Original Article

The Wakayama-Immediate Stroke Life Support Course: Achieving Successful Training on the Stroke Emergency System without using Mechanical Medical Training Simulators

Abstract

Background: The Immediate Stroke Life Support (ISLS) course run in Wakayama (Wakayama-ISLS course) is an off-the-job training course for understanding the initial treatment of acute stroke. A total of 22 Wakayama-ISLS courses have been held in Wakayama Prefecture since 2008. To begin with, the case presentation was performed using human-like, mechanical manikins for simulation training. However, as the course progressed, we found the students paying great attention to the display monitor, and less to the patients' neurological status. **Methods:** From the fourth Wakayama-ISLS course onward, we conducted the group work with the facilitators pretending to be patients, i.e., without medical training manikins. **Results:** When the facilitators acted as patients, the students gained a more realistic and expressive perception of neurological symptoms. As a result, they expressed a high level of satisfaction with the course in the questionnaire sent immediately afterwards, regardless of their profession or prior experience. Moreover, as we did not need to transfer medical training simulators, we were able to carry out three ISLS courses at locations some distance from Wakayama city on a low-cost basis. This also enabled the regional medical staff in rural hospitals to participate in the courses easily. **Conclusion:** The Wakayama-ISLS course without medical training manikins is an entirely feasible off-the-job training course, which provides training on fast and excellent treatment of acute stroke problems based on clinical practice. The course has the potential to spread not only across Japan but throughout the world, including to developing countries, given the cost perspective.

Keywords: *Acute stroke, immediate stroke life support, medical training simulator, off-the-job training course*

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Introduction

The use of clinical simulation training is gaining popularity because it permits students to practice clinical skills without putting patients at unnecessary risk.[1,2] The patient simulators provide an opportunity for medical staff to rehearse scenarios where a rapid response is essential for improving the clinical outcome.[3] The Immediate Stroke Life Support (ISLS) course has been developed as an off-the-job training course by the Japanese Congress of Neurological Emergencies and the Japanese Association for Acute Medicine and has been held at various places around Japan since 2006.[4] The ISLS course provides a standard education for understanding the initial evaluation and management of acute stroke patients for all medical staff taking first response action in cases of acute stroke.

In Japan, The Stroke and Cardiovascular Disease Control Act was enacted in December 2018 and it has become the first-ever legislative countermeasure against stroke and cardiovascular disease. A nationwide approach is expected to set up standard systems for reducing the burden of disease from stroke. For this reason, the ISLS course will take on new significance.

In Wakayama Prefecture, a total of 22 ISLS (Wakayama-ISLS) courses have been held since 2008, conducted by the Research Group for Wakayama ISLS, which is organized by the Department of Neurological Surgery at Wakayama Medical University.[5] Although Wakayama-ISLS initially incorporated role-playing methods using mechanical manikins for simulation

training in the case presentation module, we found that the students were paying great attention to the display monitor, and less to the patients' neurological symptoms. This may be due to the limitations of the current simulator, which has not been designed on the basis of stroke-related focal neurological assessment. Therefore, from the fourth, 2010 edition of the Wakayama-ISLS course onward, all the modules were carried out with the facilitators themselves replacing the medical training manikins by acting as patients. Despite all the advantages of simulation as an educational tool, there is no mention in the literature of a patient simulator being used to train students in stroke assessment.

We will now provide further details and a report on this unique training course and discuss the development of the current training system on the basis of the contents of the modules and responses to the questionnaire sent to the students.

Methods

Design of the Wakayama immediate stroke life support course

We designed the Wakayama-ISLS as a 1-day medical training course. During the morning session of the course, the students study the normal neurological findings through lecture-based learning. In the afternoon, they are divided into four groups and study subjects contained in the following four modules: (1) evaluation of coma scale using the Glasgow coma scale (GCS), (2) evaluation of neurological conditions using the National Institute of Health Stroke Scale (NIHSS), and (3 and 4) total management of acute stroke by case presentation-Parts

1 and 2, respectively [Table 1]. Through the course, they learn the process of examination and the requisite skills for dealing with acute stroke.

This is the content of the modules in order followed in the course timetable [Table 1]:

Lecture-based learning

Our lecture provides the students with a general introduction to cerebral stroke and to the assessment of the patient's clinical status using the GCS and NIHSS. There have been certain difficulties in evaluating the best motor response with GCS. We introduce "Ajimi" performance as a simple way to understand the category of best motor response.[6]

Evaluation of coma scale using Glasgow coma scale

In this module, students learn to evaluate consciousness level using the GCS. We carry out eight case presentations in 1 h.

Evaluation of national institute of health stroke scale

We provide the students with a way to measure the level of neurological impairment using NIHSS with simulated patients. We gave three case presentations in 1 h.

Demonstration for immediate stroke life support algorithm

Before the next module, we created a simulated scene with people playing the roles of doctors, nurses, the patient and the patient's family, and demonstrated the sequential procedure for providing emergency medical care to a stroke patient in the emergency room (ER), as mentioned below.

Table 1: Schedule of the Wakayama Immediate Stroke Life Support course			
9:30-10:00	Reception		
10:00-10:20	Introduction		
10:20-11:10	Preparatory exercises (GCS, NIHSS)		
11:10-11:20	Break		
	Group 1	Group 2	Group 3	Group 4
11:20-12:20	Booth A (Coma Scale)	Booth B (Coma Scale)	Booth C (NIHSS)	Booth D (NIHSS)
12:20-12:30	Break		
12:30-13:30	Booth C (NIHSS)	Booth D (NIHSS)	Booth A (Coma Scale)	Booth B (Coma Scale)
13:30-14:30	Lunch		
14:30-14:50	Demonstration for ISLS algorithm		
14:50-15:40	Booth A (Case presentation 1)	Booth B (Case presentation 1)	Booth C (Case presentation 2)	Booth D (Case presentation 2)
15:40-15:50	Break		
15:50-16:40	Booth C (Case presentation 2)	Booth D (Case presentation 2)	Booth A (Case presentation 1)	Booth B (Case presentation 1)
16:40-16:50	Break		
16:50-17:10	The graduation ceremony		

Total management of acute stroke by case presentation

We designed and performed some group work based on a case presentation study to understand the treatment algorithm of ISLS.[4] One of the students played the leadership role and another played the part of ER staff and they demonstrated the full sequence of emergency medical care for acute stroke with a simulated patient: Receiving the patient in the ER, performing medical care to evaluate the patient's cardiorespiratory and neurological condition, performing and assessing the clinical imaging, presenting the clinical information and handing the treatment over to the stroke specialist. Facilitators observed the students' performance and helped them in their work. We performed six case presentations in 100 min.

Characteristics of the Wakayama immediate stroke life support course

Without medical training simulator

The facilitators present situations to the students by pretending to be patients, who show neurological symptoms such as impaired consciousness, speech disturbance, motor and sensory deficits involving the face and extremities, headache, vertigo, and seizure. Vital signs and other physical information, including electrocardiographic waveform, are displayed on tablets.

Case presentation study modified to fit changing needs

We chose the scenarios of case presentation study from the ISLS course guide book.[4] We provided customizable scenarios according to the students' needs. For example, when a large number of the students are ward nursing staff, nosocomial stroke cases are incorporated.

Wakayama-immediate stroke life support in the local area

Without the need to transfer medical training simulators, we were able to carry out three ISLS courses at places quite a long way from Wakayama city. The geographical distribution of the students and facilitators was statistically compared - the venue for the Wakayama-ISLS ranged between Wakayama city and rural areas in Wakayama prefecture - using a Chi-square test. Moreover, we sent a questionnaire to the students about their satisfaction with each module immediately after the course.

Results

Students[Figure 1a and b]

From the fourth to the 22th Wakayama ISLS course, there were a total of 435 students. An average of 22.8 students attended each of courses. By profession, the highest number of participants were nurses at 294 (67.6%), followed by doctors at 113 (26.0%) and emergency medical technicians at 22 (5.1%), respectively. About 75.2% of the doctors were trainees.

Facilitators [Figure 2]

A total of 346 facilitators were involved in the program. An average of 18.2 facilitators attended each course. By profession, doctors were most strongly represented with 143 (41.3%), followed by nurses with 102 (29.5%) and emergency medical technicians with 93 (26.9%), respectively.

Holding courses in regional areas [Table 2a and b]

In the three courses held in rural areas in Wakayama prefecture, the percentage of regional students of doctors and medical staffs was statistically higher than the figure for courses held in Wakayama City.

Satisfaction level of students [Figure 3]

In the questionnaires for students, the high satisfaction levels for each module were achieved regardless of the students' profession.
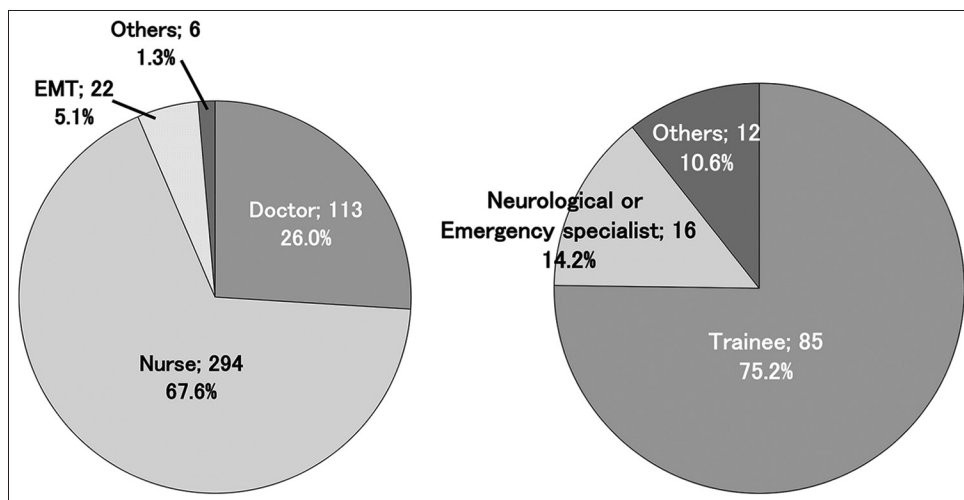

Figure 1: (a) Background of all students from the fourth to the 22th Wakayama immediate stroke life Support course (*n* = 435) (EMT; Emergent Medical Technician) (b) Distribution of students of doctors from the fourth to the 22th Wakayama immediate stroke life support course (*n* = 113)
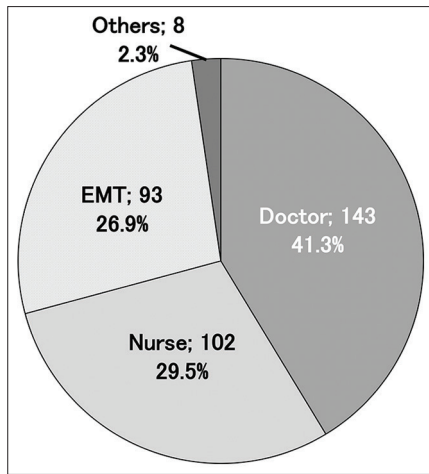
Figure 2: Background of all facilitators from the fourth to the 22th Wakayama immediate stroke life support course (*n* = 346) (EMT; Emergent Medical Technician)

Figure 3: Results of questionnaires regarding satisfaction level of each booth from the fourth to the 22th Wakayama immediate stroke life support course (*n* = 435). (NIHSS; National Institute of Health Stroke Scale)

Discussion

ISLS is planned as an off the-job-training course to evaluate and manage patients with acute stroke and has been held at various places in Japan since 2006.[4] While there is a common learning goal for all courses nationally, some creative course designs in various regions have been reported.[7-11] Although Wakayama-ISLS initially incorporated role-playing methods using manikin simulation techniques in the case presentation module, we realized that the students were paying less attention to the patients' neurological status and focusing intensively on the display monitor. For this reason, from the 4th Wakayama-ISLS course in 2010 onward, we have organized all the modules by getting the facilitators to simulate the role of "patients" themselves, i.e., without using any medical training manikins.

Table 3 shows the summary of some unique course settings in various regions have been reported in ISLS.[4,7-11] The traditional methods of the courses are designed as a half-day training program, incorporated role-playing methods using medical training simulators and tabletop simulation exercise with clinical map.[4,12] The clinical map has a structure like a clinical path and provides a procedure and contents of an initial treatment of stroke in chronological order according to the algorithm of ISLS. Initially, students were given a flame and elements which were derived from a clinical map. Students need to fill an empty frame by putting pieces of elements to complete the clinical map. Facilitators observed their performance and helped their work. Fukushima-ISLS is broadly following the course design using medical training simulators and clinical map in half a day.[10] ISLS-Gunma is designed as a half-day program, using video images on educational software in addition to medical training simulators and clinical map.[11] We integrated a lecture-based learning during the morning, giving the students thorough understanding of
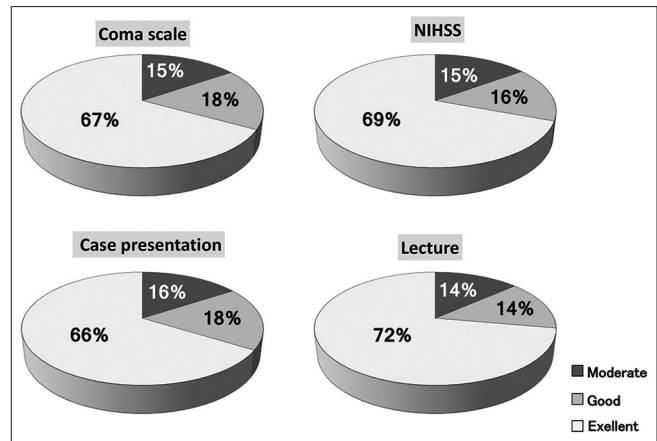
Table2a: Geographical distribution of the students of doctors in Wakayama Immediate Stroke Life Support courses

Students from the areas Venue for the course	Wakayama City and the surrounding areas	Rural areas in Wakayama Prefecture
Wakayama City and the surrounding areas	74	24
Rural areas in Wakayama Prefecture	2	13

Table 2b: Summary of the students of medical staffs in Wakayama Immediate Stroke Life Support courses

Students from the areas Venue for the course	Wakayama City and the surrounding areas	Rural areas in Wakayama Prefecture
Wakayama City and the surrounding areas	134	130
Rural areas in Wakayama Prefecture	20	38

case presentation study in the afternoon. Hence, we even withdrew the tabletop simulation with clinical map from the course curriculum.

An average of 22.8 students and 18.2 facilitators attended each of the Wakayama-ISLS courses. Wakayama-ISLS courses have four groups of students and teams of four facilitators. In practice, then, four or five facilitators teach groups of six students. We consider that the course had an appropriate ratio of facilitators to students, thus enabling the educational quality of the course to be broadly ensured.

We would point out that one of the hallmarks of the Wakayama-ISLS course is that it does not use medical training simulators. The current simulation technology does

	Original course[4]	Yamada[7]	Nakamura[8]	Okudera[9]	Sakuma[10]	Tanizaki[11]	Present study
Duration of a course (day)	0.5	0.5	0.5	0.5	0.5	0.5	1
Use of Medical training simulator	yes	yes	yes	yes	yes	yes	no
Use of Clinical map	yes	no	yes	yes	yes	yes	no
Use of Video images	no	no	no	no	no	yes	no

impose limitations on the realism of neurologic assessment. When the role of simulated patients is performed by the facilitators, the students were able to perceive the true nature of more realistic and expressive neurological symptoms such as impaired consciousness, speech disturbance, motor and sensory deficits involving the face and extremities, ataxia, headaches, vertigo, and seizure. Consequently, most of the students had a high satisfaction level, regardless of their profession or experience, which they expressed in the questionnaire after the course. When the facilitators of nurses and trainee medical technicians perform as simulated patients this contributes to their understanding of the neurological symptoms. The students sometimes give the simulated patients unexpected neurological examinations. If the facilitators promptly respond to any situation at all times, this proves that they understand the essence of the neurological status. In a similar approach to ours, in order to overcome the limitations on the realism of neurologic assessment, a report has been published which states that integrating video and audio material from real patients into simulated scenarios can be an effective method to promote the recognition and subsequent treatment of acute stroke.[11,13]

The additional benefit without medical training simulators is cost reduction. In the beginning, we had to pay 3000 dollars for borrowing two advanced training simulators at every course in the beginning. Further, there was always a risk that they got broken in transit. In the current Wakayama-ISLS, all the equipment necessary to hold the course are only handouts, picture images and notices. Once we prepare them, they can be repeatedly used in a less expensive format and carried around easily. In that sense, our course design is cost-effective compared to the traditional approach.

Another special feature of Wakayama-ISLS is that the customizable scenarios are used based on the occupational skills of the students themselves. We are referring to the scenarios originally developed by the Research Group for Wakayama ISLS. These scenarios include stroke mimics for conditions such as hypoglycemia and dissociation disorder, as well as acute stroke. Furthermore, if many of the students are ward nursing staff, we try to incorporate sufficient flexibility to fit in the nosocomial stroke cases that they may encounter.

The other characteristic of Wakayama-ISLS is that we do not designate the area for the course. Since we do not use medical training simulators we can avoid the cost and effort of transferring them, so we could hold three ISLS courses at locations some distance from Wakayama City. Our results demonstrate that the regional doctors and medical staff were more easily able to participate in a course in their local area, rather than in Wakayama City. Due to the success of these courses, there is an increasing demand to hold the course in rural areas. Hence, this course could spread not just across Japan but also throughout the world, and is especially suited to developing countries from a cost perspective. However, the problem with providing the course in distant locations is the cost for inviting the facilitators. Currently, we are only able to pay the transportation costs to facilitators, which is not adequate. To organize Wakayama-ISLS routinely in remote areas is very important in order to promote higher medical standards for treatment of stroke throughout Wakayama prefecture. To make this possible, it is necessary to secure financial support for setting up a course and to increase the number of facilitators in each region in Wakayama prefecture. In particular, we must plan to have more nurses and paramedics as training facilitators as well as medical doctors.

Conclusion

We provided the Wakayama-ISLS course for the stroke emergency system without medical training manikins. With the facilitators replacing the medical training manikins by acting as patients, the students gained more realistic and expressive understanding of neurological symptoms. Moreover, without medical training simulators, we were able to carry out the course at some distant areas from Wakayama city from a cost-cutting standpoint. The Wakayama-ISLS course is a feasible off-the-job training course, which achieves successful training on the stroke emergency system based on clinical practice.

Acknowledgment

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Conflicts of interest

There are no conflicts of interest.

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