

Compilation of a Sign Language Database for Use in Medical Practice

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Abstract. This paper reports on a study into the establishment of a medical sign language database.

When visiting a medical institution, hearing-impaired patients are sometimes accompanied by a sign language interpreter. The interpreter's job is to correctly interpret the doctors' explanations. However, a problem arises in that medical sign language varies considerably in style from one region to another and has not been standardized.

We compiled a list of medical sign language with an emphasis on standardization of meanings and movements. For compiling the sign language terms, we consulted medical professionals, sign language interpreters and native signers. We tried to ensure that the resulting medical sign language include common expressions that can be easily understood by non-professionals. We also produced sign language instructions for medical terms that are hard to understand based on sign language alone, as well as other difficult terms.

1 Introduction

When visiting a medical institution, we receive an explanation on the medical condition and the treatment from a doctor or nurse. However, among medical terms there are many hard-to-understand words. A patient's inability to fully understand the doctor's explanation could be life-threatening, so it is essential for the patient and the attendant to correctly understand the doctor. If understanding is not enough, it is imperative to ask for a repeated explanation from the doctor or nurse. When visiting a medical institution, hearing-impaired patients are sometimes accompanied by a sign language interpreter. However, it is difficult to translate technical medical terms into sign language so the patient can understand. There are some books currently available in Japan that provide sign language words and example sentences for medical settings [1]– [3]. There are problems, however, in that some of the expressions included in such books are not widely accepted and sign language words have been created without any specific rules or consistency.

Considering this situation, we have compiled and collected medical sign language words that are more easily understandable and are in wider usage. We have already defined 1,080 sign language words for 800 Japanese medical terms. Yet some terms can be confusing after being directly translated into a sign language word. For such terms, appropriate explanatory text has been provided. This report describes how to create medical sign language words and explanatory text, and introduces a part of the database that was experimentally developed.

2 Medical Sign Language Words

First, we briefly explain how we created medical sign language words. We created words mainly for commonly used words in a hospital setting, such as names of body parts, organs and bones, medical conditions and diseases, hospital departments, tests and equipment, and drugs. Table 1 shows word classification and examples.

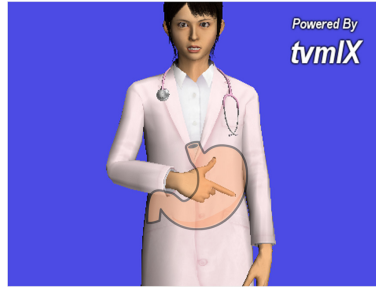
Table 1. Medical word classification and example words

Classification	Example words
Body parts	Head, Face, Body, Skin, Eye
Organs and Bones	Stomach, Skull, Spine, intestine, lung
Medical Conditions and Diseases	Cold, High Blood Pressure, Stomatitis, Dizziness
Hospital Departments	Surgery, Gastroenterology, Internal Medicine
tests and equipment	echocardiography, MRI, endoscopic
drugs	mouthwash, antibiotics, powdered medicine, tablets
others	doctor, receptionist, medical history, recurrence

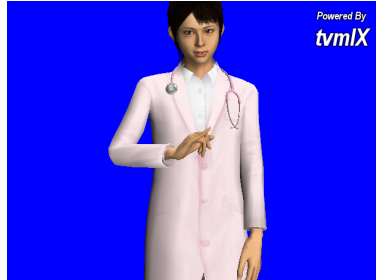
With the help of sign language interpreters, including health care workers, and native signers, we have already created 1,080 sign language words for 800 Japanese medical terms. The number of sign language words differs from that of Japanese words because ways of expressing vary from person to person, so there are sometimes multiple sign language words for one Japanese word.

For example, we have created two sign language words for the word *gstromachh* – an expression of tracing the stomach shape and an expression of using the manual alphabet, which are shown in Figure 1 (a) and (b), respectively. The animation images used in Figure 1 were created using TV program Making Language (TVML), which is currently being developed by NHK Science & Technical Research Laboratories.

With regard to phrases that include the word "stomach," such as "stomach ulcer" and "stomach camera," we created two types of sign language in order to standardize the way of expression. Therefore, the sign language words we actually created were increased in number. Most Japanese words have only one, two or three corresponding sign language words.



(a) Tracing the stomach shape



(b) Using the manual alphabet

Fig. 1. Sign language for the word "stomach"

3 Explanatory Text for Medical Sign Language

3.1 Problems of Medical Terms and Selection of Words

Medical terms are hard to understand when only looking at the name. There are many Japanese medical dictionaries available and the styles vary widely. Some include detailed descriptions and some provide example sentences for the purpose of translation, while others include generally used terms. However, the fact is that most of them are somewhat incomprehensible to non-professionals.

Take Kawasaki disease as an example. If it is directly translated from Japanese into sign language, the result is:

Kawasaki disease = *kawa* (river) + *saki* (small peninsula) + disease

It is almost impossible to understand the term since the sign language is created by transliterating each Japanese word.

Health care workers and non-professionals often interpret a certain disease name or symptom name differently. As seen in the example of "late childbearing," non-professionals tend to consider this phrase as meaning a woman who gives birth at a later age (35 or older). But in fact the Japan Society of Obstetrics and Gynecology defines the term as "first-time childbearing at a later age," i.e., a woman who gives birth for the first time at age 35 or older. Thus, it is necessary to add explanatory text to a case in which health care workers

and non-professionals have different understandings, and misunderstanding can easily occur.

We have then included explanatory text that we created based on the medical sign language data already collected.

Conditions for selecting a word to be given explanatory text were determined as follows:

Condition 1

Some of the terms used in a medical setting are important and one's life can depend on them. We assumed a case in which a parent (a mother) with a hearing disorder brings his or her child to a hospital, because such a case is often time-critical.

Condition 2

We selected the names of diseases and symptoms that are common from the standpoint of nurses.

Condition 3

We preferentially selected terms that are hard to understand when transliterated to sign language.

We created example sentences for 69 medical terms. The procedure is described in the next section.

3.2 Procedures for Creating Explanatory Text

We created example sentences for selected words with the help of sign language interpreters, including health care workers, and native signers. The procedures are described by presenting the term "fundus examination" as an example.

Step 1

After a word is selected, a health care provider writes explanatory text in Japanese.

Writtenexplanatorytext

"Among all the blood vessels throughout the body, only those in the fundus can be seen by the naked eye. This examination is not only for detecting an eye disease but also for checking vascular conditions and presence or absence of bleeding. It can help in knowing the state of arteriosclerosis, diabetes, high blood pressure and others, so it can also be effective as a test for lifestyle-related diseases."

Step 2

A native signer and a sign language interpreter translate the Japanese sentence into sign language (a series of sign language words). It is preferable to use sign language words that are easier to understand for non-professionals and not to use technical terms. When a technical term must be used, it should be selected from the words already collected.

Translated sign language sentence

{ eye } { disease } { only } { not } { diabetes }
 { red } { vessel } { stiff } { disease }
 { hypertension } { exist } { not exist } { examine } { method }

Step 3

The sign language words that were translated in Step 2 are recorded as a video data.

Step 4

The video data recorded are Step 3 is verified with the cooperation of the health care worker, sign language interpreter and native signer. If there is a vague or confusing expression, the sign language sentence should be reviewed and recreated. When the recorded sign language sentence is transcribed into a written sentence, fundus examination is expressed as follows:

Transcribed sentence

"This is a method for not only detecting an eye disease but also checking the presence or absence of diabetes, arteriosclerosis and high blood pressure."

As described above, the translated sign language is simpler compared to the original sentence, but it is possible to convey the minimum necessary information. Another example is a case of bacterium and virus. Although each word is an individual term, we made only one explanatory text in order to clarify the difference between them.

Example: "Bacterium and Virus"

Written explanatory text

"Bacterium has cells and can grow on its own. Antibiotics can work effectively against it by destroying the cell walls. On the other hand, a virus is a pathogen smaller than bacterium. It can grow in other organisms but cannot grow on its own. A virus causes a disease. Antibiotics cannot work against it because it has no cells."

Translated sign language sentence

{Bacterium} {case} {bacterium} {inside} {cells} {exist}
 {on its own} {grow} {can}
 {virus} {case} {bacterium} {compared to} {very} {small}
 {on its own} {grow} {difficult}
 {For example} {human} {animal} {transmitted} {grow} {can}

4 Conclusion

This report reviewed how we created medical sign language words. We emphasized consistency of sign language and made the utmost effort to use sign language words that are easy for non-professionals to understand. We also created explanatory text for confusing medical terms. Corrections and further considerations for words that are required in a medical setting were conducted. Creating a database of medical sign language and explanatory text that is easy for non-professionals to understand is expected to help reduce the anxiety of the hearing impaired when they visit medical institutions.

We intend to continue collecting medical sign language words and creating explanatory text.

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