

The Effectiveness of the “Communication Model” in Blended Learning in Medical English Education

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Abstract

This paper addresses the language barrier between Japanese doctors and foreign patients, which could lead to medical errors. Although there are several reference books for clinical communication, they do not provide any systematic approaches to communication. Therefore, some Japanese doctors are forced to rely on memorization of dialogues for each case. Mona Baker’s translation theory (Baker 1998; Baker & Saldanha 2009) will be used to analyse clinical communication and to build a more effective “Communication Model”. This paper offers an explanation of the “Communication Model” as well as examples of its application. It also offers experiments to measure the effectiveness of the “Communication Model” performed with Japanese doctors and medical students. By analysing the results of these experiments, this paper clarifies some pedagogical effects of the “Communication Model” and offers some tips for teachers in English communication education settings.

1. Introduction

The rapid globalization of the medical field and the increase in the number of foreign patients in Japan have made clinical communication in English increasingly important. However, many medical professionals still have difficulties in English communication in their work settings. This paper addresses the language problem in Japanese medical settings, and experiments are performed to evaluate the effectiveness of the proposed “Communication Model,” which uses translation techniques drawn from Mona Baker’s translation theory (Baker 1998; Baker & Saldanha 2009). This approach is expected to bring significant benefits to medical personnel, in particular, Japanese doctors.

2. Background: Influence of Globalization on the Japanese Medical Setting

The steady progress of globalization in Japan has increased the number of foreign residents, but this has not been matched by a corresponding increase in the number of hospitals willing to treat them. On the other hand, there is evidence that communication problems can lead to medical errors. This section sets out these important background factors to this study.

2.1 Foreign Patients in Japan

The number of foreigners residing in Japan has increased steadily over the last twenty years. The number of foreign residents in Japan soared from 1,350,000 in 1994 to 2,200,000 in 2014 (The Ministry of Justice). Although the number of foreigners in Japan dropped after the major earthquake in 2011 and the nuclear plant meltdown that followed, the number has rebounded and is still increasing.

With the rise in the foreign population, it is becoming increasingly important for medical personnel to communicate with foreign language speakers. As they speak a wide range of languages, English is very important as a lingua franca.

2.2 Limited English Proficiency Can Affect Medical Safety

The USA has long experience of offering medical services to a wide range of foreign language speakers, and the US situation suggests what Japan can expect to see in the future. Research based on the Joint Commission, Sentinel Event Database indicates that language barriers can be responsible for medical safety problems for LEP (Low English Proficiency) patients. The next section presents the purpose of this paper, which is to offer a way to tackle this language barrier.

3. Purpose

The objective of this study is:

- (1) Improvement in medical English education, so that it is more effective at improving a doctor-patient communication.

As mentioned in section 2, the possibility that the insufficiency of doctors' clinical English communication might lead to medical errors has been reported. This underscores the importance of more effective communicative education. Thus this study has two concrete objectives for its programs:

- (2) Apply a "Communication Model" based on Baker's Translation Theory to medical English education.
- (3) Assess its effectiveness.

A description of the "Communication Model" can be found in the next section. In pursuit of the third objective, two experiments were performed to measure the effectiveness of the proposed "Communication Model." I will explain how the results of these experiments support the general approach of the "Communication Model." This paper will also offer specific suggestions for applying the model to educational practices.

4. The Particular Suitability of Baker's Theory Compared to a Variety of Existing Translation Theories

This section sets out the reason why Baker's translation theory was chosen as the background to this research from among a variety of translation theories proposed by many specialists in the translation field in different eras.

First, Baker's translation theory deals with non-equivalent translation using the concept of "content explanation". This content-based explanation exactly fits medical content explanation, which is one of the key components of the proposed "Communication Model" and is essential to improvement in clinical communication. Holmes (1988) first coined the words "translation studies." In this field, two major groups of translation theories have been proposed. One is an "equivalent approach" between the source language and target language (Chesterman, 2004). For example, according to this approach, changing sentence structures can lead to a different nuance, as in the case where the passive voice and active voice have different functions in the target context (Nishimitsu, 2014). Therefore, verbatim translation was considered to be the best. The other group is a "non-equivalent approach". Vermeer ((2004[1989])) argues that the status of the source text can be considered to be lower than the target language. The source language can be preserved or modified or even transformed, depending on the client's purpose (Torikai, 2014). In clinical communication, conveying the medical content in the target language is a more important factor than preserving the meaning of the source language, as in a direct translation. Indeed, what a patient expects to hear from a doctor is not a direct translation but an easily understandable explanation that conveys the medical content.

The second reason for using Baker's theory in this study is the practicality of her theory. Baker's translation theory has been accepted by translators because of its practicality and so is suited to form the background of this paper. The prime aim of Baker's translation theory is to focus on differences and similarities between any two languages, offering a categorization of expressions in terms of their semantics or meanings. This provision of appropriate practical methods and development of translation techniques for each category makes Baker's theory clearly different from other translation theories, which value the theory itself over practical methods.

5. Features of Medical English Communication

This section clarifies several specific features of medical English communication.

5.1 Comparison of Medical and Literary English

To appreciate literary English, we often need not only the literary meanings of the source language themselves, but also the meanings found outside of the sentences, such as the nuances, implications, or cultural implications of a passage. By using Saito's (2016) model of creative stylistics, we can see how concise and accurate medical English communication should be.

Figure 1 Features of Medical English adapted from Saito (2016: 109-117)

Literary English	Medical English
1. Intention	Doctor's intention should be the same for any patients regardless of sex, age or nationality.
2. Message, theme, or motif	A doctor usually should convey no indirect messages, themes, or motifs, but only direct messages to a patient.
3. Text type	Limited types or consistent types are usually used in the medical context.
4. Characterization and metaphor	Characterization and metaphor are usually not employed in the medical context.
5. Narrative structure	Narrative description is used in a quite limited fashion, such as in a report of a patient's complaints.
6. Tense and time-shift	Rather than tense and time-shift, or tense format, coherent tense format is more likely to be valued in the medical context.
7. Extra-linguistic, or implications, including Syntactic, Lexical, Phonological and Graphological diversity	All these extra-linguistic or implications should be generally avoided for the purpose of offering the same equally accurate medical information to any patient whoever they may be, regardless of sex, age or race and so on.

This comparison between medical and literary communication suggests that, to communicate with patients smoothly, one needs to use simple words, specific sentence structures and styles commonly used in medicine. (See also: Tsujitani 1999, Nishimura 2014, Le & Bhushan 2018a; 2018b)

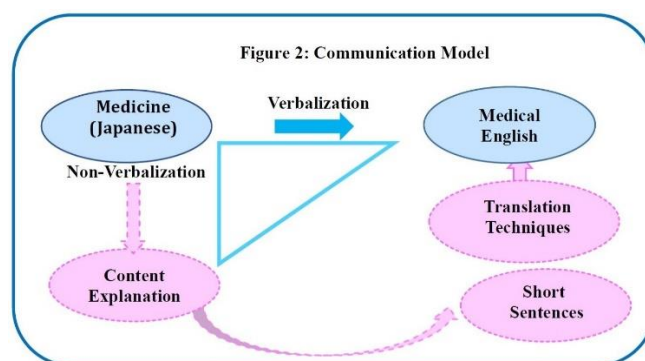
5.2 Two Major Concerns about Japanese English Learners

There are two important concerns about the way Japanese learners of English tend to approach the process of translation. The first concern is that many Japanese people seem to believe that dictionaries are the final authority on all definitions, even if the definitions given are incomplete or inaccurate. For example, the definition of the word "house" in most dictionaries used in Japan does not include the meaning of 'keep an animal', even though the phrase "house rats" is often used in experimental reports. The second concern is that Japanese people, in general, tend to make word-for-word translations, and not have the concept of non-equivalent translations

Baker's theory deals with non-equivalent translation and also with the meanings of expressions not included in dictionaries, by developing translation techniques. In the next section, I will propose the "Communication Model" as an effective approach to improving medical English communication.

6. Communication Model

Next this paper will explain the “Communication Model,” as modified for medical English communication. This model will be particularly effective for complex medical explanations, when direct translation is not applicable. The idea consists of four steps. (Figure 2)



- Step 1. ‘Deverbalize’ the Japanese words.
You are moving away from the original, a step known as de-verbalization in translation theory. To put it simply, the speaker should stop explaining merely by switching from the source language to the target language, when a direct translation does not convey the meaning of the source language. Instead, move on to the second step.
 - Step 2. Think about the content (Content Explanation).
This step involves paraphrasing the content while retaining the same connotations or changing the complex medical content into simple explanations so that a patient can easily understand. The three-sided model, shown above in the blue triangle (see Figure 8), has been already demonstrated in semantic theory and translation theory. Clinical explanations are mostly about medical content. Therefore, it is easy to recognize the match between ‘medical content explanation’ and the “Content Explanation” shown in the “Communication Model.”
 - Step 3. Break the information into short sentences.
This step involves cutting long sentences into shorter sentences. Example of the exercises used for this step are given later in this paper of the exercises used for this step are given later in this paper (see section 7.2).
- Step 4. Use Baker’s translation techniques to interpret the information into English.
This step relies on the use of the translation techniques when you find it difficult to express what you want to convey.

7. Experiments

The following two experiments were carried out to test the hypothesis that applying the “Communication Model” would be effective in helping clinical communication.

Experiment 1: Japanese Medical Students with High English Ability

An experiment with 20 first-year medical students with high English ability at a national university was carried out in January 2016. The participants' TOEIC scores ranged from 695 to 950, with an average of 770.

7.1 Experimental Method

The experimental method for experiment 1 was as follows.

Step 1. As a part of a translation practice exercise, participants translated a Japanese explanation of ischemic heart disease (as shown below in Question (1) into English as if they were explaining the disease to their patients. This is done without any prior knowledge of the “Communication Model.”

Question (1) : Translate the following Japanese explanation of ischemic heart disease into English.
「虚血性心疾患: 心臓の筋肉(心筋)が動くために必要な酸素や栄養を送る冠動脈に、動脈硬化が進んだ結果、血液の流れが悪くなり、心臓がポンプ機能を担うために必要とする酸素の需要・供給バランスが崩れ、心筋の一部が酸素不足(虚血)になる病気を言う。 (Adapted from Keio University Hospital)」

Step 2. Participants listened to the explanation of the “Communication Model” and completed four translation exercises, applying the “Communication Model” (shown in 7.2), over about 40 minutes.

Step 3. Next, the participants were asked to translate question 1 again and then question 2:

Question (2): Please translate the following sentence into English.

「狭心症も心筋梗塞も冠動脈の血液の流れが悪くなり、心筋の一部に酸素不足(虚血)が生じる結果、胸に痛みや圧迫感を感じます。 (Adapted from Keio University Hospital)」

Step 4. The quality of communication in each test was assessed, and the results before and after the exercises were compared. The assessment was conducted blindly: the participants' answers were assessed by a native English teacher who was not informed which answers were given before and which answers were given after the exercises.

7.2 Step 2: Examples of Exercises Applying the “Communication Model”

This section explains the kind of exercises the participants practiced.

In one of the exercises, the participants were shown a Japanese explanation from the Keio University hospital webpage and its direct translation.

This is the Japanese sentence:

「酸素の需要・供給バランスが崩れ、心筋の一部が酸素不足(虚血)になる。」

The following sentence (A) is its direct translation:

(A) It can lead to an imbalance of the oxygen supply and demand necessary to support the pumping function of the heart, which causes lack of oxygen in parts of the heart muscle.

Analysing the English, the participants were led to notice how complex it is and thus how difficult it would be for patients to understand.

Next, the participants were asked to translate it not directly, but to convey its contents. Then the example answer (B) was shown.

(B) The heart can't get enough oxygen for its pumping function.

When comparing sentence (A) with (B), the participants could see that sentence (B) was much easier for a foreign patient to understand.

In the next exercise, the participants were asked to translate the following Japanese into English.

「冠状動脈に、動脈硬化が進んだ結果、血液の流れが悪くなり、酸素の需要・供給のバランスが崩れ、心筋肉の一部が酸素不足(虚血)になる。(Adapted from Keio University Hospital)」

After showing them the following sentences (C) which is a direct translation produced by the author, the participants were asked to cut it into shorter sentences without changing the meaning.

In this exercise, they first split the Japanese sentence into short sentences in Japanese. Then they translated the short Japanese sentences into English. Afterwards, they were shown the example answers in (D).

(C) Direct Translation: As a result of the progression of arteriosclerosis in coronary arteries, the blood flow decreases, which can lead to an imbalance of oxygen supply and demand necessary to support the pumping function of the heart, resulting in lack of oxygen in parts of the heart muscle.

(D) Short Sentences

1. Heart blood vessels harden and become narrow;
2. Blood flow to parts of the heart muscle decreases;
3. As a result, the heart can't get enough oxygen to pump blood.

Comparing the two kinds of translations, the participants learned how using shorter sentences makes the explanation in English easier and clearer.

In explaining specific translation techniques, I created and used the following list based on Baker (1998) and Hasegawa, Y. (2012)

A list of Baker's translation techniques applied to medical English

1. Structural Change
 - 1.1 Voice change: passive voice \Leftrightarrow active voice
 - 1.2 Subject change
 - 1.3 There-insertion syntax or it-insertion syntax.
 - 1.4 Use of inverse expressions.
 - 1.5 Use a simpler structure for comparatives.
 - 1.6 Addition of a subject or an object as necessary.
2. Word Class Change
 - 2.1 noun \Leftrightarrow verb • adjective
 - 2.2 noun clause \Leftrightarrow sentence
3. Omission: Omit redundancy or medical terms as necessary while retaining the same connotations.
4. Adding an explanation is used so that a patient can understand the content more easily.
5. Substitute Expressions
 - 5.1 Explain using related expressions.
 - 5.2 Explain using unrelated expressions while retaining the same connotations.
6. Superordinate (General word) Use - use general terms for a category.
instead of medical terms.e.g. COPD \rightarrow problems with lungs.
7. Loan words
 - 7.1 English written in the Japanese characters called Katakana.
 - 7.2 Japanese written in English. e.g. Kawasaki Disease

7.2.1 Step 4: The Results and Data Analysis of Experiment 1

The results suggest that there is a clear improvement in communication ability overall with the use of the "Communication Model," as shown in Chart 1.

The participants' translations were assessed by a native professional English teacher with over fifteen years' experience in both teaching and editing.

Each of the translation was given a score from 0 to 5.

Q (4) Translation of angina passage after the exercises.

Q (5) Translation of ischemic heart disease passage after the exercises.

Q (6) Translation of ischemic heart disease passage (the same text as Q5) before the exercises.

The standards for each score were as follows:

0 The translation is impossible to understand, or absent.

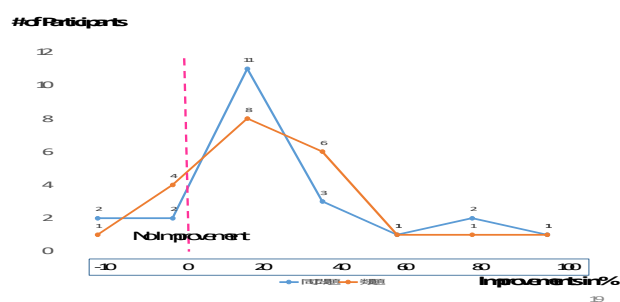
1 It is possible to see what the translation is about, but not to understand what it is trying to say about that topic.

- 2 It is possible to get an idea of what the translation is trying to say, but it is ambiguous or unclear.
- 3 There is no doubt about what the translation is trying to say, but the language errors make it difficult to understand.
- 4 The translation is easy to understand if you have some background in the topic, but might be hard if you are a novice.
- 5 The translation is easy to understand even if you are unfamiliar with the topic.

Chart 1. Statistical Analysis of 20 First-year Medical Students (Advanced English Level)

Q1 Ischemic heart disease		Sample subject (n=20)						
	Average score	Standard deviation	Standard error of the mean					
Q1 before exercises	2.90	1.51	.340					
after exercises	4.30	.733	.164					
Difference in scores before and after the exercises 95% confidence intervals of difference								
	Average score	Difference in standard deviation	Standard error of the mean	Lower confidence limit	Upper confidence limit	t value	Degree of freedom	P value (both sides)
Q1 difference in score before and after exercises	-1.400	1.569	.351	-2.135	-.665	-3.989	19	.001

Figure 3 Data Analysis of Experiment



This graph shows the scores obtained. The y-axis represents the number of people, while the x-axis shows the percentage improvement in score after the exercises. The red dotted line represents the boundary between students who showed improvement and those who did not. The blue line represents comparisons between scores before and after the exercises for the ischemic heart disease question, and the orange line represents comparisons between the angina translation and the ischemic heart disease exercise before instruction. For example, for the ischemic disease question, the number of participants who improved by 20% scores is 11, whereas, for the angina question, the number of participants who improved by 20% scores is 8.

The table in figure 4 gives the scores and comments for three students (06427025, 06427092, and N.Y.) who left the question entirely blank and therefore received a score of 0 out of 5 before learning about the “Communication Model.” After the exercises, two participants (06427092 and N.Y.) improved their scores

Figure 4

Participant's ID	Score	Comment
06427025	0	No answer
	0	No answer
	3	The English is incomplete, making it hard to work out the meaning.
06427092	0	No answer
	4	This one also talks about the arteries breaking off, but is otherwise clear
	5	Clear, even though it does not say “narrow” explicitly, and talks about reduced blood flow
N.Y	0	No answer
	5	Short sentences, and clear links
	4	The explanation of where the plaque comes from is hard to follow.

dramatically, from 0 to 4s and 5s on both translations about ischemic heart disease (5) and angina (4).

7.2.2 Summary of Experiment 1

1. This study suggests a clear effect of the application of the “Communication Model”.
2. This experiment indicates that participants with high English ability could promptly apply the “Communication Model” to other related diseases (angina Q4).
3. The study indicates the importance of optimizing the “Communication Model.”

7.3 Experiment 2: Japanese Doctors and Medical Students with/without Basic English

7.3.1 Experimental Method

In experiment 2, the same method was used as in experiment 1, except that in step 2, first, the participants listened to a medical video entitled “Heart Failure Explained Clearly” delivered by a US professor over the internet, as part of a blended learning approach. The video included an explanation of the calculation of EF, which refers to a measurement of how much blood the heart pumps out with each contraction. Thus, after the exercises, the participants translated two questions, including the same Question (1) as experiment 1, and a translation of a passage about the calculation of EF.

This experiment was conducted with 11 doctors in the rheumatoid department at a private university hospital along with 5th-year medical students at the associated private medical university on August 4, 2016. In a written survey completed by all participants before the exercises, all doctors answered that they could read medical papers in English, whereas all medical students answered they could not. Thus, a clear difference between doctors and medical students in the ability to read medical papers in English was found. Therefore, the participants were divided into two groups: Group (A) lacking the ability to read medical papers in English and Group (B) with the ability to read medical papers in English.

7.3.2 Data Analysis and Discussion

The results suggest that there is a clear improvement in communication ability overall with the use of the “Communication Model,” as shown in Chart 2 and Chart 3.

Those with scores under 4 might have difficulties in adequate communication, in spite of an improvement in their scores after the exercises. It turned out that although some participants claimed to be able to read medical papers in English, they seemed to lack basic English ability, so they failed to carry out smooth communication even after the exercises (see Chart 2: scores shown by red arrows). Those with scores over 4 were considered to be able to carry out smooth communication in real situations (see Chart 3: scores shown by red arrows).

Chart 2. E1 (Arteriosclerosis) E2 (EF Calculation) Statistical Analysis
(Low level English : Group(A) (5 medical students and 4 doctors)

Subject Sample		Average score	Standard deviation	Standard error of the mean
Pair 1	Q1 before exercises	2.11	1.364	.455
	after exercises	3.00	1.118	.373
Pair 2	Q2 before exercise	1.33	1.414	.471
	after exercise	2.44	1.236	.412

Difference in scores before and after the exercises
95% confidence intervals of difference

		Average score	Standard error of the mean	Lower confidence limit	Upper confidence limit	The degree of freedom	P value (both sides)
Pair 1	Q1 difference in score before and after exercises	-0.889	1.167	-1.786	0.008	2.286	8 .052
Pair 2	Q2 difference in score before and after exercises	-1.111	1.900	-2.572	0.350	-1.754	8 .117

Chart 3. Statistical Analysis of 6 doctors (Advanced English Level)

Subject Sample (n=6)		Average score	Standard deviation	Standard error of the mean
Pair 1	Q1 before exercises	3.00	1.673	.683
	after exercises	4.17	.408	.167
Pair 2	Q2 before exercise	3.67	1.366	.558
	after exercise	4.33	.816	.333

Difference in scores before and after the exercises
95% confidence intervals of difference

		Average score	Standard error of the mean	Lower confidence limit	Upper confidence limit	The degree of freedom	P value (both sides)
Pair 1	Q1 difference in score before and after exercises	-1.167	1.835	-3.092	0.759	-	5 .180
Pair 2	Q2 difference in score before and after exercises	-0.667	1.633	-2.380	1.047	-	5 .363

7.3.3 Summary of Experiment 2

1. This experiment suggests that the “Communication Model” is quite useful in improving medical English communications in both those who can read medical papers in English, and those who cannot read medical papers in English.
2. This experiment suggests that to begin with, a doctor with low English levels should learn basic English grammar and medical expressions for their field. This is because those who lack basic English ability tend to make too many English errors, and they can hardly make even short sentences.
3. The results of the experiments have shown that the “Communication Model” is particularly effective for those with high English ability, enabling them to improve their communicative ability by exploiting its quick application to different cases.

8. Conclusion

Through the application of communication theory to Japanese medical English learners and the qualitative analysis of the experiments, this paper identified two significant findings:

1. The results of the experiments suggest that the practical use of the “Communication Model” proposed in this paper has a clear impact on improvement in medical English communication for those who have sufficient English ability to make short accurate sentences.
2. The results of the experiments also suggest the importance of acquiring basic English grammar along with specialized medical expressions in order to achieve adequate medical communication. Composing accurate short sentences is the main component of the “Communication Model.”

Although the present research has yielded some significant findings, there is room for debate and further study as follows:

1. There were not enough subjects to make a statistical analysis possible. Thus, more experiments should be conducted in the future, to gather enough data to allow for the statistical

confirmation of the observed effects.

2. Medical English educational materials incorporating this model would be expected to be helpful in improving medical English communication. Explaining specialized medical content requires medical background knowledge, and therefore, it is valuable for doctors to learn how to explain medical information directly to foreign patients.

3. More exercises should be included in new materials to assure improvement in communication ability. During the exercises, it was found that even though clear improvements were observed, the improvement was sometimes more subtle for those with lower English levels.

With this and other qualifying points in mind, it is my hope that further research will eventually produce effective medical education materials that assist Japanese doctors to become more globalized by overcoming the language barrier.

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