



Quality Assessment of Newly Modified Patient Diagram on Oral Exercise

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Abstract

Oral exercises provided by healthcare professionals have improved functional outcomes in various patients, such as cancer patients, post-stroke patients, and elderly patients. Among several patient education methods, the diagram is helpful to supplement written and oral information for those limited in their ability to read. Therefore, the diagram must be a more universal and comfortable tool to provide patient education to a broad population. This study aimed to modify and design a self-instruction oral exercise diagram for Thai patients and evaluate the quality of the oral exercise diagram.

The certified Japanese-Thai interpreter translated and re-translated the oral exercise diagram in our study to ensure the critical message and slightly modified it for readability. According to the pilot study, we altered the illustration for the Thai context. Nine invited experts involving oral care for the elderly have evaluated the oral exercise diagram's content using the Agency for Healthcare Research and Quality's Patient Education Materials Assessment Tool for printable materials (PEMAT-P) via electronic survey. The data analysis uses descriptive statistics. The median understandability (100%), actionability (100%), and overall scores (95.83 %) from the PEMAT-P survey support the diagram's utility for patient education. The results showed that our newly modified patient education diagram for self-instruction on oral exercise provides practical and easy-to-follow patient information to improve oral function, particularly in the elderly.

Keywords: *Health education, Oral exercise*

1. Introduction

Oral health is vital to overall health, and good oral health improves a person's ability to speak, smell, taste, masticate, and swallow (Hescot, 2017; Minakuchi et al., 2018; Pretty et al., 2014; Su, van Wijk, & Visscher, 2021). Moreover, much evidence has shown a link between oral health and overall health, as the oral cavity is the primary entry point for the digestive and respiratory tracts. Hence, some oral diseases can cause disease in another system (Gil-Montoya, de Mello, Barrios, Gonzalez-Moles, & Bravo, 2015).

The number of oropharyngeal cancer survivors and other chronic diseases such as stroke increases as medical technology advances and the number of older people grows. Surgical therapy, radiotherapy, chemotherapy, and multiple medications cause essential impairment in oral functions such as mastication, swallowing, and speaking (de Groot et al., 2020; Matsuda et al., 2021). Several types of neurological, structure, and muscle damage from these treatments and chronic conditions can cause oral or pharyngeal dysphagia (Griffin, Jones, Brunson, Griffin, & Bailey, 2012; Nakamori et al., 2016; Umemoto, Tsuboi, Kitashima, Furuya, & Kikuta, 2011). Additionally, some patients also suffer from xerostomia and tooth damage. These conditions can severely limit patients' activities and lead to low oral health-related quality of life (Barrios, Tsakos, Gil-Montoya, Montero, & Bravo, 2015; Venkatesan, Ramalingam, Seenivasan, & Narasimhan, 2020).

In recent years, functional outcomes and quality of life have increasingly interested in clinical routine, cancer research, and geriatric dentistry. Hence, pre-treatment functional assessment is essential to plan the rehabilitation, supportive care, preventive therapy, and post-treatment rehabilitation to reduce oral functional problems. For example, healthcare professional exercises have improved functional outcomes in cancer treatment, post-stroke patients, and elderly patients (Barkmeier-Kraemer & Clark, 2017).



One crucial general barrier limiting a person's preventive interventions and treatments is social determinants such as limited access to and availability of dental services, lack of awareness of the need for care, and low education and income levels. Nevertheless, potential strategies to improve access to dental services and improve oral health, such as enhancing rehabilitation methods and increasing the capacity and accessibility of dental health programs to provide preventive oral health services, must be helpful (Vargas, Chuang, & Lee, 2014).

Among several patient education methods, the diagram is helpful to supplement written and oral information for those limited in their ability to read. Difficulties in processing written instructions may attribute to age, low literacy, and comorbidities in the elderly such as vision impairment. Therefore, the diagram must be a more universal and straightforward tool to provide patient education to a broad population (Reeves et al., 2020; Schorr, Hunter, & Zuzelo, 2018).

The survey about oral healthcare in Thailand showed the inequity of oral health service utilization. The oral health literacy promotion is one of the oral health policies that can create an equitable oral health service system (Tussanapirom, Panichkriangkrai, & Vongmongkol, 2019). An effective patient education material is a part of achieving better health literacy, so our study aimed to develop easy-to-follow patient material on oral exercise.

2. Objectives

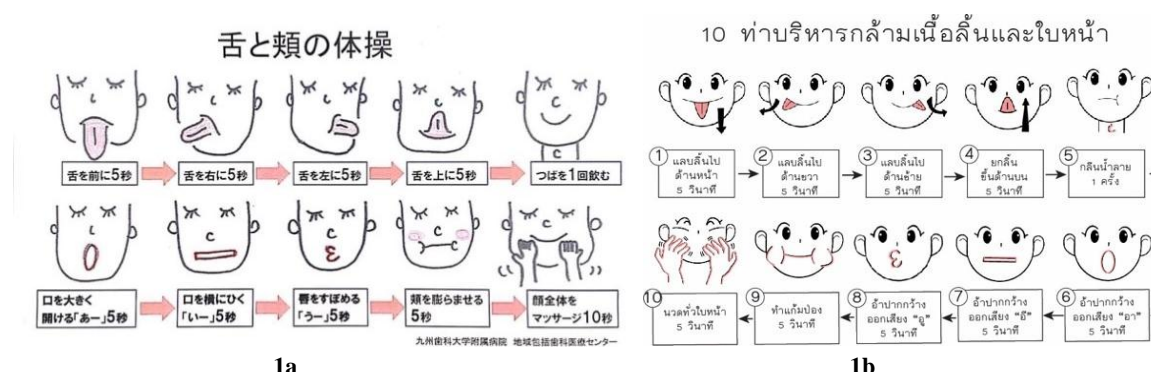
- 1) To modify the prototype diagram for self-instruction purposes.
- 2) To evaluate the overall quality of the newly modified oral exercise diagram.

3. Materials and Methods

3.1 The development of the research tool (oral exercise diagram)

3.1.1. Translation and modification

Japanese uses illustration in public communication and media widely, including health education materials. The simple oral exercise in Japan is called Kenkobi or sometimes called Kenko-taiso. The original oral exercise diagram in our study is in Japanese. Before administering the diagram to subjects with cultural and linguistic differences, it had to be translated and validated. The illustration of the oral exercise diagram was translated from Japanese into Thai by a licensed interpreter, who was fluent in both languages, and then translated back into Japanese by another interpreter. The translator compared the back-translated and original versions to determine the quality of the translation. We tested the readability of the content, and it is suitable for the primary school level of education. The diagram is then slightly modified to be compatible with Thai font and Thai people, but all contents remain intact as much as possible (Figures 1a and 1b).



Figures 1a and 1b. The original (Left, a) and newly modified oral exercise diagram (Right, b)



Details of the diagram in English in order 1-10 are as follows: 1 Stick your tongue out straightly and hold for five seconds; 2 Stick your tongue out to the right and hold for five seconds; 3 Stick your tongue out to the left and hold for five seconds; 4 Stick your tongue out and move upward and hold for five seconds; 5 Gulp down your saliva one time; 6 Say “Aah” and continue for five seconds; 7 Say “Eeh” and continue for five seconds; 8 Say “Ooh” and continue for five seconds; 9 blow your cheeks and hold for five seconds; 10 Massage around your cheek for five seconds.

3.1.2. Overall quality assessment of the diagram by PEMAT-P

The PEMAT-P consists of items to measure understandability ($n = 17$), and actionability ($n = 7$) which is the tool in this study. An independent expert panel is needed to determine instrument appropriateness, accuracy, and representativeness within the relevant practice domain. Nine invited experienced healthcare professionals to participate in the project. Participants represented a variety of settings and organizations, including public healthcare facilities and schools.

All participants evaluated the diagram via an online survey program (survey monkey) and then completed scoring the diagram for understandability and actionability using the PEMAT-P scoring system.

3.2. Data collection and Data analysis

The electronics platform will submit the Diagram and PEMAT-P assessment tool, including a free-text comment box. Survey data was blinded, and free-text comments were reviewed, compiled, and organized.

The performance assessment raters were two experienced dentists (ten years or more in practice). They calibrated their scoring from the pilot study video to ensure reliability. The group of subjects was blinded. Then, they assessed the patient's performance from video recordings under the same condition and at the same time to avoid bias in the evaluation. The scoring will be correct (1) and incorrect (0) for each posture and then calculated into analysis percentages.

We analyzed the data using Statistical Package for the Social Sciences (IBM Corp. SPSS Statistics for Mac, Version 28.0.1, Armonk, NY, USA) to determine the descriptive analysis and suitable inferential statistics for comprehensive demographic data, overall PEMAT-P score, and performance score.

The PEMAT-P guide instructed the participants to agree if the criterion was met 80% to 100% of the time. This guidance helped minimize scoring challenges, and we analyzed any items with high discrepancies with the appropriate method.

4. Results and Discussion

4.1 Quality assessment of the newly modified diagram by PEMAT-P

All invited experts (100%) responded to the online survey anonymously. The experts have been working in oral rehabilitation and senior care for at least five years. Table 1 shows the details of responder characteristics.

Table 1 Descriptive data of the inviting experts ($n=9$)

Details	N (%)
Gender	
Male	5 (55.56)
Female	4 (44.44)
Specialty	
Geriatric dentist	2 (22.22)
(*Note that one of them is also qualified in Dental Public Health care)	
Oral medicine and oral pathologist	2 (22.22)
Prosthodontist and Maxillofacial prosthodontist	2 (22.22)
Maxillofacial surgeon	1 (11.11)
Rehabilitation medicine (MD)	1 (11.11)
A double degree in dentistry and medicine	1 (11.11)

**Workplace**

Academic institute	5 (55.56)
Public healthcare facilities	3 (33.33)
Private practice	1 (11.11)

From PEMAT-P analysis, determine the quality of the patient material. The mean scores from nine experts were calculated and summarized in Table 2. Our diagram has met the criteria of PEMAT-P to be a good quality patient material in all sections of PEMAT-P (score more than 70%), which are understandability (94.34 % \pm 9.00), actionability (91.53 % \pm 13.63), and overall scores (93.56 % \pm 8.82).

Table 2 PEMAT-P Descriptive analysis (n=9)

Variables	PEMAT-P scores					
	Mean	Min	25 Percentile	Median	75 Percentile	Max
Overall scores	93.56	72.73	90.91	95.83	100	100
Understandability	94.34	73.33	90.81	100	100	100
Actionability	91.53	66.67	78.57	100	100	100

The percentage agreement of each item among nine experts is shown in Table 3. Twelve items out of twenty-four items scored 100 percent agreement (50%), while five items have agreements less than 80 percent (20.83%).

Table 3 Percentage agreement between nine experts on each PEMAT-P item

Item #	Section	Percentage agreement %
Topic: Content		
1	The material makes its purpose completely evident.	100
2	The material does not include information or content that distracts from its purpose.	100
Topic: Word choice and style		
3	The material uses common, everyday language.	100
4	Medical terms are used only to familiarize the audience with the terms. When used, medical terms are defined.	100
5	The material uses the active voice.	100
Topic: Use of numbers		
6	Numbers appearing in the material are clear and easy to understand.	88.89
7	The material does not expect the user to perform calculations	88.89
Topic: Organization		
8	The material breaks or "chunks" information into short sections.	100
9	The material has informative headers	77.78
10	The material presents information in a logical sequence	100
11	The material provides a summary	55.56
Topic: Layout and design		
12	The material uses visual cues (e.g., arrows, boxes, bullets, bold, target, font, highlighting) to draw attention to key points	100
Topic: Use of visual aids		
13	The material uses visual aids whenever they could make content more easily understood (e.g., illustration of healthy portion size)	100
14	The material aids reinforce rather than distract from the content.	88.89
15	The material's visual aids have clear titles or captions.	88.89



Item	Section	Percentage agreement
16	The material uses illustrations and photographs that are clear and uncluttered.	88.89
17	The material uses simple tables with short and clear row and column headings	66.67
#	Actionability	%
18	The material identifies at least one action the user can take.	100
19	The material addresses the user directly when describing actions.	88.89
20	The material breaks down any action into manageable, explicit steps.	100
21	The material provides a tangible tool (e.g., menu planners, checklists) whenever it could help the user take action.	88.89
22	The material provides simple instruction or examples of how to perform calculations	55.56
23	The material explains how to use the charts, graphs, tables, or diagrams to take actions	66.67
24	The material uses visual aids whenever they could make it easier to act on the instruction.	100

According to the results and comments from the experts, we improved the diagram with a percentage agreement of less than 80 percent before using it with the subjects in the initial implementation (Table 4 and Figure 1).

Table 4 Items need adjustment following percentage agreement on PEMAT-P evaluation.

Details		Percentage agreement
Item#	Understandability	
9	The materials have informative headers	77.78
11	The material provides a summary	55.56
17*	<i>The material uses simple tables with short and clear row and column headings</i>	66.67
Item#	Actionability	
22*	<i>The material provides simple instruction or examples of how to perform calculations</i>	55.56
23	The material explains how to use the charts, graphs, tables, or diagrams to take actions	66.67

**Note that our diagram does not provide items 17 and 22.*



10 ท่าบริหารกล้ามเนื้อลิ้นและใบหน้า

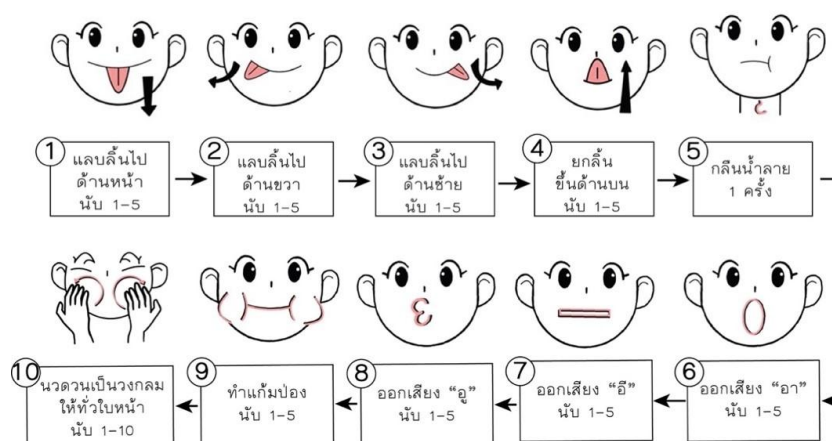


Figure 2 shows the outcome of the oral exercise diagram by altering the items listed in table 4

4.2. Discussion

Health literacy is crucial to maintaining an excellent quality of life in all patient groups, particularly the elderly, whose overall health and oral health become decelerating. Health education is one pathway to improving individual capacities in health literacy. This concern leads to our rationale for conducting this study about providing good quality health educational material on oral exercise.

The main objective of this study aimed to modify and design a good quality patient material for oral exercise. Our team chose PEMAT-P as an assessment tool to determine the quality of the diagram, which is relatively new in Thailand. As far as we research, only one dissertation by the master's degree student of Art in Career English for International Communication used the PEMAT in the study about a comparative evaluation of patient education materials on rheumatoid arthritis from two private hospitals in Thailand (Teeranan Pinthong, 2019).

Another team from Siriraj Hospital recently published their research about educational materials assessment tools by translating the CDC Clear Communication Index tool into Thai (Fakkheaw, Suwanwaree, Mounngern, Thintip, & Mirattanaphrai, 2021). However, the CDC Clear Communication Index tool evaluates mainly the clarity and reader's understandability of the vital message, not the actionability. Our team has not found the implementation of PEMAT in Thai articles to date, and hence, introducing PEMAT has instead been encouraged and interesting.

The certified Japanese-Thai interpreter has processed the translated and re-translated the oral exercise diagram in our study to ensure the key message of the material. We slightly modified the illustrations' design to fit the Thai people's context and preferences.

The AHRQ, the agency that developed PEMAT, suggests interpreting the educational material evaluation as good quality at the cut-point of 70%. From descriptive analysis, the PEMAT's results from nine experts have high scores on all three sections: understandability (Median 100%), actionability (Median 100%), and overall scores (Median 95.83 %). Accordingly, our newly modified diagram has good quality to use with the patient as educational material.

AHRQ and previous studies interpreted the PEMAT results with the total scores on three sections and the agreement between the experts (Lipari, Berlie, Saleh, Hang, & Moser, 2019; Shoemaker, Wolf, & Brach, 2014; Wong, Gilad, Cohen, Kirke, & Jalisi, 2017). The agreement between experts did not directly reflect the quality of the material but showed the results' internal consistency and provided helpful information to improve the material. In this study, we used the percentage agreement to verify the consensus between the experts.



The percentage agreement of our diagram on each item of PEMAT-P has five topics that have not reached the 80% of consensus. Most of these below 80% score items are due to our diagram being concise material, or those items are not applicable. Besides the score of the topic under 80% agreement, we also adjusted our diagram from the additional expert's comment section before applying the diagram with the research subjects.

5. Conclusion

Our newly modified patient education diagram on oral exercise provides data that are easy to understand and practice to improve oral function.

6. Acknowledgements

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