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# Understanding the burden in communication through a short-term education program with practical experiences

– Focus on VAS differences among method and transition through experience –

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**Abstract:** We designed and implemented a short-term educational program with practical experiences for students on communication support for patients with neurodegenerative disorders. We aimed to (1) clear and dissolve the factor of burden in communication through students' understanding, (2) evaluate and maintain the effects of understanding this burden through practical experiences. Two lectures and one experience session that included a three method communication trial was conducted four times every 6 months. The students learned this program two consecutive times. The burden was recorded and evaluated by a visual analog scale (VAS) before/after using the three methods. A difference in the trend between the beginners' and experienced group was found - the former felt that communication would be possible by using some tools before the experience. While comparing the before/after experience, the significant differences found in the beginners' group was higher as compared to the experienced group. Almost no significant difference was found between (a) the same 1st and 2nd item and (b) the after 1st and before 2nd experience. The VAS of the before experience had high significant difference before it eventually transitioned to low. The burden was low while using any tool with a good timing or signal to the device or partner. We presume that participants understood the factor of burden and found a solution during the 1st experience to realize it at re-learning. Therefore, maintaining experiences 6 months apart, suggested the effect of repeated learning.

**Keywords:** Amyotrophic Lateral Sclerosis (ALS), Augmentative and Alternative Communication (AAC), Burden, Experience, VAS

## 1. INTRODUCTION

Patients with neurological diseases such as advanced amyotrophic lateral sclerosis (ALS) have difficulty in communication. They need Augmentative and Alternative Communication (AAC). There is a conceptual scheme of AAC in Japan, as shown in Figure 1.[1] AAC is a general inclusive concept, covering non-information technology (IT) methods and IT products; and includes personal computers, portable voice output communication aids, and Japanese scanning communication aids (JSCA) --listed in order from non-specific to specifically dedicated products.

However, AAC was not always used in appropriate and adequate ways because of insufficient support.[2] It should be noted that there are difficulties in acquiring experience in clinical practice because the number of patients is very low. So, we designed and evaluated a short-term education program with practical experiences for students in multiple health-care fields. [1,3]

AAC	non IT	"kuchimoji" etc.	
		communication board	
	IT	devices based general PC (with specific equipments)	
		specifically dedicated products	VOCA

AAC: augmentative and alternative communication  
IT: information technology  
PC: personal computer  
VOCA: portable voice output communication aid  
JSCA: Japanese scanning communication aid

**Figure 1:** Conceptual scheme of AAC in Japan

## 2. OBJECTIVE

In this report, we focus on the differences and transition of the visual analog scale (VAS) as the sense of burden. We aimed to clear and dissolve the factor of burden in communication, through students' understanding.

In addition, we evaluated and maintained the effects of understanding the burden of communication through practical experiences by re-learning this program.

### 3. METHOD

#### 3.1 Outline of the Education program

Our education program consists of two lecture sessions and one experience session that includes a three method communication trial (shown in Table 1). There are a few topics, group discussions for retrospection after topics and self-evaluation of burden, in each session.

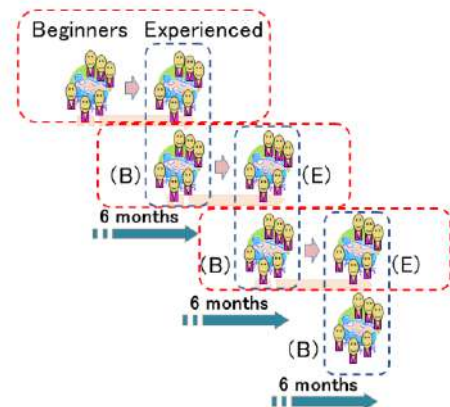
We recorded the following: (1) sense of burden (using 100mm VAS) before/after experiences and (2) the number of characters transmitted about three methods in Session II. Additionally, we imposed a Pre-/Post-test before Session I/after Session III, in order to confirm whether the students understood the lecture with burden VAS.

**Table 1:** Curriculum of education program

<b>I. Lecture of introduction</b>	
–About ALS pathology and actual circumstances care	
–Multidisciplinary cooperation of Communication support	
<b>II. Practical exercises of communication</b>	
–Cross-shaped (flick-type) communication board (Flick)	
–Comprised an oral and eye-blink method without a board (Kuchi-moji)	
–Japanese scanning communication aid (JSCA)	
<b>III. Lecture of detailed exposition</b>	
–Selecting and adjusting communication aids(CA) and public support systems	
–Contents of the support corresponding to the progression/stage of ALS	

The participants are undergraduate students in health-related disciplines such as nursing, medical, rehabilitation and clinical psychiatry. This program was held four times every 6 months and they learned this education program two consecutive times (as shown in Figure 2.). Therefore, all participants were beginners in the first period. In the second period, there were experienced participants and beginners together.

**Figure 2:** Protocol of lecture and evaluation



#### 3.2 Evaluate of effect

Attributes of participants are shown in Table 2. We compared the VAS of each method to clear the factor for a high sense of burden, before/after experiences to clear the effect of learning and 1st/2nd experiences to clear the effect re-learning. Self-evaluation VAS after the experience was subdivided after Period 2. Hence, we compared it only to period 2 and period 3. VAS is shown as average +/- SD with p-value in tables 3 to 7.

Data analysis was performed using a statistical application, SPSS version 25. Statistical significance of paired sample t-test was set at less than 0.05.

**Table 2:** Attribute of participants

Univ.	course	sex	Period-0/1	Period-1/2	Period-2/3	Period-3	Total(*)
MU	Medical	male	(4)	2	1	0	3
		female	(0)	0	1	1	2
	nursing	male	(0)	0	0	1	1
		female	(2)	4	4	1	9
SUMS	nursing	male	0	0	0	0	0
		femare	6	6	2	14	
CGU	nursing	male	1	0	0	1	1
		female	2	3	3	8	
Rehabilitation	male	2	0	1	3	3	
	female	1	3	2	6		
AUE	clinical	male	1			1	
	psychiatry	female	4			4	
Subtotal			(6)	23	18	11	52

(\*) Total: participants except Period-0/1

MU : Mie University  
SUMS : Suzuka University of Medical Science  
CGU : Chubu Gakuin University  
AUE : Aichi University of Education

#### 3.3 Ethical approval

This study was approved by the Research Ethics Committee of the Faculty of Medicine, Mie University (No. 3245, March 2018), Chubu Gakuin University & College (No. D18-0004, June 2018).

### 4. RESULTS

#### 4.1 Compared by method

The transitions of VAS before/after experience on three methods are shown in Table 3. The before experience had significant differences in each method. The highest VAS was Kuchimoji, that doesn't use any tools, and lowest was JSCA as an IT based AAC.

The VAS after experience was higher than before on every method. On Flick and Kuchimoji, VAS for the role of presenter was higher than the VAS for the role of the confirmer. Significant differences were found between the before and after (presenter), but none found between before and after (confirmer). On JSCA, the highest VAS was recorded after experience (before adjustment of scanning speed), and after adjustment, the VAS was transitioned lower.

**Table 3:** Transitions of VAS in overall participants (N=70)

	Before experience:	After experience(upper) (lower)	Presenter Confirmer	
Flick	24.2 +/- 18.2	36.8 +/- 22.2 28.3 +/- 17.1	p=0.000** p=0.185	} p=0.001*
Kuchi-moji	43.1 +/- 20.2	51.8 +/- 27.5 45.1 +/- 22.8	p=0.027* p=0.678	} p=0.055
	Before experience:	After experience(upper) (lower)	Before Adjustment After Adjustment	
JSCA	16.3 +/- 15.4	34.6 +/- 26.1 20.1 +/- 14.8	p=0.000** p=0.032*	} p=0.032*

p-value of each method before experience:  
(F)-(J) p=0.001\*\*, (F)-(K) p=0.000\*\*, (K)-(J) p=0.000\*\*

## 4.2 Compared by experience

### (1) Beginners group

There were 29 beginners, who had not experienced this education program. Their VAS before/after experience in the three methods is shown in Table 4. There was no significant difference between Flick and JSCA at before experience. This was a specific trend.

The VAS after experience was higher than before on every method and it was the same trend as the overall comparison. Although there was a high significant difference between the before and after (confirmer) on Flick, it was not the same trend as the overall comparison.

**Table 4:** Transitions of VAS in beginners group (N=29)

	Before experience:	After experience(upper) (lower)	Presenter Confirmer	
Flick	19.4 +/- 14.9	40.6 +/- 29.7 30.3 +/- 17.5	p=0.000** p=0.015*	} p=0.010*
Kuchi-moji	40.7 +/- 18.3	56.8 +/- 27.0 47.5 +/- 20.0	p=0.013* p=0.150	} p=0.062
	Before experience:	After experience(upper) (lower)	Before Adjustment After Adjustment	
JSCA	15.1 +/- 8.8	36.1 +/- 26.4 20.8 +/- 14.3	p=0.000** p=0.046*	} p=0.001**

p-value of each method before experience:  
(F)-(J) p=0.149, (F)-(K) p=0.000\*\*, (K)-(J) p=0.000\*\*

### (2) Experienced group

There were 41 participants, who had experienced this education program. Their VAS before/after experience in the three methods is shown in Table 5. Before the experience, there were significant differences among each method - same trend as the above.

The Average VAS of after experience was higher than the before experience on every method, except between the before and after (confirmer) on Flick and Kuchimoji. However, there were no significant differences except between before and after (before adjustment) on JSCA.

**Table 5:** Transitions of VAS in experienced group (N=41)

	Before experience:	After experience(upper) (lower)	Presenter Confirmer	
Flick	27.6 +/- 19.7	34.2 +/- 23.1 26.9 +/- 16.9	p=0.122 p=0.872	} p=0.047*
Kuchi-moji	44.7 +/- 21.6	48.1 +/- 27.6 47.3 +/- 27.8	p=0.519 p=0.515	} p=0.325
	Before experience:	After experience(upper) (lower)	Before Adjustment After Adjustment	
JSCA	17.2 +/- 18.7	33.5 +/- 26.2 19.6 +/- 15.3	p=0.000** p=0.287	} p=0.000**

p-value of each method before experience:  
(F)-(J) p=0.004\*, (F)-(K) p=0.000\*\*, (K)-(J) p=0.000\*\*

### (3) Transition from a beginner to an experienced student

There were 18 participants, who had experienced this education program two times. Their VAS of the 1st(beginner)/2nd(experienced) are shown in Table 6. There was significant difference only in the after (presenter) of Kuchimoji.

**Table 6:** Compare of VAS in two times (N=18)

		1st(beginner)	2nd(experienced)	p-value
Flick	Before	20.1 +/- 14.2	27.4 +/- 16.0	p=0.193
	After (p)	45.8 +/- 20.9	42.9 +/- 21.7	p=0.616
	After (c)	36.1 +/- 16.6	30.8 +/- 17.1	p=0.353
Kuchi-moji	Before	43.9 +/- 17.3	43.1 +/- 23.7	p=0.905
	After (p)	59.0 +/- 28.1	42.6 +/- 27.0	p=0.010*
	After (c)	53.9 +/- 22.2	39.6 +/- 25.5	p=0.053
JSCA	Before experience	15.7 +/- 9.8	20.0 +/- 20.1	p=0.298
	Before Adjustment	39.2 +/- 27.2	32.2 +/- 24.3	p=0.291
	After Adjustment	21.2 +/- 13.3	20.3 +/- 15.4	p=0.794

Table 7 shows continuity after the 1st experience to before the 2nd experience; with a gap of 6 months. There was lower significant difference in between the 1st-after (presenter) and 2nd-before on Flick and Kuchimoji.

**Table 7:** Transitions of VAS between two times (N=18)

	1st-After experience (upper) Presenter (lower) Confirmer	2nd-Before experience	p-value
Flick	45.8 +/- 20.9	27.4 +/- 16.0	p=0.008**
	36.1 +/- 16.6		p=0.050
Kuchi-moji	59.0 +/- 28.1	43.0 +/- 23.0	p=0.019*
	53.9 +/- 22.2		p=0.157
	1st-After experience (After Adjustment)	2nd-Before experience	p-value
JSCA	21.2 +/- 13.3	20.0 +/- 20.1	p=0.782

## 5. DISCUSSION

We presume that the VAS before practice is the burden that the participants impression. There were significant differences between each method in the overall and experienced groups.

However, in the beginners' group, there was no significant difference between Flick and JSCA, and both were low. Therefore, we guessed; they thought communication would be possible by using some tools as an impression before the experience. There was a partner on Flick and Kuchimoji. Hence, their burden was a difference between the presenter role and the confirmer role. Under all conditions, the VAS of the presenter role had a higher burden than the confirmer role.

A comparison of the sense of burden before and after the experience showed a difference in trend between the beginners and the experienced. In the experienced group, there was no significant difference in the sense of burden before and after the experience (except JSCA). On JSCA, VAS of after experience with default values transitioned to high. When after the experiences, by adjusting the speed to their own good, the VAS translated to low. Therefore, not being able to communicate at your own pace may be a factor of high burden.

There was no significant difference between the 1st (as beginner) and 2nd time (as experienced) same evaluation item (except Kuchimoji after an experienced role of the presenter). Kuchimoji after an experienced role of a presenter the 1st time had the highest VAS, which transitioned to low the 2nd time.

We continuously evaluated the VAS transitions between after the 1st experience to before the 2nd experience. There was lower significant difference only at the Frick and Kuchimoji role of presenters. The reason for no significant difference in others could be because the participants understood the factor of burden and found the solution during the first learning experience. In others, there was no significant difference. Therefore, this indicates that the results were maintained employing the 6 months apart process, suggesting the effect of repeated learning.

## 6. CONCLUSION

We designed a short-term education program with practical experiences on communication support for patients with neurodegenerative disorders, especially ALS, and implemented it for students in multiple healthcare disciplines at four universities.

We found the burden and the points of improvement through communication experiences in three different

ways; (1) VAS was lower in case of using tools, (2) VAS of the presenter role had a higher burden than the confirmer role and (3) not being able to communicate at your own pace could be a factor of high burden.

VAS transitions between the 1st to before 2nd experience had no or lower significant difference, hence short-term education programs with practical experiences can be useful.

However, it should be understood that not all VAS are inexpensively low. The participants did not eliminate the burden but they understood that there were high burden communication methods.

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