

# Rehabilitation Medicine in the Acute Care Setting in Japan

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## Abstract

In Japan, restorative rehabilitation units were introduced into the healthcare system in 2000. This policy brought structural changes to our inpatient medical services. Three types of medical facilities—namely, acute care hospital, restorative rehabilitation hospital, and chronic care hospital—are now clearly differentiated according to the health condition of inpatients and the medical procedures the facility provides. Developing medical rehabilitation services in acute care hospitals is a challenging task because of the shortage of the time to treat the patients to such an extent. In recent years, the mean length of stay in acute care hospitals per patient has been about 2 weeks. Acute care physicians also have to be careful about delivering rehabilitative interventions because the patients' medical conditions are often too complicated and too critical to undergo sufficient medical rehabilitation. Consequently in acute care hospitals, the role of a medical rehabilitation team, which includes a physiatrist (physician specialized in rehabilitation medicine), physical therapist, occupational therapist, and speech pathologist, is to properly evaluate patients and deliver safe, effective, and efficient rehabilitative intervention. Moreover, for some patients who need long-term intensive care (severe traumatic brain injury, cerebrovascular accident with multiple comorbidities, cervical cord injury, multiple injury, etc.), we have to make exceptions and deliver intensive long-term rehabilitation care in acute care hospitals. Medical rehabilitation in the acute care setting is a challenging yet essential mission for providing high quality medical care.

**Key words** Acute rehabilitation, Stroke, Spinal cord injury, Traumatic brain injury, Multiple trauma

## Introduction

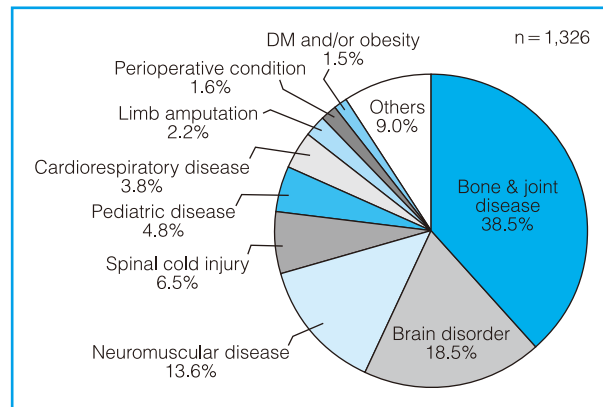
Among medical institutions in Japan where the progress in medical system reform brought clear functional sharing among physicians, acute care hospitals, general medical institutions that are responsible for acute and emergency medicine. These acute care hospitals include hospitals that support community medicine and are responsible for secondary emergency care, emergency medical centers responsible for tertiary emergency care, and the designated special function hospitals and university hospitals that have those community hospitals and emergency centers. In contrast, hospitals with restorative rehabilitation units are responsible for providing restorative

medicine. Acute medicine and restorative medicine have been clearly distinguished from one another since the introduction of the restorative rehabilitation unit into the Japanese healthcare system in 2000.

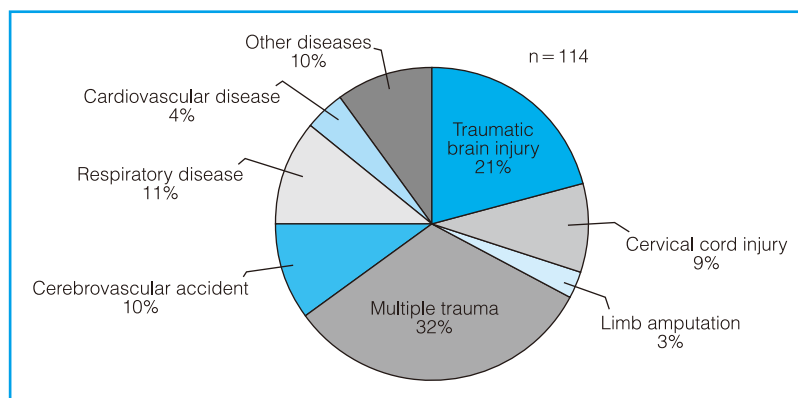
Rehabilitation is often categorized into 3 temporal stages; 1) acute rehabilitation, 2) sub-acute or restorative rehabilitation, and 3) chronic or supportive rehabilitation. As the same patient undergoes these rehabilitation stages, such categorization is merely for the convenience of the medical care providers, although the quality and amount of rehabilitation medicine provided to patients vary among these stages. Properly conducted role sharing can lead to providing efficient rehabilitation, which is desirable for both

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**Fig. 1 Breakdown of the new patients' diseases seen at Yokohama City University Hospital Rehabilitation Unit (Year 2005)**



**Fig. 2 Breakdown of the diseases of the patients who requested rehabilitation at Yokohama City University Hospital Advanced Emergency Care Center (Years 2000–2001)**

the patients and the medical care providers.

### Rehabilitation in Acute Care Setting

Yokohama City University Hospital is an acute care hospital complex consisting of 2 hospitals; the university hospital, and Yokohama City General Medical Care Center, which also houses an advanced emergency care center. The university hospital provides secondary emergency care and the medical center provides secondary and tertiary emergency care, while the rehabilitation unit exists independently from these 2 facilities. The university hospital is a designated special function hospital with the average hospitalization

of 16.6 days, which is relatively long because it has a tuberculosis care unit and psychiatric care unit. The average hospitalization for the medical center is 14.2 days for the advanced emergency center and 15.1 days for other beds.

One unique characteristic of rehabilitation medicine in acute care hospitals is that it is concluded within the time restriction of approximately 2 weeks.

Ishigami<sup>1</sup> points out that intensive rehabilitation in the acute care setting is not comparable to comprehensive rehabilitation by multidisciplinary staff offered at rehabilitation-specialized hospitals, and recommends collaborative rehabilitation of a physiatrist (physician specialized

**Table 1 Acute rehabilitation program**

	Physical therapy	Occupational therapy
Basic program		Positioning ROM training Sitting tolerance training Using a wheelchair (leaving bed)
Special program	Movement training <ul style="list-style-type: none"> <li>• Flexion and elevation of the head, while being supported by the chest</li> <li>• Turning over to the paralyzed side</li> <li>• Turning over to the non-paralyzed side</li> <li>• Bridge exercise</li> <li>• Balance exercise in sitting position with no back support</li> </ul>	Management of paralyzed arm  Movement training <ul style="list-style-type: none"> <li>• Coordinated movement between the eyes and hand on the paralyzed arm</li> <li>• Active and passive movement on the paralyzed arm</li> <li>• Stimulation of motion and visual perception</li> <li>• Adjustment of hospital room environment to improve visuospatial perception</li> </ul> ADL training <ul style="list-style-type: none"> <li>• Movements to wipe the hands, face, trunk, and neck</li> <li>• Teeth-brushing movement in front of a mirror</li> <li>• Movements for changing clothes, taking care of appearance and face washing, in a sitting position</li> </ul>

(From Sashika et al.<sup>5</sup>)

in rehabilitation medicine) and a therapist (PT/OT/ST) so that a psychiatrist can monitor the patient to minimize the risk during acute care and both the psychiatrist and the therapist can properly address unforeseen problems. On the other hand, in an advanced emergency care center, Sashika<sup>2</sup> states that the risk management during physical and occupational therapy was entrusted to the main attending physician of the patient, and a psychiatrist worked as a coordinator. Therefore, the rehabilitation medicine system provided in the acute care setting varies among institutions.

Another unique feature is that the goal of rehabilitation medicine in acute care lies in enabling the patient to leave their sick bed early and safely in order to smoothly transfer them to proper restorative rehabilitation. A physician and other rehabilitation specialists (physical therapist, occupational therapist, and speech pathologist, medical social worker, etc.) are to closely collaborate to properly evaluate patients in order to deliver safe, effective, and efficient rehabilitative intervention.

**Figure 1** shows a breakdown of new patients' diseases who were admitted to the rehabilitation unit of Yokohama City University Hospital, and **Fig. 2** shows a breakdown of the diseases of the patients who were admitted to the advanced

medical care center and requested rehabilitation care from the rehabilitation unit. These figures include conditions in which patients can be released home early without involving a multidisciplinary rehabilitation team though application of the clinical path, such as myocardial infarction, femoral neck fracture, post-operation of lower limb joint replacement, perioperative care.

Rehabilitation in the acute care setting is particularly important when a physical or mental disorder is expected to remain for a considerable period of time due to a condition or trauma. Those patients will have to be transferred from rehabilitation in the acute care setting to a rehabilitation hospital or restorative rehabilitation unit for proper treatment, and will have to undergo in-hospital or stable home-visit rehabilitation after being discharged from hospital before returning to society. Such conditions include cerebrovascular disorder, spinal cord injury, brain injury, and multiple traumas.

## Acute Rehabilitation for Important Diseases

### Stroke

The *Japanese Guidelines for the Management of Stroke*<sup>4</sup> strongly recommend aggressive rehabilitation intervention from the early phase after

the onset of stroke (“Grade A”). Applicable rehabilitation includes early sitting and standing postures, early walking training with equipment support, eating and swallowing training, self-care training.

The duration for acute rehabilitation for stroke is 2 to 3 weeks after onset. Sashika et al.<sup>5</sup> conducted a randomized controlled trial to study the effect of acute rehabilitation for the elderly patients who experienced their first stroke episode in their 70’s or older. The study subjects were assessed as stages 1 to 4 on the Brunnstrom stage (1 = complete paralysis, 2 = associate reaction, 3 = synergic movement, 4 = partially isolated movement, 5 = isolated movement, 6 = fast isolated movement) on the lower limb of the paralyzed side. The subjects in the basic treatment group were given the *basic program*, which is physical and occupational therapy focusing on passive movement exercises for 20 minutes a day. The subjects in the aggressive treatment group were given the special program, which included training for more active and dynamic movement exercises for 40 minutes a day (**Table 1**). In both groups, rehabilitation intervention started within 1 day after hospitalization, and the outcome on the 12th week after the onset of stroke was compared. The subjects in the aggressive treatment group showed no critical blood pressure change during the training, and their movement on the paralyzed lower limb improved significantly compared to the basic treatment group in 2 to 4 weeks.

Regarding patient safety management in acute care, Kondo<sup>6</sup> found about 30% of patients in the acute phase of stroke experience exacerbation in clinical condition (i.e., lower consciousness level and the progress of paralysis), commonly within the 7th day from the onset and more frequently among severe cases. Kondo suggests a standard scheme for sitting tolerance training based on the Japan Coma Scale (JCS) and the Brunnstrom stage assessment of the patients. Patients whose JCS score have 2 or 3 digits, Kondo recommends bed rest until the condition improves to the single-digit figure on JCS. For patients with the single-digit JCS score but with moderate to severe paralysis (4 or less on the Brunnstrom stage), 3 days of bed rest is advised. For those patients whose JCS scores are in single digits and with a Brunnstrom stage of 5 or more, Kondo suggests starting the

sitting tolerance training as early as the first day of hospitalization.

Kondo also suggests a standard to suspend training: 1) when a patient is suffering from consciousness disorder or become less responsive, 2) when the blood pressure decreases (30 mmHg or over), 3) when the blood pressure decreases less than 30 mmHg, depending on whether the blood pressure returns to normal and on subjective symptoms, 4) when the blood pressure increases more than 30 mmHg in cerebral hemorrhage or systolic pressure of 180 mmHg or more, and 5) if the patient has subjective symptoms, objective symptoms should be evaluated to reach an overall decision. The necessity of managing patient safety through a multidisciplinary rehabilitation team is strongly emphasized.

### Spinal cord injury

In many cases of traumatic spinal cord injury, the initial treatment is provided at an emergency medical care center. On the other hand, many patients with spinal cord injury in general acute care hospitals are elderly, and the majority of them have central spinal cord syndrome due to minor trauma.<sup>7</sup> The records of traumatic spinal cord injury at the emergency center of Yokohama City University Hospital from 1991 to 1999 shows quadriplegia from cervical cord injury is 67% and is more common than paraplegia due to thoracic or lumbar, with 40 long days of hospitalization. Almost all of them are transferred to another facility, however, 40% are admitted to hospitals with long-term nursing care or hospitals with no rehabilitation facility.<sup>8</sup> This figure illustrates the problem for patients with cervical cord injury, that the transition from acute rehabilitation to restorative rehabilitation is not conducted smoothly for them. There are several reasons for this, such as the presence of severe comorbidity, concurrent mental disorder, or long-term artificial respiration management. In such cervical cord injury cases with complications, rehabilitation has to continue for a prolonged time at acute care hospital, requiring the hospitals to fulfill the role of providing restorative rehabilitation as well.

Sumida et al.<sup>9</sup> examined the effect of early rehabilitation intervention for traumatic spinal cord injury in a multicenter study using the database of *rosai* hospitals [laborers’ hospitals]. In a retrospective study of 123 cases in 3 years

**Table 2 The acute rehabilitation program for traumatic cervical cord injury offered by the rehabilitation unit of Yokohama City University Hospital**

	Physical therapy	Occupational therapy
Bedside rehabilitation	Respiratory physical therapy Positioning (maintaining good limb posture) ROM training Strengthening training of the remaining muscle strength Bed-raising training	ROM training Strengthening training of the remaining muscle strength Providing means of communication Assisting communication
Training room rehabilitation	Sitting tolerance training Condition-specific movement training Wheelchair riding training	ADL training: eating, changing clothes, using transfer assisting tools and self-help devices

from 1995 to 1998, in which the acute phase is defined as within 2 weeks from the onset, the convalescent phase is defined as 2 weeks to 6 months, the chronic phase is defined as after 6 months, Sumida et al. compared the number of hospitalized days between the patients who were transferred to a *rosai* hospital during the acute phase (early intervention group) to those who were transferred during the convalescent phase (delayed intervention group). The early intervention group showed a shorter length of hospitalization (185 days compared to 267 days) and higher Functional Independence Measure (FIM) efficiency (0.446 compared to 0.126), indicating that rehabilitation intervention as early as possible is effective in shortening the hospital stay and efficient recovery of physical functions for spinal cord injury as well.

The goal of acute rehabilitation for patients with cervical cord injury is to have them disengage from an artificial respirator, prevent respiratory comorbidity, joint contracture and bedsores, and enable them to leave the sick bed as early as possible (secure sitting posture in wheelchair).<sup>10</sup> The acute rehabilitation program for traumatic cervical cord injury of the rehabilitation unit of Yokohama City University Hospital is summarized in **Table 2**. During this period the patient undergoes treatment for multiple comorbidities, such as orthostatic hypotension, hypoventilation, psychiatric symptoms, limb fractures, organ damage, requiring careful monitoring and information sharing from the routine morning rounds to the staff meeting afterward.<sup>10</sup>

### Traumatic brain injury

Traumatic brain injury accompanies severe phys-

ical disorders such as disturbed consciousness and spastic quadriplegia. Although movement disorders show rapid improvement as consciousness improves, the patient follows a unique course of progress in which his/her cognitive disorders, such as emotional disorder, memory disorder, and attention deficit, gradually become evident. Acute rehabilitation intervention has various effects including shorter coma, shortening the hospital stay, alleviating cognitive disorders, improving the likelihood of returning home after hospital discharge.<sup>11</sup> The focus of rehabilitation for traumatic brain injury is in cognitive rehabilitation in the sub-acute phase. The cognitive rehabilitation is a comprehensive rehabilitation program in which clinical psychologists, occupational therapists, career counselors, social workers, and other relevant professionals play active roles; and it consists of 4 cores: 1) functional recovery training, 2) functional compensation training, 3) educating the patient's family, 4) interventions to the patient's daily living environment.

The role of rehabilitation in acute care setting, therefore, is to: 1) prevent the development of secondary disorders and facilitate leaving the sick-bed early, 2) properly evaluate advanced brain function disorders and assess the prognosis, 3) establish a long-term rehabilitation policy toward re-integrating into society, and 4) select the appropriate location for restorative rehabilitation for the patient and provide information.<sup>12</sup>

### Multiple trauma

Rehabilitation for multiple trauma should be carried out at high level by a multidisciplinary team of fully experienced staff in treating trauma, including a physician, physical therapist, occu-

pational therapist, speech pathologist, medical social worker, and rehabilitation nurse. In the US, a medical institution is placed into one of 4 groups (Level I–IV) based on its trauma treatment standard and is required to have certain medical equipment and the number of staff of a quality that are appropriate for its level, securing the quality of care for the patients.<sup>13</sup>

There are several aspects of care that a Level I trauma center has to fulfill.<sup>13</sup> The rehabilitation standard must be managed by physiatrists on a 24-hour basis (physicians and a manager). There has to be at least 1 full-time nurse specialized in rehabilitation (nurse). Occupational therapy, physical therapy, counseling by a clinical psychologist, neuropsychologist, and drug-abuse counselor, social services, and speech-language-hearing therapy must be provided on a 24-hour basis (multi-disciplinary medical rehabilitation team). A specialist in communication devices, driving instructor, prosthetist, rehabilitation engineer, recreation trainer, and vocational rehabilitation instructor must be available (other rehabilitation specialists). Educational programs and clinical studies on trauma rehabilitation must be offered on a continuous basis (education and research). Patient peer groups must be offered, and publicity programs on trauma rehabilitation must be offered (patient support and education).

On the contrary, there is no standard for medical institutions with regard to trauma treatment in Japan. The standard for a rehabilitation facility is limited to the area of a training room, the number of staffs, and the number of available rehabilitation devices, which are all quantitative conditions.

The goal of treating multiple trauma in the acute care setting is to prevent the development of secondary comorbidities and prepare the patients to have them leave their sick bed safely and with confidence. To reach this goal, it is important to check the patient's general status through various monitoring devices and vital signs and to pay attention to common comorbidities that accompany trauma, such as soft-tissue infections, deep vein thrombosis, and compartment syndrome. The staff members of a rehabilitation team must also communicate and share information with each other.

## Problems of Rehabilitation Medicine in the Acute Care Setting in Japan

It is only about 10 years since the introduction of the restorative rehabilitation unit into the Japanese healthcare system and the initial goal of having 50 beds per 100,000 people is almost within reach. Additionally, the upper limit for the number of patients per therapist was stipulated along with the establishment of disease-specific rehabilitation payment system. The healthcare system is now moving toward supplying a sufficient number of therapists to meet the number of patients where needed. However, there is no obligation to post a rehabilitation specialist in the institutional standard for acute care hospitals, and consequently, the levels of sufficiency of multidisciplinary rehabilitation teams differ considerably among medical institutions. Furthermore, it is somewhat questionable if the patient is transferred at the proper time under proper conditions when moving from acute care to a restorative rehabilitation unit.

Certain patients require continuous rehabilitation in the acute care setting—for example, stroke patients with comorbidities that require advanced medical treatment, such as malignant tumor, renal failure, diabetes, coronary artery disease, or peripheral vascular disease. Other examples include patients with quadriplegia due to cervical cord injury who are under artificial respiration management and require assistance for eating, or patients with traumatic brain injury who require psychiatric treatment due to psychoneurosis and cognitive disorders. Yet, there are probably many patients who are determined not eligible for rehabilitation and are forced to transfer to long-term nursing care.

Rehabilitation systems in the convalescent phase and acute phase are like a pair of wheels. Both rehabilitation systems must operate sufficiently in order to realize true rehabilitation medicine.

## Conclusion

For the patient, rehabilitation intervention in the acute care setting acts as the beginning of a long journey to overcome sequelae from stroke, spinal cord injury, traumatic brain injury, or multiple trauma and to be re-integrated into society. In these diseases, acute rehabilitation intervention

is proven to shorten hospitalization, facilitate early recovery from functional disorders, and shorten the overall rehabilitation period as well.

The roles of rehabilitation in the acute care setting are: 1) proper evaluation of functional disorders, 2) make prognosis and set goals, 3) prevent comorbidities and manage patient safety, 4) leaving the sick bed as early as possible and recover physical functions, and 5) select a proper

restorative rehabilitation facility and provide relevant information.

When a multidisciplinary rehabilitation team collaborate with acute care staff and demonstrate the best efforts, rehabilitation intervention during the acute phase can enable maximum recovery in a short time. Acute rehabilitation, therefore, is advanced and professional medical care.

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