Viet Nam, Cambodia, and Lao PDR, where medical and rehabilitation provision systems and medical personnel training system are not fully developed, and to suggest an effective rehabilitation provision system. These countries have few subdivided rehabilitation professionals, especially OTs and STs. Several cases show that PTs were involved rehabilitation that was supposed to be provided by OTs or by STs (swallowing training) in developed countries such as Japan. Because specialisation is not advanced and the healthcare workforce is insufficient, Southeast Asian countries must maximise existing human resources. Another solution to the shortage of medical and long-term care resources is seamless and integrated intervention from acute care to home care, even in developed countries, including Japan. The role sharing amongst hospitals, homes, or care facilities for long-term care to disabled and older people varies depending on a society's cultural, social,

historical, political, or administrative background, which determines how a country can achieve a seamless and integrated care system. Policymakers must create healthcare and long-term care provision systems most suitable for their societies, especially when resources are tight.

Our goal is to develop a guideline – the Kitahara Rehabilitation Formula – reflecting the situation of families and sociocultural and administrative realities. Further qualitative studies are required. For case studies, we need to adopt progressive contextualisation, starting by focusing on each case and tracing the interacting elements of the case, including family structure, community support, administrative system, and socio-economic issues. In doing so, we can reach a holistic understanding of problems as part of a complex of interacting causes. Focus group discussions targeting patients' families and rehabilitation staff are needed to detect the most effective means to maximise the outcomes of healthcare interventions for stroke patients. Even if we do succeed in establishing the Kitahara Rehabilitation Formula, we will need to keep track of patients' needs and constantly modify the guideline. The Kitahara Rehabilitation Formula must reflect changes in society, the economy, and population dynamics, and must be valid for and consistent with the healthcare and long-term care systems that will develop as populations age.

Chapter 5

Effect of Education on the Rehabilitation Staff in the Study Countries

5.1. Overview

We report on education for rehabilitation staff in Viet Nam, Cambodia, and Lao PDR. We investigated the countries' rehabilitation situation and set training goals and training curricula according to each country's circumstances. We conducted training to foster rehabilitation human resources who can work beyond their job descriptions, if necessary: e.g., PTs who are willing to do the jobs of OTs and STs and can develop a seamless rehabilitation plan from acute care to home care, and acquire the required professional knowledge and treatment techniques. The content and results of the training are in section 6.5, including case reports of 12 trainees.

5.2. Education Systems of Rehabilitation-related Professionals in the Study Countries

5.2.1. Viet Nam

After completing medical school, which takes at least 6 years, and interning for 18 months, students can apply for a doctor's license (The Japan Institute for Labour Policy and Training, 2017). Doctors with clinical experience of 3 years or more are qualified to join a master's course (2 years). They mainly engage in research during the master's course but they may take the 2-year rehabilitation specialist level 1 course. After getting a master's degree, they are qualified to get a doctorate degree (3–6 years). After completing the rehabilitation specialist level 1 course, they are qualified to take the 2-year level 2 course. The level 1 and 2 courses are provided only by Ha Noi Medical University and Ho Chi Minh City Medicine and Pharmacy University. Short-term courses for nurses, rehabilitation doctors, and traditional medicine practitioners are also available (Le, 2018).

Viet Nam has created about 5,000 PTs since 1972 and has four PT training schools: Hai Duong Medical Technical University in the north, Da Nang University of Medical Technology and Pharmacy in the central part of the country, Ho Chi Minh City Medicine and Pharmacy University in the south, and Tokyo Human Health Sciences University (founded in 2016) in the north. The language of instruction is Vietnamese. Students learn fundamental anatomy, physiology, and physical therapy for each disease. Clinical training makes up a third of the courses.

Viet Nam has no national licensing system for PTs. The physical therapy certificate is issued when trainees complete 9 months of clinical training after graduating from a training school. The use of the title 'PT' is not restricted to graduates of physical therapy training schools. Nurses who have taken short-term physical therapy courses may call themselves PTs or may work as PTs.

Training courses for physical therapy vary from 2 to 4 years, but all 2-year training courses will be abolished by 2020. Ho Chi Minh Medicine and Pharmacy University established a 4-year course only in 2006. Even those who hold a physical therapy certificate must take university classes to keep their licenses.

There is no official occupational therapy curriculum and some PTs call themselves OTs and STs after completing short-term courses for occupational or speech-language-hearing therapy. However, occupational therapy courses are being prepared with the support of India. As of 2018, five Vietnamese faculty members from Hai Duong Medical Technical University and Ho Chi Minh Medicine and Pharmacy University were studying in India (Manipal University). They will obtain a bachelor's degree in occupational therapy after completing the 4-year course and play a central role in establishing the occupational therapy bachelor's course in Viet Nam. Viet Nam has recently received much support from other countries besides India. Occupational therapy short-term courses were held in cooperation with overseas expert tutors. Some physical therapy schools even offer occupational therapy training. Ho Chi Minh Medicine and Pharmacy University, for example, has ADL rooms, which provide occupational therapy training. A total of 57 students who have acquired physical therapy qualifications – 21 in Ho Chi Minh City and 36 in Hai Duong – are taking occupational therapy courses. Occupational therapy is not included in the physical therapy curriculum in either university, so those who wish to become PTs and learn occupational therapy must do so after they get the physical therapy qualification.

There is no official standard curriculum for speech-language-hearing therapy qualification, but the country has 33 STs because of support from the University of Sydney and the Trinh Foundation in Australia. Trainees can choose to either study in Australia for 2 years or participate in ST lecture courses and practical skill training in Viet Nam. The Physical Therapy Association is creating a speech-language-hearing therapy master's course. Cho-Ray Hospital in Ho Chi Minh City is promoting speech-language-hearing therapy education in collaboration with Japan-based Seirei Christopher University.

5.2.2. Cambodia

The first course to train new PTs in Cambodia was opened at the Technical School for Medical Care in 1987. The training course has two sub-courses – a bachelor's degree course, which started in 2017 and graduated 18 students in 2019, and a 3-year associate degree course, in which an average of 15 students are enrolled every year. Both sub-courses include lectures and clinical training. Graduates can obtain national qualification for physical therapy if they pass the national exam. There are no training institutions for OTs or STs. The CPTA organises training courses lasting a few days for qualified PTs four or five times a year, and invites lecturers from outside Cambodia. Details of the training courses are shared through social networking services such as Facebook and through e-mail. However, the courses cannot be regarded as regular or systematic career education, and the shortage of PTs and the low quality of physical therapy education are still big problems.

5.2.3. Lao People's Democratic Republic

With the support of the World Health Organization, Lao PDR started training PTs in 1968 and developed a 3-year PT curriculum in 1972. In 1981, the Technology Health College was established, the first institution providing medical education to graduate medical doctors in Lao PDR, and the University of Health Science (UHS) was established in 2009 to transfer management of medical education from the Ministry of Education to the Ministry of Health and to provide integrated medical services.

There used to be 2- and 3-year education programmes for PTs, which were replaced by a 4-year programme in 2015. In the first year, students attend lectures on mathematics, English, and psychology, and on anatomy and neurology, and in the second year, on biomechanics, physical therapy, and first aid. In the third year, students move from classroom to clinical activities and must take 320 hours of practice and four case studies and group learning. In the fourth year, in addition to lectures and graduation exams, students receive 640 hours of practical training at several national hospitals and 3 weeks of practice in rural areas. The criteria for admission are graduation from high school and passing the entrance exam. The students obtain a certificate when they graduate. A national exam for PTs has not been introduced. There are no training institutions for OTs and STs, but the UHS physical therapy curriculum offers optional lectures on occupational and speech-language-hearing therapy and provides opportunities for clinical training and for attendance of a 2-month training course at Khon Kaen University in Thailand.

As of June 2018, 1,072 PTs were registered in Lao PDR. They may work as nurses, radiologists, and pharmacists if there is a shortage of medical staff in rural areas. Unfortunately, there are only about 200 PTs working in hospitals because many PTs look for better-paying jobs in healthcare.

Post-graduate education programmes are provided by Humanity & Inclusion, an international non-governmental organisation for PTs, at national hospitals in Vientiane every 2 months. PTs from national hospitals are dispatched to local hospitals to help improve their knowledge and skills. The establishment of an association for PTs is under consideration.

5.2.4. Education of Rehabilitation Staff in Japan

In 1963, the School of Rehabilitation, Tokyo National Chest Hospital, was founded as the first physical therapy training school in Japan. Since then, 261 similar schools (as of 2018) have produced 161,487 PTs. Those wishing to be PTs need national qualifications and must study at a training school for more than 3 years to take the national exam. There are several kinds of training schools – 4-year colleges, 3-year junior colleges, 3- or 4-year vocational colleges, and special schools targeting the visually handicapped. The number of postgraduate schools offering master's and doctoral degrees in specialised knowledge and research is increasing. The training school curriculum is roughly divided into general liberal arts, specialised basic subjects, specialised subjects, and clinical training. To develop expertise and research skills of qualified PTs and to contribute to the academic development of physical therapy, those

who have completed the education programme may enter the Professional Physical Therapist System, which is managed by the Japan Physical Therapy Association (JPTA). The JPTA introduced the national qualification system and the PT certification system. The JPTA issues certificates to PTs whose high professional clinical skills and expertise in physical therapy are approved by the association. The system is effective in maintaining PTs' skills and expertise and can open up job opportunities for certified PTs. PTs can easily find education programmes other than those managed by the JPTA, either in or outside of Japan.

5.3. Kitahara Group's Capacity-building Programme

During the study period, 12 staff members of target institutions in the three study countries participated in training we provided. Clinical training was conducted in line with the concept of clinical clerkship. Unlike other training programmes that assign patients to trainees and focus on case reporting, clinical clerkship encourages them to participate in medical team to acquire practical clinical skills.

At the same time, we conducted educational activities for medical staff members in the study countries.

Table 7. Trainees Who Trained in Japan

	Country	**Job Category**	**Period of Stay**
Trainee 1	Viet Nam	Doctor	19–25 October 2017
Trainee 2	Viet Nam	Physical therapist (PT)	25 March–22 April 2018
Trainee 3	Viet Nam	PT	25 March–9 April 2018 26 April–16 June 2018
Trainee 4	Viet Nam	Doctor	25–27 April 2018
Trainee 5	Viet Nam	PT	9–16 June 2018
Trainee 6	Cambodia	PT	15 May–28 November 2015
Trainee 7	Cambodia	PT	21 July 2015–30 January 2016
Trainee 8	Cambodia	PT	21 July 2015–30 January 2016
Trainee 9	Cambodia	PT	7 May–29 July 2018
Invitee 10	Lao PDR	Doctor	7–11 May 2018
Trainee 11	Lao PDR	Nurse	7 May–1 June 2018
Trainee 12	Lao PDR	PT	7 May – 1 June 2018

Source: Authors.

5.3.1. Capacity Building for Vietnamese Staff Members

Record of Training in Japan

1) Vietnamese trainee 1

Basic Information	[Age] 53 [Sex] Female [Affiliation] Viet Duc University Hospital [Job Category] Doctor[Duration] 7 days
Purpose of training	Visit facilities of KNI, a medical corporation Understand provision of seamless medical care from emergency to chronic phase after discharge, which is the basic philosophy of KNI Understand acute care and acute phase rehabilitation Especially focus on early rehabilitation intervention and risk management Understand the system of post-operative management mainly by doctors and nurses
Training place	Kitahara International Hospital, Kitahara Rehabilitation Hospital
Training content	Participation in ward rounds: Learn about patient care before and after surgery for risk management and stroke complications Learning in rehabilitation unit: Stroke rehabilitation, evaluation of exercise therapy and swallowing function, and methods of oral intake training Participation in doctor's conference: Learn about diagnostic technologies, especially those important for diseases requiring brain surgery Visit to emergency department and ICU: Learn the roles and job descriptions of the ICU nurse and the emergency room nurse Visit to rehabilitation hospital and home rehabilitation: Learn integrated and seamless medical services from acute care to chronic phase
Summary	She is a physician specialising in rehabilitation at the National Viet Duc University Hospital in Viet Nam and is head of the Department of Rehabilitation. She observed how rehabilitation was administered in the hyperacute period and participated in joint conferences involving several occupations. She learned about seamless provision of medical services from the acute phase to the recovery period and home care. She understood the importance of early rehabilitation and learned how to practise it. Before training in Japan, she believed that after a stroke the patient should rest in bed for 1 month, but after training, she started instructing staff of other occupations to let the patient get out of bed as early as possible, depending on the patient’s condition.

2) Vietnamese trainee 2

Basic Information	[Age] 26 [Sex] Female [Affiliation] Viet Duc University Hospital [Job Category] PT[Duration] 28 days
Purpose of training	Promote better understanding of the Kitahara Group's philosophy and action policy Enrich the understanding of Kitahara-style rehabilitation Improve knowledge and techniques for rehabilitating patients with brain injury
Training place	Kitahara International Hospital, Kitahara Rehabilitation Hospital
Training contents	New-employee training at KNI (partial participation) Lecture and practical training (following the rehabilitation department curriculum) Attendance in lectures by the KNI president, Shigemi Kitahara, and project-planning events (overseas business) held by the Kitahara Group
Summary	She is a PT at the rehabilitation department of the National Viet Duc University Hospital. She had basic English conversation skills but an interpreter was required for communication about technical subjects. Although Japanese language skills would be important for her to join the training course in Japan, she had no time to learn Japanese before departure. We encouraged her to communicate as much as possible in Japanese and she learned the language by herself. Before training in Japan, she worked with the staff of the Kitahara Group in Viet Duc University Hospital, and Japanese experts deployed by the Kitahara Group provided her with basic knowledge and skills of Kitahara-style rehabilitation and carried out pre-departure training. The training period in Japan was 1 month. During this period, two Vietnamese staff members studied in Japan. We assigned another Vietnamese trainee who could speak English fluently to interpret tutors' instructions for her. She learned Japanese and built close relationships with Japanese people. Before starting the technical knowledge and skills sessions, she was provided with instructions on basic principles and descriptions of the Kitahara Group and social norms of Japanese society, such as greeting, punctuality, tidiness and cleanliness, and general manners. She learned the Kitahara Group's integrated service delivery model, from acute-phase rehabilitation to home-care services, by observing them in practice. She learned occupational therapy and speech therapy to provide rehabilitation not limited to physical therapy. We

	believe building the capacity of human resources will improve rehabilitation provision in Viet Nam. She disseminated what she learned, especially principles of organising the workplace, to the rehabilitation department of Viet Duc University Hospital. She lectured on the 5S (Jiménez et al., 2015): *Seiri, Seiton, Seiso*, *Seiketsu,* and *Shitsuke,* in Japanese. These words mean organisation, sorting, putting things in order, streamlining, shining, cleaning, and standardising. They refer to the basic discipline needed to work in an organisation and guide hospital staff. She reviewed the conduct of morning meetings where patient information was shared amongst staff members. She is engaged in rehabilitation practice in the hospital, collaborating with Japanese PTs deployed by the Kitahara Group. She is actively involved in services that should be provided by OTs or STs.

3) Vietnamese trainee 3

Basic Information	[Age] 23 [Sex] Female [Affiliation] KMSI [Job Category] PT [Duration] 15 days and 51 days (twice)
Purpose of training	Promote a better understanding of the Kitahara Group's philosophy and action policy Enrich the understanding of Kitahara-style rehabilitation Improve knowledge and techniques of rehabilitation for patients with brain injury
Training place	Kitahara International Hospital, Kitahara Rehabilitation Hospital
Training contents	New-employee training at KNI (partial participation) Lecture and practical training (following the rehabilitation department curriculum) Attendance in lectures by the KNI president, Shigemi Kitahara, and project-planning events (overseas business) held by Kitahara Group
Summary	Whilst training, she studied Japanese language on her own and proactively communicated with Japanese staff members and patients, although with difficulty. She acquired the skills to comprehend the status and problems of patients from the perspective not only of PTs but also other healthcare professionals. In Viet Nam, she shared her knowledge of speech-language-hearing therapy learned in Japan with other staff members. She became more responsible. For example, if she could not understand a patient's condition, she actively tried to ask questions about the patient's condition to doctors, unlike before training, when she

	passively depended on Japanese staff members. She is young has the potential to lead the Vietnamese staff, which can strongly support the development of our business in Viet Nam.

4) Vietnamese trainee 4

Basic Information	[Age] 32 [Sex] Male [Affiliation] Viet Duc University Hospital [Job Category] Doctor (Neurosurgeon) [Duration] 2 days
Purpose of training	Deepen understanding of the Kitahara Group Improve knowledge as a neurosurgeon
Training place	Kitahara International Hospital, Kitahara Rehabilitation Hospital
Training contents	Observation of surgical procedures Participation in conferences Visit to rehabilitation hospital
Summary	He is in charge of many patients and always tries to find the best solutions for them. He has wide experience in prolonged neurosurgical operations. Through training in Japan, he learned a series of activities, from treatment (surgery) to rehabilitation, as practised in Kitahara hospitals. After returning to Viet Duc University Hospital, he began to actively communicate with the rehabilitation staff, thus strengthening cooperation between the departments of brain surgery and rehabilitation.

5) Vietnamese trainee 5

Basic Information	[Age] 27 [Sex] Male [Affiliation] KMSI [Job Category] PT [Duration] 7 days
Purpose of training	Promote better understanding of the Kitahara Group's philosophy and action policy Enrich the understanding of Kitahara-style rehabilitation Improve rehabilitation knowledge and techniques for patients with brain injury
Training place	Kitahara International Hospital, Kitahara Rehabilitation Hospital
Training contents	Visit to rehabilitation hospital

	Instruction on Kitahara's healthcare system philosophy (the role of the rehabilitation hospital, total life support, digital hospital) Participation in clinical activities Participation in conferences Training in managing organisations and keeping the workplace clean
Summary	He has been working for KMSI under the instruction of Japanese experts deployed by the Kitahara Group to Viet Nam since September 2017. When he started working with us, communication even in English was difficult, so an interpreter was required. But his English language skills have improved significantly. Before training in Japan started, Japanese experts from the Kitahara Group in Viet Nam met with him to explain the Kitahara project's aims and to orient him so he would quickly adjust to the working environment in Japan. He studied Japanese by himself. The training period was 1 week. The training aimed to deepen his understanding of healthcare and long-term care systems in Japan and Viet Nam and of the Kitahara project. His stay in Japan was too short for him to make progress in Japanese language and language lessons were not provided. But he appeared to enjoy communicating with Japanese staff members. He had a positive attitude to understanding the project and, despite language barriers, he asked the staff many questions. The training was excellent motivation to learn Kitahara's philosophy in depth. His interest in not only clinical matters but also the project will greatly contribute to its development in Viet Nam and to the rehabilitation industry.

Capacity-building Programmes in Viet Nam

Activities took place in Viet Duc University Hospital in Ha Noi starting in August 2017. They are classified by job category and workplace:

(i) Project staff of the Kitahara Group (three Vietnamese PTs)

(ii) Rehabilitation staff of Viet Duc University Hospital (rehabilitation physician, PTs)

(iii) Nurses of Viet Duc University Hospital

(iv) Other medical rehabilitation personnel

Project staff of the Kitahara Group (three Vietnamese PTs). We involved three local PTs for the study from September 2017, using on-the-job training. They received lectures and practical guidance 4 days a week on rehabilitation of patients with brain injury. The training was designed so they can pass on clinical knowledge and skills to other staff members, become managers who can oversee projects and research activities in collaboration with Japanese staff members, and learn how to behave as medical professionals. Communication between project staff and Japanese staff was in English or through a Japanese–Vietnamese interpreter.

Rehabilitation staff at the Viet Duc University Hospital. The Kitahara Group's Japanese PTs gave 16 lectures to the hospital's rehabilitation staff from August 2017 to June 2018 to improve their skills in rehabilitating patients with brain or nerve injury. After the lecture series, a clinical training session was held for 1 month, giving the staff an opportunity to practise the knowledge and skills gained in a clinical setting. We administered exams to confirm that the staff had acquired the knowledge and to know whether further capacity development activities were required. Most staff cannot speak English. Communication was done mainly through a Japanese–Vietnamese interpreter or English–Vietnamese interpreter.

Nurses at the Viet Duc University Hospital. Nine lectures were given from August 2017 to May 2018. Previously, the hospital's neurosurgical and neurological wards provided little rehabilitation to patients. After the lecture series, we regularly shared ideas and rehabilitation methods for patients with brain and nerve injury and tried to create a system to provide rehabilitation as effectively as possible in collaboration with ward staff. The lectures were mainly done through a Japanese–Vietnamese interpreter.

Other medical rehabilitation personnel. A workshop was held on rehabilitation for patients with brain injury at Viet Duc University Hospital on 29 January 2018. About 100 people working in rehabilitation in northern and central Viet Nam participated. The Kitahara Group introduced physical, occupational, and speech therapy and discussed the situation and challenges of rehabilitation in each region.

Table 8. Lectures in Viet Nam

Date	Title	Participant or Target	
2017			
23 August	Introduction Outline of Neuro-brain Disease	15	Viet Duc University Hospital (PTs)
29 August	Introduction Positioning of Swallowing	25	Viet Duc University Hospital (nurses)
7 September	Traumatic Brain Injury Evaluation of GCS	12	Viet Duc University Hospital (PTs)
14 September	Range of Motion	28	Viet Duc University Hospital (nurses)
21st September	Brain Anatomy Evaluation of BI	11	Viet Duc University Hospital (PTs)
29 September	Higher Brain Dysfunction Evaluation of MMSE	12	Viet Duc University Hospital (nurses)
4 October	Stroke Evaluation of MMSE	13	Viet Duc University Hospital (PTs)
13 October	Criteria for Stopping Rehabilitation	12	Viet Duc University Hospital (nurses)
18 October	Clinical Reasoning	9	Viet Duc University Hospital (PTs)

8 November	Transfer from Bed to Wheelchair	14	Viet Duc University Hospital (nurses)
16 November	Observation of Posture and Motion, 1	14	Viet Duc University Hospital (PTs)
23rd November	What Is OT?	11	Viet Duc University Hospital (nurses)
29 November	What Is OT?	13	Viet Duc University Hospital (PT)
28 December	What Is Spasticity? 1	13	Viet Duc University Hospital (PTs)
2018			
10 January	What Is Frontal Lobe Symptom	15	Viet Duc University Hospital (nurses)
11 January	Practice of GCS and MMSE	9	Viet Duc University Hospital (PTs)
23rd January	Observation of Posture and Motion, 2	12	Viet Duc University Hospital (PTs)
6 Feburary	Higher Brain Dysfunction (Aphasia, Apraxia)	15	Viet Duc University Hospital (nurses)
28 Feburary	Brunstrom Stage	13	Viet Duc University Hospital (PTs)
14 March	What Is Swallowing?	8	Viet Duc University Hospital (nurses)
29 March	What Is Ataxia?	12	Viet Duc University Hospital (PTs)
19 April	Test	7	Viet Duc University Hospital (PTs)
10 May	Submission of test and review	8	Viet Duc University Hospital (PTs)
15 May	What Is Spasticity? 2	14	Viet Duc University Hospital (PTs)
5 July	Standing Motion	16	Viet Duc University Hospital (PTs)

BI = Barthel index, GCS = Glasgow Coma Scale, MMSE = Mini Mental State Examination, OT = occupational therapist, PT = physical therapist.

5.3.2. Capacity-building Activities for Cambodian Staff Members

Training in Japan

1) Cambodian trainees 6–8

Basic Information	[Age] 32 [Sex] Male [Affiliation] Sunrise Japan Hospital [Job Category] PT [Period] 6 months in 2015 [Age] 33 [Sex] Male [Affiliation] Sunrise Japan Hospital [Job Category] PT [Period] 6 months in 2015–2016 [Age] 29 [Sex] Male [Affiliation] Sunrise Japan Hospital [Job Category] PT [Period] 6 months in 2015–2016
Purpose of training	Carry out daily operations in accordance with the philosophy of the Kitahara Group Enhance inter-departmental and inter-occupational collaboration Be familiar with the duties of every hospital section, comprehend how a hospital works, and be able to perform the minimum duties of any section, if required Develop basic Japanese conversation skills Acquire professional knowledge and skills as physical therapy experts Acquire enough managerial knowledge and skills to establish a Kitahara hospital in Cambodia
Training place	Kitahara International Hospital, Kitahara Rehabilitation Hospital
Training content	Training at the Facility Maintenance Division (tour of hospital facilities, lecture on maintenance and cleaning methods) Rotation training (assignment to departments other than specialty to learn the work of other occupations) Philosophy training (lecture on the Kitahara hospital philosophy, favourable attitude towards clients, medical professionals' code of conduct) Training in basic medicine (lecture on minimum-level medical science and technology required for any hospital professional) Technical training in each department (training of expert skills in physical therapy, occupational therapy, and speech-language-hearing therapy departments) Team-building activities (encouraging teamwork and skills to find solutions in the field) Visit to private companies (learning about Japanese technology, organisational capabilities, corporate philosophy by visiting Japanese

	companies) Japanese language training (learning Japanese greetings and daily conversation to ease communication between trainees and Japanese staff) Group training (forming a group, including Japanese staff, and conducting simulation training, assuming training participants work in the emergency room; designed to leverage teamwork and problem-solving skills, and to develop the skills to use the expertise of every group member as effectively as possible)
Summary	The training was conducted in 2015–2016 with support from JICA. The Kitahara Group planned to establish a hospital in Cambodia, to disseminate Kitahara-style medical care and rehabilitation, which we believed the Cambodian people wanted. We employed several Cambodian staff members, who needed training before the new hospital opened. They received training from Japanese staff members of Kitahara International Hospital in Japan to fully understand the Kitahara management philosophy and practical operations of a hospital. The Cambodian staff members have been deeply engaged in managing the hospital, from launch to daily operation. All those who trained in Japan are PTs, and we employed Cambodian physicians, nurses, laboratory technicians, accountants, and management staff. The training in Japan focused not only on acquiring expertise but also on inter-occupational cooperation. After the training, Sunrise Japan Hospital opened in Phnom Penh in October 2016.
Continuous training	The trainees have been assigned to the rehabilitation department as PTs. In countries where rehabilitation provision systems are well established, PTs specialise only in clinical physiotherapy. The trainees engaged in physiotherapy when they returned to Cambodia, but they are expected to lead in other activities, as well, utilising what they learned in Japan, such as hospital management, marketing, and local community service. The trainees have shown their ability to engage in these activities. They take on most of the training sessions for new employees and instruct them in the Kitahara Group philosophy and clinical techniques. The former trainees take their responsibilities seriously. As leaders, they are expected to provide the best medical services they can. They learned physiotherapy for acute-phase stroke patients at Kitahara International Hospital, from the basics to the advanced level, as well as other rehabilitation categories, i.e. occupational therapy and speech-language-hearing therapy. When they returned to Cambodia, they were keen to improve their skills in and knowledge of any rehabilitation category regardless of their own physical therapy expertise. For

	continuous training of local staff members, a remote education system connects Cambodia with Kitahara International Hospital, which regularly sends Japanese OTs and STs to Cambodia. The demand for rehabilitation services, such as support for feeding and swallowing, home care, and care guidance for families, is rapidly growing as the number of stroke patients increases in medical facilities. Our activities to train local staff will help improve rehabilitation service provision in Cambodia.

2) Cambodian trainee 9

Basic Information	[Age] 23 [Sex] Female [Affiliation] Sunrise Japan Hospital [Job Category] PT [Period] 3 months in 2018
Purpose of training	Improve skills in and knowledge of feeding support and swallowing rehabilitation, which Cambodia provides few opportunities to learn Learn inter-occupational cooperation Promote better understanding of the Kitahara Group's philosophy, activities policy, and rehabilitation projects Share experiences in training in Japan with Cambodian colleagues and help develop rehabilitation services in Cambodia Build up a strong human network between Japan and Cambodia and strengthen bilateral collaboration
Training place	Kitahara International Hospital, Kitahara Rehabilitation Hospital
Training content	Orientation (about the Kitahara Group project, living in Japan) Lectures, practical exercises, and visits to all-around hospitals in line with the curriculum for new employees of the department of rehabilitation Case study of patients with dysphagia Attending the lecture of Dr. Shigemi Kitahara, president of the Kitahara Group, and participation in the Kitahara Group's business planning workshop Networking event with Cambodian people living in Japan and the Cambodian Embassy in Japan
Lecture series	(i) Dysphagia introduction, (ii) essential information that should be collected through interviews with dysphagia patients, (iii) types of screening tests and vital points to achieve reliable results, (iv) cervical auscultation for dysphasia patients, (v) case study of pseudobulbar paralysis, (vi) how STs provide oral care, (vii) indirect training (without using food) applicable to patients with consciousness disorder, (viii) higher

	brain dysfunction part 1, (ix) higher brain dysfunction part 2, (x) higher brain dysfunction part 3, (xi) throat ice massage for dysphagia patients, (xii) pathophysiology of cognitive impairment and its treatments, (xiii) pathophysiology of oral dysfunction and its treatments, (xiv) pathophysiology of disorders of mastication and food bolus formation in oral cavity and their treatments, (xv) pathophysiology of the disorder of the transfer of food bolus from oral cavity to pharynx and its treatments, (xvi) pathophysiology of transport disorder from pharyngeal passage to oesophagus and its treatments, (xvii) monitoring and risk management during direct swallowing training (using food), and (xviii) criteria that require the suspension of direct swallowing training
Summary	She was employed by Sunrise Japan Hospital immediately after graduated from a training school. She trained in Japan after receiving on-the-job training at Sunrise Japan Hospital for about 1 year. She is quick to understand and keen to learn what is important to improve services, such as professional ethics, attitude as a medical professional, and cleanliness and tidiness. Perhaps she was quick to learn because our hospital was her first workplace after the graduation. Her understanding of swallowing rehabilitation was at a level equivalent to 6 months of ST clinical experience based on the criteria of training organisers. Therapists who meet this criterion are considered capable of understanding evaluation screening tests and practicing training procedures. They can be engaged in the patients' first trials of resumption of oral intake after its suspension caused by brain injury, and to modify the meal form in accordance with the dysphagia level under the supervision of more skilled therapists. She learned the importance of teamwork and sense of responsibility by interacting with other occupations in Japan. Our training programme still has several challenges: (i) lack of reliable indicators that can objectively evaluate the improvement level of comprehension and knowledge of trainees, (ii) few opportunities to experience swallowing rehabilitation for severe cases, and (iii) necessity to regularly hold conferences and case study sessions that include STs. She is expected to share her knowledge and experience gained in Japan with her colleagues in Cambodia.

Effects of Training in Japan on Cambodian Staff Members

Local staff members at Sunrise Japan Hospital have several weaknesses that should be addressed to satisfy demand for high-quality healthcare. For example, because of staff members' insufficient clinical knowledge and skills, patient assessments were not reliable and differed greatly from those of skilled Japanese experts. Patient assessments are directly linked to the planning and outcome of treatments. In ICU duties, local staff members'

understanding of risk management was not enough to treat the patients in the hyperacute phase after the onset of stroke or immediately after an operation, so we continued to support and advise them. Local staff members were not proactively involved in team building or improvement of the working environment and system, and they seemed unwilling to join the activities, which they probably thought would not help improve their clinical skills. They were not interested in mutual learning activities, especially for new employees. Above else, their lack of patient-centred thinking needed to be changed.

After the training in Japan, the skills, knowledge, and even work attitude of local staff members greatly improved. They have a reputation for great expertise and their correct clinical assessment attracts clients to Sunrise Japan Hospital. In ICU, local staff members no longer require the support of Japanese staff from the Kitahara Group and they understand the concept of risk management. They are willing to improve the work environment and to promote team building. They voluntarily suggest ways to improve the hospital to the manager, whom they selected from amongst themselves. They introduced a mentor system, which encourages mutual learning. Now they adopt patient-centred thinking and are willing to accept patients' requests regardless of time or their own personal affairs. Surprisingly, however, overtime working hours have been reduced although the hospital accepts more patients, probably because it has improved the quality of the work, such as management of time scheduling.

Kitahara Group Strategies to Develop Rehabilitation Human Resources in Cambodia

With growing demand for rehabilitation services for patients with brain injury and the shortage of rehabilitation experts, innovations in rehabilitation services, and multi-skilled rehabilitation experts are required. Innovative ideas can be developed by well-trained and skilled practitioners, and we encourage local staff members to continuously acquire clinical skills and knowledge so that they can provide services independently from Japanese experts. Local staff members are expected to participate in hospital management, share their ideas on how to meet clients' demands, and think of ways to improve services. Cambodians expect our services to expand and to improve healthcare, especially to treat patients with brain injury. We need to promote the networking of Cambodian PTs and to investigate more extensively the realities of rehabilitation provision system.

The Kitahara Group supports developing clinical skills through the following:

(i) clinical skills guidance and instant feedback in front of patients (physical therapy, occupational therapy, and speech and hearing therapy);
(ii) participation in morning and afternoon rounds and information exchange with other occupations;
(iii) remote instruction from Kitahara International Hospital (including occupational therapy and speech and hearing therapy);
(iv) short-term dispatch of staff members from Kitahara International Hospital (OT, ST);
(v) regular case study meetings and practical lectures;
(vi) periodic rehabilitation rounds, discussions with other occupations;
(vii) regular departmental meetings;

(viii) mentoring for new staff and follow-up; and
(ix) participation in workshops planned by the CPTA.

The Kitahara Group builds capacity in nonclinical technical fields through the following:

(i) promotion of committee activities and regular meetings (risk management, infection control team, basic life support, quality improvement, marketing);
(ii) hosting of basic life support and infection control team lectures at the hospital;
(iii) development and support of education programme for new staff members;
(iv) participation in out-of-hospital activities (medical support for marathon contest, lecture for medical students);
(v) participation in hospital management meetings (proposals and discussions on improving hospital administration); and
(vi) marketing activities that introduce hospital services to other hospitals and healthcare or long-term care facilities.

5.3.3. Capacity-Building Activities for Lao People's Democratic Republic Staff Members

Programmes in Japan

1) Lao People's Democratic Republic invitee 10 (deputy director of Mittaphab Hospital)

Basic Information	[Age] 56 [Sex] Male [Affiliation] Mittaphab Hospital [Job Category] Doctor, neurosurgeon [Period] 7 days in May 2018
Purpose of visit to Japan	Understand the Kitahara Group's philosophy and action plan Understand the Kitahara Group's healthcare practice Observe neurosurgical operations and understand post-operative management for patients with brain injury
Visiting place	Kitahara International Hospital, Kitahara Rehabilitation Hospital, Kitahara Life Support Clinic
Summary	We offered our warmest hospitality to this most important guest, and the Kitahara Group president himself guided him around the Stroke Centre. Our guest seemed impressed and said he had high expectations for the Kitahara Group's contribution to upgrading Mittaphab Hospital, particularly the establishment of an up-to-date healthcare support system and the introduction of high-quality medical instruments. He discussed the problems for personnel in government hospitals, saying they are poorly paid and the wage structure is not based on performance or outcome and does not motivate staff to improve services. He observed neurosurgical operations that could not be performed in Lao PDR and envisioned the stroke centre that the Kitahara Group intended to establish in collaboration with Mittaphab Hospital. He visited the Tokyo Fire Department, which provides public ambulance transport. In Japan, an ambulance can be used free of charge as long as it is public; most local authorities have enough ambulances to respond to emergency calls promptly. Treatment before arriving at emergency room is critically

	important for patients of acute brain injury so we showed him Japan's ambulance services. Lao PDR does not yet have ambulance services. Mittaphab Hospital has a big ongoing project to construct a building, supported by Austria. Despite his hectic schedule, he values discussions with nurses, rehabilitation therapists, and other staff members. His visit to Japan encouraged him to emphasise interaction amongst personnel of different occupation categories.

2) Lao People's Democratic Republic Trainee 11

Basic Information	[Age] 41 [Sex] Female [Affiliation] Mittaphab Hospital [Job Category] Nurse [Period] 28 days in May–June 2018
Purpose of training	Understand the Kitahara Group's philosophy and action plan Understand the Kitahara Group's healthcare practice Improve the knowledge and skills of post-operative management for patients with brain injury
Training location	Kitahara International Hospital, Kitahara Rehabilitation Hospital
Training content	Care of patients before and after operation, especially risk management of stroke patients, e.g. risk of falls from bed. The programme focused on perioperative care more than care during operation. Assessment of swallowing function, which is important because nurses in Mittaphab Hospital can decide when patients can start tube feeding after the onset of stroke or operation. Introduction of the latest hospital equipment Duties of nurses in the emergency room and ICU Observation of hospital rehabilitation and home-visit rehabilitation
Summary	She observed neurosurgical operations, which are not performed in Lao PDR. The training programme provided her, as an expected counterpart of our project in Lao PDR, with the chance to learn what services are provided in a stroke centre, particularly post-operative care. After training in Japan, she shared the training content with nurses at Mittaphab Hospital. She has already altered the nursing care delivery system in Mittaphab Hospital: She introduced a primary nursing system under which a primary nurse is assigned to each patient and is responsible for planning nursing care. This system has heightened nurses' sense of responsibility. They can detect critical changes in patients' condition more quickly than before the introduction of the primary nursing system. She standardised the nursing process, particularly assessment of patients. Mittaphab Hospital did not have a standardised way of assessing stroke patients, including their sequelae, but she created manuals and forms to assess patients' condition and provided practical guidance on assessing methods. As a result, the nurses' work has been standardised and become more efficient.

	She was invited to the International Rehabilitation Association in Ha Noi, which was organised by the Kitahara Group and sponsored by the Economic Research Institute for ASEAN and East Asia. She won the Best Poster Award.

3) Lao People's Democratic Republic trainee 12

Basic Information	[Age] 38 [Sex] Male [Affiliation] Mittaphab Hospital [Job Category] PT [Period] 28 days in May–June 2018
Purpose of training	Understand the Kitahara Group's philosophy and action plan Understand the Kitahara Group's rehabilitation practice Improve the knowledge and skills of rehabilitation for patients with brain injury
Training places	Kitahara International Hospital, Kitahara Rehabilitation Hospital
Training content	Risk management of acute rehabilitation Visit to emergency room and learning of emergency medical services Observation of STs' activities Participation in clinical conferences on patient's condition and treatment explanations Participation in training in ADL outside the hospital, and home-visit rehabilitation services Lecture by the rehabilitation department supervisor on how rehabilitation skills can be transferred from experts to trainees (how to develop training courses)
Summary	The Kitahara Group is proud of our seamless intervention from the acute phase to home care. The trainee traced the whole process of treatment for one patient from immediately after the operation to discharge. He learned that rehabilitation services must be modified to suit patients' conditions. In Lao PDR, he applied what he learned from item (v) above and is involved in building the capacity of local staff members by, for example developing the content of lectures delivered by the Kitahara Group's Japanese experts.

Capacity-building Programmes in Lao People's Democratic Republic

In January 2018, the Kitahara Group started education in the National Rehabilitation Centre and Mittaphab Hospital about (i) rehabilitation in the acute phase of stroke; and (ii) seamless, integrated, and comprehensive rehabilitation services from the acute phase to home life, focusing on patients' daily lives at home.

We develop the capacity of local staff through on-the-job training and lectures. In on-the-job training, we focus on skills in assessing and treating patients. The lecture audience includes rehabilitation therapists, nurses, and students. By 13 July 2018, 24 lectures had been delivered (Table 9).

Table 9. Lectures in Lao People's Democratic Republic

Date	Title	Participant and Target	
2018			
6 February	Introduction	10	Nurses, PTs (Mittaphab Hospital), medical students
8 February	Introduction	14	Nurses, PTs (National Rehabilitation Centre), medical students
9 February	What Is Stroke?	13	Nurses, PTs (Mittaphab Hospital), medical students
23 February	Brain Function	14	Nurses, PTs (Mittaphab Hospital), medical students
2 March	Physical Assessment	15	Nurses, PTs (Mittaphab Hospital), medical students
13 March	Introduction: What Is Stroke?	10	Nurses, PTs (Mittaphab Hospital)
15 March	About Stroke	14	Nurses, PTs (National Rehabilitation Centre), medical students
16 March	Assessment (BI, GCS, MMSE)	13	Nurses, PTs (Mittaphab Hospital), medical students
29 March	Range of Motion	13	Nurses, PTs (National Rehabilitation Centre), medical students
30 March	How to Care for Stroke Patients	9	Nurses, PTs (Mittaphab Hospital)
6 April	Swallowing, 1	15	Nurses, PTs (Mittaphab Hospital), medical students
26 April	What is Ataxia	13	Nurses, PTs (National Rehabilitation Centre), medical students
27 April	Swallowing, 2	10	Nurses, PTs (Mittaphab Hospital), medical students
9 May	Swallowing, 3	14	Nurses, PTs (National Rehabilitation Centre), medical students
10 May	Swallowing, 1	15	Nurses, PTs (Mittaphab Hospital), medical students
24 May	Swallowing, 2	13	Nurses, PTs (National Rehabilitation Centre), medical students

25 May	Swallowing, 3	10	Nurses, PTs (Mittaphab Hospital)
25 May	What is Ataxia?	14	Nurses, PTs (Mittaphab Hospital), medical students
8 June	Shoulder Joint Pain, 1	13	Nurses, PTs (Mittaphab Hospital), medical students
14 June	Shoulder Joint Pain, 2	14	Nurses, PTs (National Rehabilitation Centre), medical students
28 June	Risk Management for Stroke, 1	14	Nurses, PTs (National Rehabilitation Centre), medical students
29 June	Risk Management for Stroke, 2	12	Nurses, PTs (Mittaphab Hospital), medical students
29 June	Risk Management for Stroke, 3	9	Nurses, PTs (Mittaphab Hospital)
13 July	Risk Management for Stroke, 4	10	Nurses, PTs (Mittaphab Hospital), medical students

BI = Barthel index, GCS = Glasgow Coma Scale, MMSE = Mini Mental State Examination, PT = physical therapist.

5.4. Discussion

An objective of our capacity-building programme is to help rehabilitation staff develop the skills to do more than their job descriptions. The study countries have established training courses for PTs but not for OTs, STs, and medical social workers, compelling PTs to respond to patients' various needs.

Our programme aims to establish integrated care systems that can provide seamless services from the acute phase to home care for patients with brain and nerve injuries. None of the study countries has an integrated or seamless service provision system: when patients are released from hospital their information is not shared amongst related healthcare facilities, or professionals do not provide care in patients' homes or communities. An integrated and seamless system is indispensable to bring patients back into communities and social activities after brain injuries. It will take a long time for governments to establish such a system, so we focus on building the capacity of rehabilitation professionals to provide it. They must be able decide on services suitable for patients based on their needs, such as what is important for them after discharge and what type of services can improve their quality of life (QOL).

In Japan, the trainees learned how to improve patients' ADLs and how to provide seamless rehabilitation. They observed acute-phase hospitals, rehabilitation hospitals, and home healthcare services. Trainees observed the Kitahara Group's original clinical recording system and learned about the practical use of information and communications technology and artificial intelligence (AI). We introduced a facial recognition system to entrance and exit

management and an AI-based system to support building the rehabilitation plan, including forecasting prognosis and setting rehabilitation goals.

The trainees shared what they learned in Japan with their colleagues in Kitahara projects in their home countries. They acquired the skills and knowledge to develop specific and concrete goals and action plans in their daily duties, based on how to improve patients' overall QOL. They are willing to be involved in improving their countries' healthcare system.

Rehabilitation medicine and related professions are well developed mainly in North America, Europe, and Japan, as are rehabilitation education and training. Rehabilitation personnel are clearly categorised, with their occupations' requirements clearly defined. Such systems, however, cannot be applied to Southeast Asia, which has different healthcare and long-term care systems. Training programmes should be based on the needs and background of each country. In the study countries, the concept of rehabilitation is not well understood by patients and rehabilitation training systems are not established.

Much external aid has been provided to these countries to improve rehabilitation training but it has not always been successful. One reason is the focus on rehabilitation without a comprehensive view of patients' lives.

The Kitahara Group provided a good example of rehabilitation training through this study and established Kitahara-style training for health personnel in the study countries. The training is not the same as that in Japan but it is based on Japan's practices and modified for the target societies' realities. We encourage rehabilitation personnel to be involved in jobs beyond their duties, to share patient information with other staff and other healthcare facilities, and to develop people's awareness of healthcare and rehabilitation. These activities can help provide seamless care and improve patients' QOL.

The Kitahara Group envisions transforming conventional healthcare industries into a total life support industry (TLSI), which connects everything related to people's daily life, including healthcare, long-term care, food, exercise, and even community activities or public systems to support daily life from birth to death. The present healthcare industries are too specialised and lack a comprehensive perspective on people's daily lives. The whole world will witness unprecedented population ageing. TLSI will be required to cope with it. Client information is shared in TLSI, which will suggest solutions to maximise people's capacities. The goal of our training is to create human resources who can respond to the demand for TLSI. They can help improve healthcare and long-term care systems of every country, and we hope they will lead current healthcare industries and future TLSI.

Chapter 6

Report on Project-related Events

6.1. Summary of Events

We held a symposium, a rehabilitation workshop, and a rehabilitation conference. Their common theme was future medical care and rehabilitation. Their objectives were to share the realities of healthcare and long-term care of the three study countries and Japan, discuss how healthcare and long-term care should be developed as the population ages, and determine what experts should do.

Government officials and healthcare professionals were invited from study countries and Japan as lecturers and panellists, and people involved in healthcare and long-term care industries were invited as guests. The main participants in event 1 were businesspeople, and in events 2 and 3 mostly health personnel. The lectures were open to the public.

Event 1: Symposium

Date: 11 December 2017

Title: Medical and Healthcare in the ASEAN–Mekong Region for the Next Generation

Venue: Tokyo, Japan

Number of participants: 136 (>80%: Japanese companies)

Participants: Japanese companies, doctors, rehabilitation professionals, medical care professionals and students

Event 2: Rehabilitation Workshop

Date: 29 January 2018

Title: Rehabilitation of Patients with Cerebral Damage

Venue: Ha Noi, Viet Nam

Number of participants: About 100 (from northern and central Viet Nam)

Participants: Doctors, nurses, PTs, other rehabilitation professionals, and medical care professionals

Event 3: Rehabilitation Conference

Date: 18 June 2018

Title: International Congress of Rehabilitation: Present and Future Rehabilitation in the Mekong Region

Venue: Ha Noi, Viet Nam

Number of participants: 222 (70% Vietnamese)

Participants: Doctors, nurses, PTs, companies (Japanese affiliated)

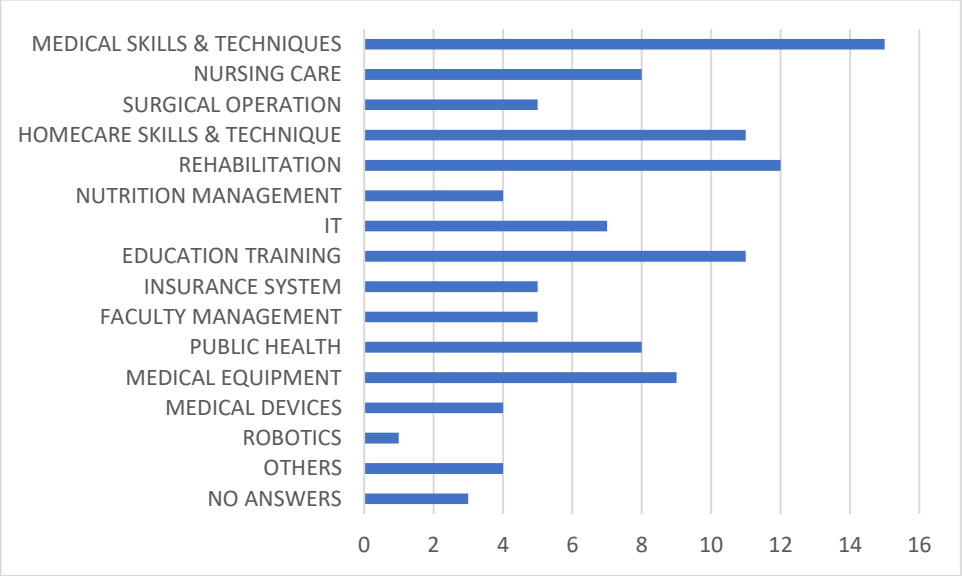
More than half of the health personnel from Viet Nam were doctors or nurses. Non-Vietnamese participants were Japanese-affiliated companies in Viet Nam, the staff of Japanese companies visiting from Japan, and health personnel from nearby countries.

6.2. Results of Questionnaire Survey Targeting Participants of Event 1

The questionnaire survey targeted Japanese participants; 34 responded. We asked several questions about the potential of Japanese healthcare and long-term care industries to collaborate with Southeast Asia and other regions.

Figure 1 shows the answers to the question about where Japan could help solve healthcare problems. The highest number of respondents selected medical skills (50.0%), followed by rehabilitation (40.0%), homecare skills and techniques (36.7%), education training (36.7%), and medical equipment (30.0%).

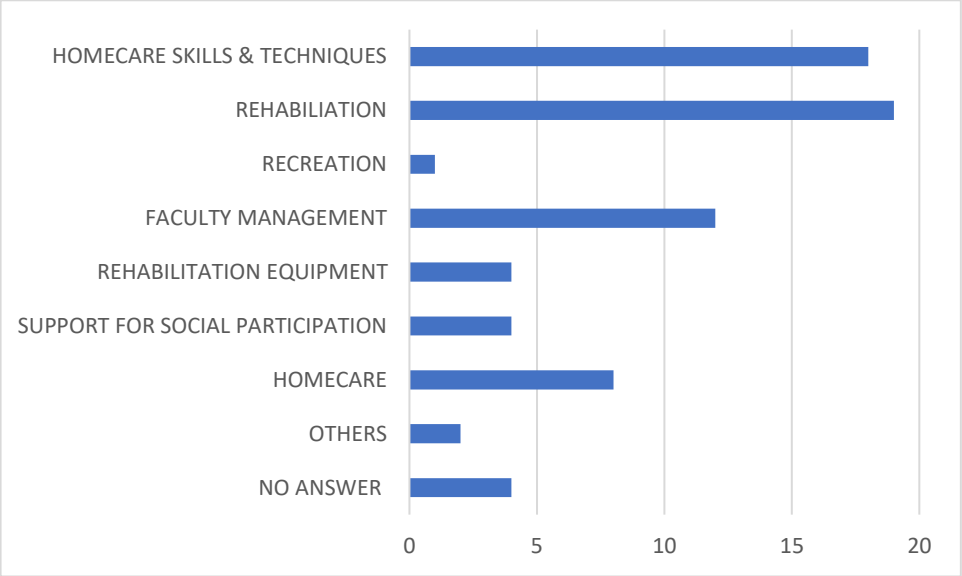
Figure 1: To solve medical and healthcare problems in Southeast Asia, which field do you think Japan could contribute to?



Source: Authors.

Figure 2 shows the answers to the question about where Japan is strongest in its exported nursing care skills and systems. The answers were rehabilitation (60.0%), facility management (40.0%), and home care (26.7%).

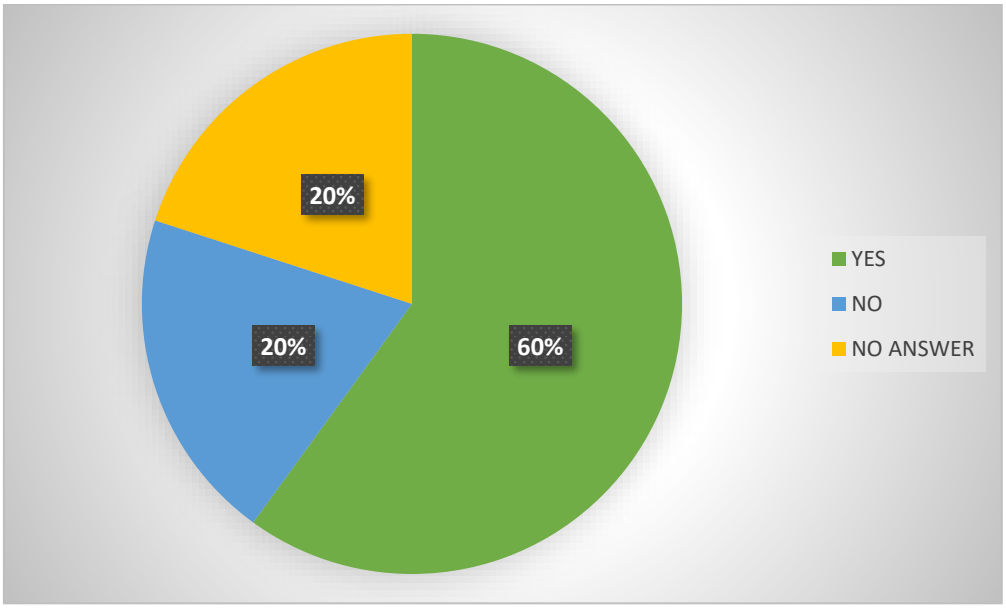
Figure 2: Where is Japan strongest in nursing care skills and systems exported to Southeast Asia?



Source: Authors.

Figure 3 shows the answers to the question on whether respondents intend to start overseas operations or if they have already started businesses in healthcare the and long-term care industries; 60% said yes and 20% no.

Figure 3: Are you considering starting overseas operations, or conducting a business in medical care, nursing care, welfare, and healthcare fields, or already doing so?



Source: Authors.

We concluded the following:

(i) The participants of event 1 think that Japan can help Southeast Asia solve the problems of healthcare and long-term care by developing the capacity of personnel rather than providing medical equipment or devices (Figure 1).

(ii) The participants think Japan's strength in nursing care is highly experienced and skilled human resources rather than advanced equipment (Figure 2).

6.3. Results of Questionnaire Surveys at events 2 and 3

We asked participants how satisfied they were with the content of the events. The answers show a high level of satisfaction (Figure 4 [event 2), Figure 5 [event 3]).

Figure 4: Rehabilitation Workshop Satisfaction Evaluation

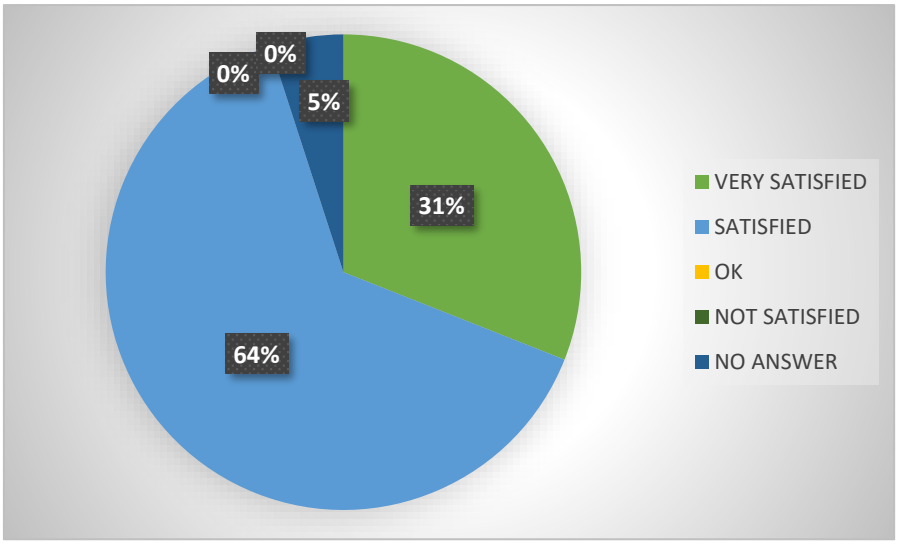
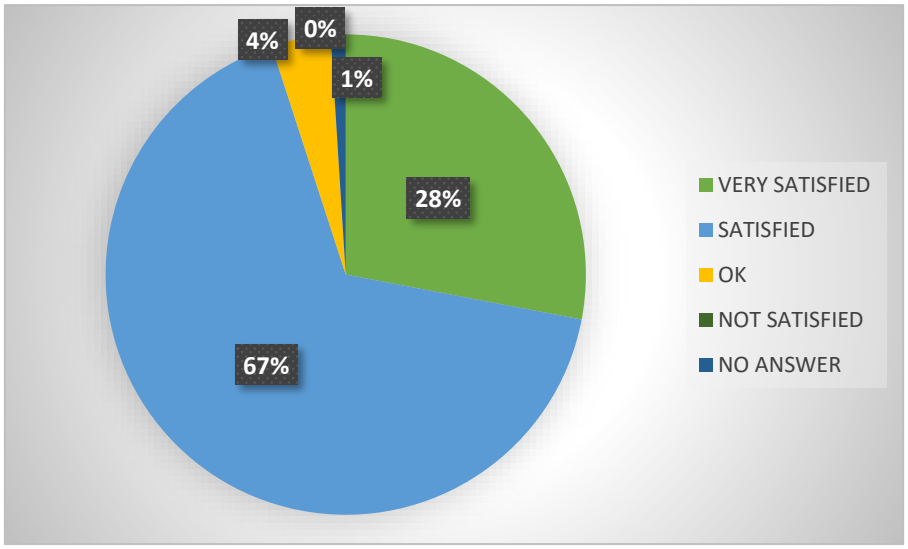


Figure 5: Satisfaction Evaluation of the Rehabilitation International Congress



Asked to comment on rehabilitation problems or needs in their countries, the participants mentioned the following:

(i) Low quality of PTs and shortage of PTs
(ii) Absence of rehabilitation professionals other than PTs; want to study other skills
(iii) Want more knowledge about rehabilitation for central nervous system diseases
(iv) Want help to manage hospitals and rehabilitation departments more efficiently
(v) Insufficient rehabilitation equipment

Providers of rehabilitation and medical care are likely to face many problems and need substantial support. Japanese healthcare and long-term care providers work with those who need to collaborate with Japanese counterparts. Such attempts will help develop healthcare and long-term care industries in Southeast Asia through innovative approaches, which will emerge from activities focusing on the needs of individuals.

Chapter 7

Conclusion: Solutions to Develop Rehabilitation Systems

7.1. Problems in Providing Rehabilitation in the Study Countries

Cambodia, Lao PDR, and Viet Nam share problems in developing rehabilitation systems for nervous system diseases: (i) insufficient understanding by doctors of the need for rehabilitation of patients with nervous system diseases, (ii) lack of incentives for hospitals to invest in rehabilitation, (iii) shortage of rehabilitation staff, (iv) lack of knowledge and skills of rehabilitation staff because of insufficient education, and (v) lack of integrated and seamless services. Poor understanding by patients of the need for rehabilitation is another problem.

Insufficient understanding by doctors of the need for rehabilitation of patients with nervous system diseases. In Japan, doctors examine patients to determine the need for rehabilitation before it is provided. Then, specialised staff members receive orders (prescriptions) to start rehabilitating patients. For an inpatient, various professionals such as nurses and care staff need to help in rehabilitation. As in Japan, rehabilitation in hospitals in the study countries may be provided only after a doctor issues a prescription. Because many doctors poorly understand the need for rehabilitation, however, initial prescriptions were not issued to patients in the departments of neurosurgery and neurology in national hospitals where we conducted the study in Viet Nam and Lao PDR. Even after our intervention publicised the necessity of rehabilitation, determining whether a patient was a candidate for rehabilitation was difficult. Doctors needed to be trained, but the hospitals had a rigid hierarchy, causing difficulties in changing the system and in imparting to doctors a sense of the importance of rehabilitation.

Lack of incentives for hospitals to invest in rehabilitation. National hospitals offer rehabilitation at a low price: US$2 per session in Cambodia, US$3.50 in Viet Nam, and US$3.50 in Lao PDR. These hospitals, therefore, earn a limited income from rehabilitation. National hospitals in Cambodia and Viet Nam adopted a self-supporting accounting system rather than relying on government budgets. Even if they understand the need for rehabilitation, investing in low-profit rehabilitation services is difficult for hospitals.

Shortage of rehabilitation staff. Rehabilitation staff (PTs, OTs, and STs) salaries are low, averaging US$200–US$300 a month. Even when emerging countries develop rapidly, rehabilitation staff salaries remain low; few are willing to become rehabilitation professionals. Excellent human resources move to better-paying industries.

Lack of rehabilitation staff's knowledge and skills because of insufficient education. Rehabilitation personnel in the study countries have limited knowledge and skills. For example, to resume motor functions after brain injury through rehabilitation, the patient needs to have neurological processes – motor learning – within the brain. Kinesiotherapy

focuses on movement using appropriate methods. Few facilities, however, provide rehabilitation to patients with nervous system diseases. Even if they provide it, the main procedure is physiotherapy, such as electrical stimulation therapy and heat therapy, and passive intervention that places patients in the dorsal position and consists mainly of massage or articular movement. Passive intervention does not affect motor learning. Rehabilitation staff in the study countries did not know that cognitive disorder is a symptom of higher cortical dysfunction, although it greatly affects the QOL of patients with cerebrovascular disease. The lack of knowledge and skills is the result of scarce learning resources on rehabilitation. In Cambodia and Viet Nam, vocational schools use textbooks translated from old books written in English, which results in a lack of quality learning materials.

Lack of integrated and seamless services. Rehabilitation services are classified into acute-phase rehabilitation (start immediately after disease onset); recovery-phase rehabilitation (start after the condition becomes stable, to recover functions from sequela); and chronic-phase rehabilitation (to maintain function). Treatment goals and strategies should be tailored to individuals throughout all stages, from preclinical to recovery to acute phases, so that patients can recover their maximum functions and smoothly reintegrated into society. KNI has established four facilities in Hachioji City, Tokyo, to provide integrated services, from prevention at the preclinical stage to acute-phase treatment immediately after disease onset, recovery-phase rehabilitation, and follow-up at home to patients with stroke. We introduced an electronic clinical recording system, which has access points at all four facilities to ensure smooth sharing of client information. We regularly reshuffle staff members amongst the four facilities to ease staff members' understanding of the importance of integrated healthcare. This model is possible because KNI adopts an integrated management system that oversees all hospitals covering patients in all stages. Even in Japan, only a few hospitals have developed such a system. In Cambodia, we could not find a hospital that could accommodate patients who needed recovery-phase rehabilitation. In Lao PDR and Viet Nam, rehabilitation centres can receive patients who need recovery-phase rehabilitation, but limited patient information is shared between acute-phase hospitals and recovery-phase hospitals. The importance of integrated and seamless provision of services is not well understood in the study countries.

7.2. Possible Solutions to Problems of Providing Rehabilitation

7.2.1. Sunrise Japan Hospital as a Model Solution

Sunrise Japan Hospital in Cambodia can suggest solutions to problems of providing rehabilitation. The hospital has more than 20 Japanese medical staff members –doctors, nurses, and rehabilitation personnel. They are involved in hospital operations and are training more than 120 local staff members. All professional staff should understand the need for rehabilitation, and doctors must explain it to patients. Then doctors may issue rehabilitation prescriptions. The hospital has high demand for rehabilitation and physical therapy contributes substantial revenue to the hospital. The monthly salary of a

rehabilitation staff member is as high as US$400, which can attract excellent human resources.

Staff training is crucially important. Before the hospital opened, about 70 Cambodian staff members were sent to Japan to learn rehabilitation and hospital management with support from JICA. They received practical training at a KNI hospital then learned from Japanese staff members in Cambodia.

The hospital treats patients in the acute phase, but the whole staff, not only PTs but also other professionals, provide comprehensive rehabilitation. Comprehensive rehabilitation programmes should be developed, considering each patient's daily life, from the early stage to after discharge, including outpatient and/or home-visit rehabilitation. Based on this, integrated and seamless services can be systematically provided.

The hospital charges the equivalent of US$40 per session, whether performed by a Cambodian or Japanese therapist. It is not a bargain in Cambodia, but the slots for rehabilitation sessions are almost fully booked 2 months ahead. This means the hospital has made known the effect and importance of rehabilitation and has won the Cambodian people's trust as an institution that can solve the five issues listed in section 7.1.

7.2.2. Other Improvements Resulting from the Kitahara Group's Activities in Lao PDR and Viet Nam

In Viet Nam, the rehabilitation knowledge of doctors at the Viet Duc University Hospital has greatly improved to 'satisfactory' thanks to strong support from the hospital. This success was the result of their considerable knowledge of acute-phase medical care, which they already had before our activities started.

Our support is not limited to rehabilitation activities. We supported bed management. Many patients could not leave the hospital because of mismanaged admission and discharge of patients. If hospitals have many in-patients who no longer need acute-phase treatment, the hospitals may fail to accept unpredictable emergency patients who need in-patient care. We advised the hospitals to establish a good bed management system under which they can reasonably determine which patients still need in-patient care and which no longer do. The hospitalisation period was optimised and only patients who need in-patient care, including surgical operations, are accommodated. The bed–turnover ratio has improved and the hospital is earning more than it did before our support. Improved hospital management can help develop the rehabilitation-providing system.

7.2.3. Necessity of a Multifaceted Approach

The whole healthcare system must be reformed if rehabilitation system is to be radically improved. We must pay attention to the hierarchical system of medical professionals, which is often led by medical doctors. Governments are deeply involved in developing the healthcare system in any country, including policies on establishing rehabilitation provision or training of rehabilitation human resources. A single approach – for example, an education project to train PTs – is not enough; a combined approach, including medical doctors and government officials in the discussion, is crucial.

When the Kitahara Group opened a clinic in 2012 providing only rehabilitation services, few patients came. When the Sunrise Japan Hospital opened in 2016, it saw a rapidly growing number of clients needing rehabilitation. The emergency facility of Sunrise Japan Hospital contributed to this success. To improve rehabilitation in the study countries, hospitals must organise integrated teams of healthcare experts, executive personnel, doctors, nurses, and rehabilitation staff.

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