Chapter 4

Results of Introducing Kitahara-style Rehabilitation in the Study Countries

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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.