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Innovative dot codes on press through packages (PTP) for visually impaired patients

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Abstract

Most blind people rely on sound information; however, the provision of this information is not satisfactory. More than 50% of drugs in Japan are distributed in Press through Packages (PTP), and there are currently no regulations for the provision of appropriate information for blind people.

Innovative Dot PTP provide visually impaired patients with sound information by touching an infrared ray radiation scanner pen to the PTP. After instructing subjects on the use of Dot PTP, we investigated the usefulness and usability of innovative Dot codes with PTP based on interviews and objective information.

The results of interviews and NRS were analyzed.

Instructions for the use of Dot PTP were evaluated as understandable by most visually impaired patients. Sound information provided appropriate drug information for blind subjects.

Considering the aging society, cost-effective innovations, such as Dot PTP, may contribute to the spread of universal designs in the society.

Keywords: dot code, press through package (PTP), visually impaired patients, innovation, usability, social needs

1. Introduction

Approximately 310,000 people in Japan are visually impaired, and include those with total blindness and amblyopia^[1]. Based on future population compositional changes in Japan, the number of visually handicapped individuals is expected to become higher with increases in the number of elderly individuals^[2]. “Braille” is the most famous writing system for the visually impaired; however, only 12.7% of all visually impaired individuals have the ability to use it^[3]. Therefore, most blind people rely on sound information; however, the provision of this form of information is not satisfactory. More than 50% of drugs in Japan are distributed in Press through Packages (PTP), and there are currently no regulations for the provision of appropriate information for blind people^[4, 5, 6]. Although some pharmacies use touch seals or sound barcodes for blind patients, this service is very rare. Tablets and capsules are the most popular drug types and are distributed in PTP. Sound information is needed for visually impaired patients who are given PTP.

Innovative Dot PTP (Ai-PAC® II^[7]) provide visually impaired patients with sound information by touching an infrared ray radiation scanner pen to the PTP. After instructing subjects on the use of Dot PTP, we investigated the usefulness and usability of innovative Dot codes with PTP based on interviews and objective information.

2. Materials & Methods

2.1 Innovative Dot PTP

We used Ai-PAC® II (UACJ Corporation, Tokyo, Japan)^[7] for Innovative Dot PTP. This is a two-dimensional code (GridOutput®, Grid mark Inc., Tokyo, Japan) in which the unit of the array is approximately 2 mm square, and this region is composed of minimal points (dots)^[8]. The dot diameter is approximately 50 µm, which is not visible^[7]. It may be printed on PTP sheets regardless of the design. This code may be printed with ink-absorbing infrared rays and outputs audio information by reading with an infrared scanner^[7].

2.2 Sound pen

We used G-Talk® (Gridmark Inc., Tokyo, Japan)^[9] as the sound pen in the present study. It reads invisible dot codes and outputs corresponding sounds. G-Talk® provides audio

information using a woman’s voice. Audio information is updated with an SD card.

2.3 Sound information

We used drug information on “Adalat® CR Tablets [10]” provided by Yakuji Nippo Limited [11], and converted this information to sound information. “Adalat® CR Tablets” are

nifedipine extended-release tablets that are commonly used antihypertensive agents in Japan.

After agreeing to participate in the present study, 10 blind subjects answered questions on G-Talk®. We explain how to use G-Talk® (Fig. 1), and then asked subjects to use it.

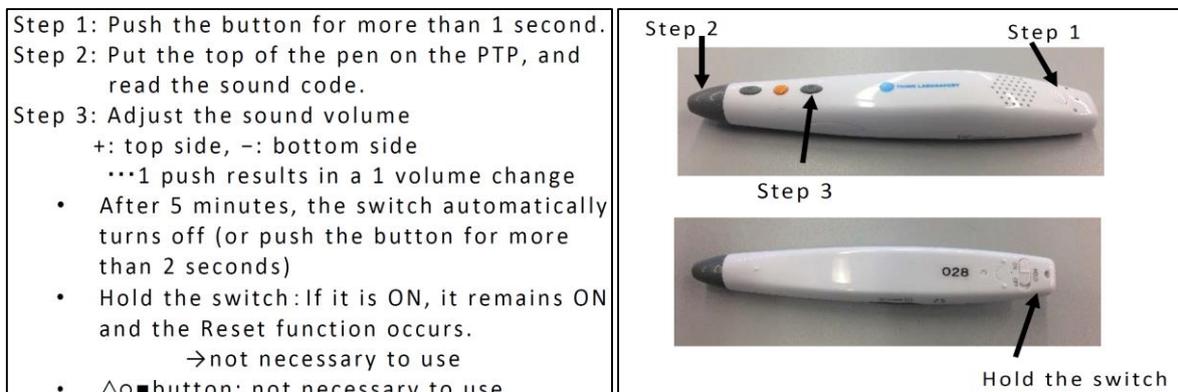


Fig 1: G-Talk® and operating procedure

The instructions provided were ‘turn on the power’, ‘read the sound code’, and ‘adjust the volume of sound’.

After we confirmed subject understanding, we evaluated the following:

1. A sensory test on the usability of G-Talk®
2. A sensory test on the feasibility of reading 3 types of PTP

with G-Talk® (Fig. 2)

3. Choice of sounds among 4 different types (Table 1)
4. Opinions on the usefulness of this system with G-Talk® and PTP

Throughout the procedure, an evaluator conducted objective evaluations.

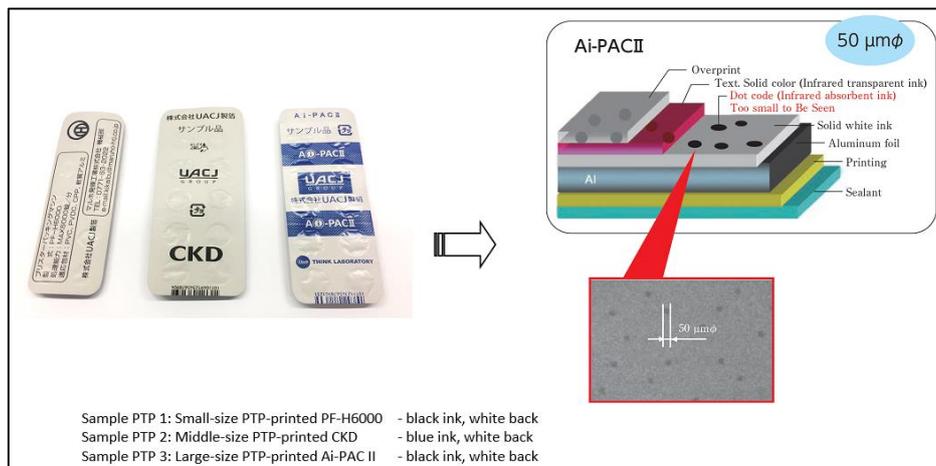


Fig 2: Sample PTP used in the present study

Table 1: Sentences read as sound information in the present study

1	Name of the drug	This drug is Adalat®CR 20 mg.
2	Effects of the drug	Vasodilatory effects and decreases in blood pressure. This drug prevents angina.
3	Caution	It must be taken without chewing.
4	Side effects and their management	<ul style="list-style-type: none"> ▪ If the symptoms listed below occur, you need to visit your doctor or pharmacist. ▪ Fever, skin rash, sore throat, aphtha, fatigue, purpura, bleeding from the nose or mouth, dermatitis, itching, diarrhea, change in skin color, nausea, mental disorder, low blood pressure, and dizziness. Care is needed when driving or operating machinery. ▪ Do not drink grapefruit juice because it may accelerate drug effects ▪ Small pieces of the drug may be present in the stools. This is not a cause for concern.

Sound information types (A-D)

A: 1'Name of the drug'

B: 1'Name of the drug' and 2'Effects of the drug'

C: 1'Name of the drug', 2'Effects of the drug', and 3'Caution'

D: 1'Name of the drug', 2'Effects of the drug', 3'Caution', and 4'Side effects and their management'

3. Results & Discussion

Regarding the operability of G-Talk®, the following percentage of subjects found the following “easy” or “somewhat easy”: 90%, “turn on the power”; 70%, “read voice code”; and 60% “change voice volume” (Fig. 3). It was also suggested that the operation buttons be larger.

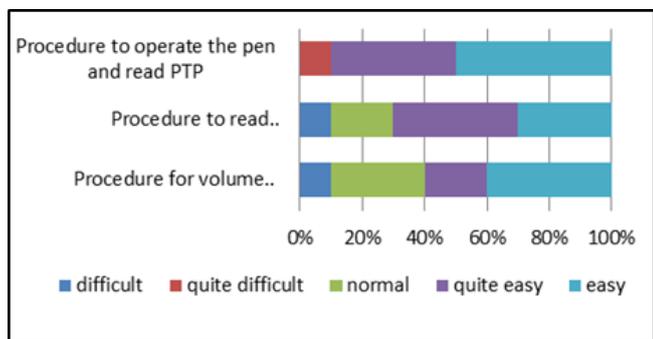


Fig 3: Sensory test of G-Talk®

Regarding the ease of listening to the device, 80% of subjects stated that it was very easy to hear, while 20% reported no difficulties with hearing (Fig. 4).

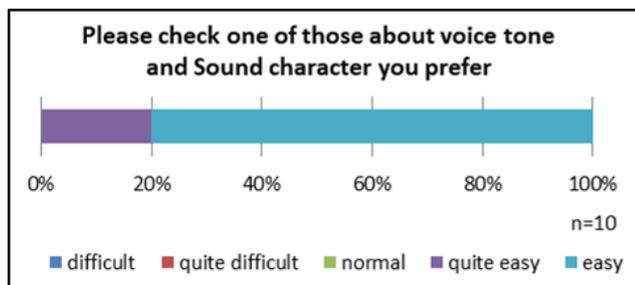


Fig 4: Evaluation of voice sound

Regarding “Which of the 3 PTP samples has the best usability?”, 60% of subjects selected sample 3, while 40% chose sample 2. None of the subjects selected sample 1 (Fig. 5).

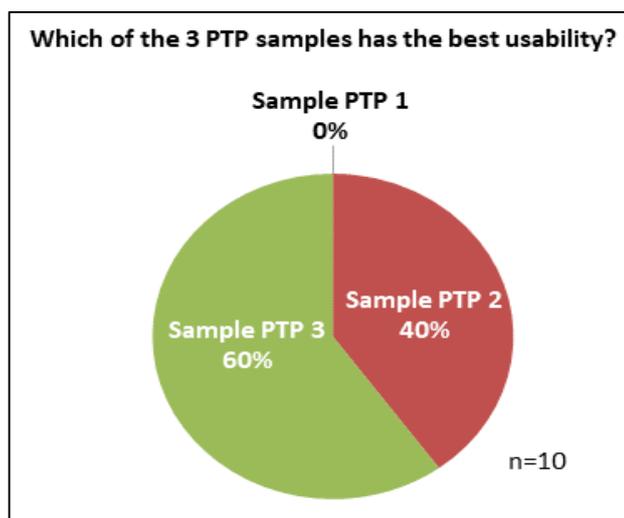


Fig 5: Evaluation of usability including reading dot codes of PTP with G-Talk®

Regarding necessary items of information, 40% of subjects selected No.2, which included the name of the drug and its effects, while 30% chose No.3, which included No.2 plus side

effects and their management. Among several subjects who chose No.2, they answered that No.4 is better if it is possible to stop the voice of the pen at any time (Fig. 6).

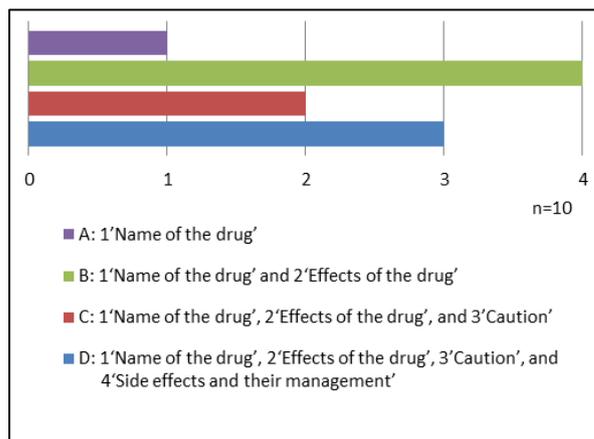


Fig 6: What are necessary items for sound information?

All subjects answered that the sound information provided by this system from PTP was useful, and that they want to use it. Furthermore, 7 out of 10 subjects responded that they want to use this system with a smartphone (Table 2).

Table 2: Overall utility of the sound pen system Number of people n=10

	Yes	No
Do you think this system is useful for providing sound information?	10	0
What are the merits of this sound pen system for drug information?	10	0
Do you want to use a smartphone to obtain information on drugs from PTP?	7	3

All subjects evaluated the merits of obtaining drug information, including that on side effects and their management. Nine subjects stated the merit of information on side effects, while 8 reported the advantage of its simple usability (Fig. 7).

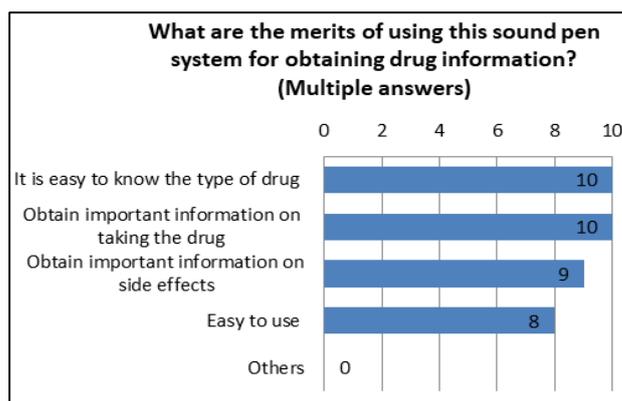


Fig 7: Merits of the sound pen system

In objective evaluations, all subjects turned on G-Talk®, read the information using the pen, and then turned off the power. No subjects broke or damaged PTP. “Smoothness of using the sound pen” was objectively evaluated using a Numerical Rating Scale (NRS). The average NRS value of “Operation from switching on to reading information with G-Talk®” was 8.8, “Operation when subjects read information with G-Talk®” was 8.3, “Operation to change the volume of G-Talk®”

was 8.0 (Fig. 8). Objective evaluations showed that subjects used the sound pen system without any difficulties.

Table 3: Usability of G-Talk®

	Yes	No
on and off	10	0
Read information with G-Talk®	10	0
Break or damage PTP when using G-Talk®	0	10

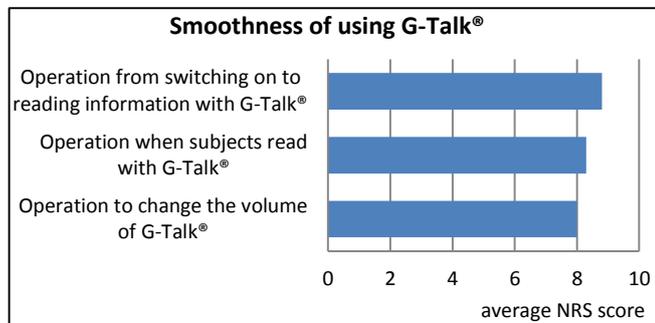


Fig 8: Overall utility of this system

4. Conclusions

The present results demonstrated that the sound pen system is a highly feasible device for blind people. In case of emergencies and accidents, an alternative power source to electric power needs to be considered, for example a G-Talk® battery. Ai-PAC® II and G-Talk® are very useful for blind users who commonly use smartphones. The technology of Ai-PAC® II and G-Talk® is being developed toward their use with Android OS and iOS. Further studies are needed for the development of technology for this system and its use with smartphones.

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