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# The Effect of a Half-Day Training Program for Students in Multiple Healthcare Disciplines on Communication Support for People with Amyotrophic Lateral Sclerosis using Pre- / Post-tests

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**Abstract:** Augmentative and alternative communication has been used as support for patients with communication disorders. We made a half-day training program on communication support for patients with neurodegenerative disorders, especially amyotrophic lateral sclerosis and implemented it for students in multiple healthcare disciplines at 4 universities. Participants took part in the same training program twice at half-year intervals. We defined the group that took the course for the first time as “Beginners” and the group that took the course 6 months previously as “Experienced”. Fifty-eight participants (105 trials) were obtained from 4 universities and 4 faculties. Beginners’ test scores increased after taking the course. These scores decreased again in the pre-test score 6 months later. However, the score was better than the pre-test score at the time of the first attendance. With the wait-list control design with half-year intervals, the pre- / post-test scores suggested that participants retained a certain level of knowledge for 6 months.

**Keywords:** *Amyotrophic lateral sclerosis, Augmentative and alternative communication, training program, Wait-list control design.*

## 1. INTRODUCTION

Amyotrophic lateral sclerosis (ALS) is one of the cruelest neurodegenerative diseases. Upper and lower motor neuron dysfunction causes progressive loss of voluntary muscle activity, including bulbar impairment (dysarthria and dysphagia) [1,2]. According to the latest data, 9,636 ALS patients in Japan were registered in 2017 [3]. Respiratory failure of ALS directly affects the prognosis. Most ALS patients without any ventilation support cannot live beyond 2 to 5 years from the onset. In Japan, the percentage of tracheostomy and invasive ventilation (TIV) is higher (28%-33%) than in other countries (1%-17%) and there are some long-term survivors [4,5].

ALS causes various communication disorders, not only speaking, writing, but also body expressions [6]. Some ALS patients develop severe difficulties in communication even if they try all means: this condition is referred to as totally locked-in state (TLS). Kawata et al. reported in a cross-sectional survey across Japan that 13% of ALS patients had TLS [7].

Communication is fundamental and essential, not only for patients but also for health care professionals, for

patients’ participation in society, making decisions and achieving symptom relief [6,8]. Augmentative and alternative communication (AAC) has been used to support patients with communication disorders. AAC refers to communication methods that replace speech or writing for those with impairments in spoken or written language. It is a multifaceted approach that involves residual vocalization and communication functions, gestures, signs and communication using a device [9].

Imura (2015) surveyed and reported on the use of AAC and communication support for members of the Japanese ALS Association (patients and families). He reported that the “stand-by group,” which did not yet use AAC had little experience in using information technology (IT) devices such as personal computers and little support was available for the “aborted group,” which discontinued AAC use. The use of IT devices in the early stage of the disease and support for the continued use of AAC were suggested [10].

Communication support for patients requires multi-disciplinary support on the introduction, daily use and longer continuation of AAC. However, even in undergraduate education for healthcare-discipline

students, there opportunities for knowledge and experience about AAC are sparse. After graduation, it is also important to get on-the-job training in each practical field, but hectic job demands tend to put such training behind higher priorities. To create training opportunities in a busy environment, it is necessary to implement the training in a short time. It is expected that young medical professionals who enter the clinical fields with knowledge and skills have a ripple effect on the others. We planned a short-term education program on communication support for patients with ALS for healthcare students who still have more training time [11]. We implemented the education program from March 2018 to September 2019. We evaluated participants' knowledge using pre- / post-tests in a process been reported in 2019 [12]. This time we examined the educational effectiveness of the program using the test.

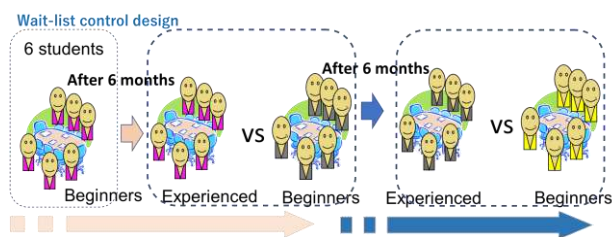
## 2. OBJECTIVE

A short-term education program on ALS communication support was held for students in multiple healthcare disciplines. We aimed to investigate how knowledge was acquired and maintained for half a year by students who learned the content once and those who complete the same program twice using the pre- / post-tests.

## 3. METHOD

### 3.1 Study design

This study used a wait-list control design with a delayed interval of nearly half a year (figure 1).



**Figure 1: Study Design**

### 3.2 Education program and participants

The content of the education program was based on Imura's Guidebook for AAC (2017) through discussions among the authors [13]. The education program comprised lectures on communication support and AAC practices. Additionally, pre- / post-tests were conducted before and after the program in 10 minutes. The test was created by extracting key points from the contents of the guidebook and comprised 10 questions in which

respondents would select 2 of 5 items [12]. The pre- / post-tests were the same.

All participants were openly recruited, payed volunteers of undergraduate students from 4 universities and 4 faculties (medical, nursing, rehabilitation and education: clinical psychology). Participants took part in the same education program twice at half-year intervals. We defined the group that took the course for the first time as "Beginners" and the group that had taken the course 6 months previously as "Experienced".

### 3.3 Ethical approval

This study was approved by the Research Ethics Committee of the Faculty of Medicine, Mie University (No. 3245, March 2018).

### 3.4 Analytical Method

Data analysis was performed using a statistical application, R version 3.5.0. Statistical significance was set at less than 0.05.

## 4. RESULTS

**Table 1: Participant Demographic Characteristics (N = 58)**

		N
Group	Beginners	58
	Experienced	47
Total		105
Age (yrs), mean (±SD)	≥ 20	20.8 (±1.61)
Sex	Male	16
	Female	42
Faculty, n (total)	Medicine	9 (17)
	Nursing	35 (63)
	Rehabilitation	9 (15)
	Clinical Psychology	5 (10)

**Table 2: Pre- / post-test scores**

	Test	Score (out of 10)
Pre-test: beginners	Avg ± standard deviation	5.1 ± 2.0
	Min-max	1-10
Pre-test: experienced	Avg ± standard deviation	6.0 ± 2.1
	Min-max	2-10
Post-test beginners	Avg ± standard deviation	6.9 ± 1.9
	Min-max	0-9
Post-test experienced	Ave ± standard deviation	7.2 ± 1.8
	Min-max	1-10

Fifty-eight students participated in the program. Each participant attended the program twice, except for 11 students who took the course only once because of their study period. We had 105 trials in total.

**Table 3: Test score for each faculty**

test	medical	nursing	rehabilitation	clinical psychology	p value
pre-test: beginners	5.5 +/- 3.0	5.3 +/- 2.2	4.8 +/- 1.4	4.8 +/- 0.8	0.879
pre-test: experienced	5.8 +/- 1.7	5.9 +/- 2.3	7.0 +/- 2.0	5.4 +/- 1.1	0.461
post-test: beginners	7.0 +/- 1.4	7.1 +/- 2.0	6.0 +/- 1.9	6.6 +/- 2.1	0.484
post-test: experienced	7.5 +/- 1.7	6.8 +/- 2.0	7.6 +/- 1.4	8.2 +/- 1.3	0.378

Table 1 showed the demography of the participants., which consisted of nursing students 35 (60.3%), medical students 9 (15.5%), rehabilitation students 9 (15.5%), and pedagogical students in clinical psychology 5 (8.6%).

Table 2 showed the average test scores for each group. Shapiro-Wilk test confirmed that each data point followed a normal distribution.

The scores between pre- / post-tests in the Beginners were compared using paired t-test. The average post-test score was 1.79 points higher ( $p < 0.001$ ,  $n = 58$ ).

We compared the post-test scores of the first attendance to the pre-test scores of the second one in the same participants by the paired t-test. Participants who took the course only the first one were excluded. The average pre-test score at the second attendance in the Experienced group was 0.89 points lower than post-test scores at the first attendance ( $p = 0.028$ ,  $n = 47$ ).

We compared the pre-test scores of the Beginners and the Experienced group using the unpaired t-test. The average score of the Experienced group was 0.88 points higher ( $p = 0.031$ , beginners:  $n = 58$ , experienced:  $n = 47$ ).

Table 3 showed the test scores for each faculty. The data were confirmed to have equal variance using the Bartlett test. The average of the test scores in 4 faculties was compared by one-way analysis of variance. There was no significant difference in the test scores among faculties.

## 5. DISCUSSION

In this study, 58 participants (total of 105 trials) were recruited from 4 universities and 4 faculties. There might be some weakness in that 35 participants were nursing students (60.3%, 63 trials) and gender imbalance towards women (72%). However, the results of 9 medical (15.5%, 17 trials), 9 rehabilitation (15.5%, 15 trials) and 5 clinical psychology (8.6%, 10 trials) could be judged to be statistically analyzable.

The test scores for the Beginners increased after taking the course once. This could be considered an effect of attending a single program. The post-test score, which had increased, decreased in the pre-test after the 6-month period. However, the score was better than the pre-test

score at the time of the first attendance. Taylor et al. (2017) examined the effects of pre- / post-test scores on pre-class work and recitation activities during class with 264 university students who took biochemistry courses. Compared with the control group, which did not perform pre-class work and recitation activities, the group that did perform these scored higher. However, after 8 months, they reported that the learning effect was not maintained [14]. In our study, it was considered that the participants' knowledge was maintained to a certain extent until 6 months later, even if they attended a single program.

There was no difference between the pre- / post-test scores for each faculty. This might be related to the small number of participants outside the nursing faculty.

"The guidebook to assist introduction of AAC for patients with neuromuscular disorders," which was provided as the material for this program, was distributed to medical facilities throughout Japan along with questionnaires about the contents. The guidebook was reorganized based on the response ( $n = 130$ ) and the final version was published online [13,15]. We could not find any more suitable materials on communication than this guidebook.

US ALS guidelines were published by American Academy of Neurology in 1995 and a revised edition was published in 2009. It states that "communication is fundamental to effective participation in life," but gives no description of specific support methods [2]. In Europe, guidelines on the clinical management of ALS were published in 2005 and revised in 2012. Communication content was included and the use of AAC for maintaining communication was recommended. As in the United States, these guidelines emphasized the importance of communication. However, we could not find more than some introduction of various AAC devices [16]. No guideline provided sufficient systematic contents about communication support except for the Imura's guidebook.

The education program based on the guidebook was confirmed to be effective to some extent in pre- / post-tests even in multidisciplinary leaning. However, this study was conducted only at 4 universities and 4 faculties. The number of samples in each faculty was so small that it may have caused no difference in scores among faculties.

## 6. CONCLUSION

We created a half-day education program on communication support for patients with neurodegenerative disorders, especially ALS, and implemented it for students in multiple healthcare disciplines at 4 universities. With the wait-list control design with half-year intervals, the pre- / post-test scores suggested that participants retained a certain level of knowledge for 6 months.

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