

Uses of Mobile Phone Language Translation Applications in Surgery

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Abstract

Globalization has resulted in the proliferation of multi-lingual communities worldwide. Local health agencies nowadays cater to the increasing demand for interpretation services, which can be an expensive effort. Professional interpretation services also have limitations in availability and convenience. With the widespread use of smartphones in the medical workplace, software applications with the ability to translate between languages represent a potentially convenient and inexpensive adjuvant to professional interpretation services. It may also be a useful option for clinicians working in rural areas devoid of professional interpreter services. Current data suggests that current translation software applications provide variable accuracy of translation depending on the language, some are acceptable and others are not. More research is required to improve the accuracy and consistency of these translation applications. Using these translation applications on mobile phones for minor or non-medicolegal tasks may help improve the efficiency of the health system by reserving professional interpreting services for important tasks with potential medicolegal implications.

Keywords: Interpretation, language, mobile phone, software, translation

Introduction

Globalization has encouraged the spread of languages worldwide and the proliferation of multi-cultural communities. A 2011 census by the Australian National Audit Office reported that 19% of Australia's population spoke a non-English language at home, and 17% from this cohort (almost 700,000 people) could not adequately speak English (1). This increases the need to provide health services in a multilingual settings. The demand for interpretation services was estimated to grow at approximately 20% annually, from 1.1 million phone interpreting services in 2011-2012 to 1.5 million in 2013-2014 (1). This increasing demand for professional interpreting services thus leads to increasing financial expenditure. For example, the Australian Translating and Interpreting Service received more than AU\$153 million in one year between 2013 and 2014 (1). Similarly, large sums of more than £20 million on average were spent each year from 2008 to 2011 by the United Kingdom (UK) National Health Service (NHS) (2). More money spent on language translation services means less money for investment into other health sectors. Unfortunately, language barriers or the inability to speak the local language is still one of the major

contributing factors to health disparities in communities with low English proficiency (3-5).

The desired solution is to provide inexpensive and accurate translation options, which are not as accurate as a medical doctor who is fluent in the same language or a professional interpreter, but accurate and consistent enough to be an alternative when the aforementioned options are unavailable. Such situations may arise especially in poorer countries or in rural areas where access to a professional interpreter is limited, either in person or via phone. One possible solution is to use translation software applications on portable electronic devices, such as smartphones, tablet computers, or laptops. Thus, this study aimed to highlight the potential issues that can arise during the care of a patient who does not speak the local language and how current translation software technology can play an adjuvant role in the communication and medical care improvement of such patients.

Role of Professional Interpreting Services

The best way to communicate important medical information is to have a doctor who speaks the same language as the patient. The next best thing to communicate with patients who do not

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speaking the local language is the professional interpreting services, which can be provided in person or via telecommunication but commonly via phone conversation. In countries with established infrastructure and an adequate workforce of professional interpreters, these services can be provided even to doctors working in remote communities. Clinical care can be benefited from the use of professional interpreters. A systematic review by Karliner et al. (6) in 2007 concluded the association of the use of professional interpreters with better positive outcomes and improved quality of healthcare than that of ad hoc interpreters (such as family members or clinical staff). Similarly, Ribera et al. (7) concluded that the use of professional interpreters can improve patient satisfaction and access to healthcare, reduce the risk of medical errors, and reduce the cost of unnecessary investigations and erroneous treatments. Besides patients, clinicians themselves have been more satisfied with their delivery of healthcare as they used professional interpreting services. Clinicians with previous training on interpreter use were more likely to use professional interpreters [odds ratio (OR) 3.2; 95% confidence interval (CI) 1.4–7.5] and report increased satisfaction with the medical care that they have provided (OR 2.6; 95% CI 1.1–6.6) (8).

Potential Issues in Using Professional Interpreters

Professional interpreting services have an important role in ensuring the appropriate provision of healthcare services to patients who do not speak the local language. The importance of this service cannot be questioned for essential tasks such as history-taking and obtaining informed consent for surgeries. However, the effort of using professional interpreting services does have several limitations, namely cost, availability, and convenience. Providing professional interpreting services can be an expensive effort. The Australian Translating and Interpreting Service reported revenue of over AU\$153 million in 2013–2014 alone (1). Similarly, large expenses were also found in other countries. In the UK, NHS trusts spent an estimated £23.3 million on interpretation services in the 2010/2011 financial year and £64.4 million over 3 years before and including the 2010/2011 financial year (2). In Australia, the government-affiliated translating and interpreting service in 2021 charged rates approximately twice the base pay rate of doctors with several years of working experience (Table 1) (9,10).

The issue of availability may be due to the non-availability of interpreters who speak uncommon minority languages. Furthermore, interpreters in Australia predominantly work on a casual basis (1), thus anyone may not be available to interpret certain languages at certain times. The lack of professional interpreters after normal working hours brings inconvenience for hospital teams to see patients outside the normal working hours or even during early morning ward rounds, as is common with the surgical teams. Planned interpreter sessions can be a potential

solution to this issue; however, finding meeting times that suit the patient, medical staff, and interpreter can be challenging. Physicians often tend to multiple patients and have to address unplanned emergencies, be it personal or professional. Patients themselves could have an unexpected event, thus arranging an interpreter immediately may not be feasible. Furthermore, interpreters themselves may be already booked ahead to provide their services at a separate time and location, thus making it difficult for them to overstay during the meeting and even stay before the meeting concludes to attend to their next booking. Hiring an interpreter for 24-hour care will be geographically and financially inconvenient. Not so much in Australia, but in some poorer countries, professional interpreter services may be limited in rural areas, including phone interpretation services either due to lack of communication infrastructures or lack of professional interpreters.

Despite 1 in every 35 Australians having low English proficiency (11), studies suggest that the use of interpreters in a clinical scenario remains uncommon (11,12). Diamond et al. (13) found that the underuse of interpreters was due to complexity and that physicians often have to weigh the importance of communication in clinical decision-making against time pressures. Medical practitioners gauged the need for interpreters on a case-to-case basis and whether the perceived benefit of the exact situation will outweigh the hassle factor, have a high yield, and is worth the time invested (13). Therefore, arranging for professional interpreting services in a small and simple need, such as asking the type of food suitable to the patient's religion or explaining the need to perform minor procedures, like intramuscular injections, can be inconvenient. In addition, for patients to not be able to describe their pain or other symptoms immediately to the treating team is inconvenient if professional interpreting services had to be organized each time the patient tries to communicate.

Interpreting Services Available on Mobile Phones

Several applications are available on mobile phones to provide interpreting services, some of which require payment and others are free. Currently, one of the most popular translation applications is Google Translate (Google Inc., California, USA), which is also free of charge. As of December 2015, this application was able to translate into 90 languages via typing on the mobile phone, which also supports automatic speech translation in 40 languages that would be particularly helpful in patients who are uncertain nationality and could not even tell their spoken language. Translated text can either be read on-screen or spoken aloud by the mobile device. More recently, the text can also be translated using the phone camera in 26 languages. The majority of doctors and other healthcare workers are found to use a smartphone at work nowadays, enabling convenient and rapid access to interpreting services via their phones.

With technological advances and updated statistical translation techniques, Google Translate has other helpful features. The translation process can be improved using the list of synonyms with corresponding definitions in Google Translate to effectively form a coherent sentence. A higher level of accuracy can be achieved using the "sanity check" feature, which makes Google back translate the text enabling the user to determine if the translated work makes sense. Furthermore, patients with different language scripts can respond using Google Translate's on-screen keyboard. This keyboard icon allows them to type or virtually handwrite non-Roman alphabets. Google Translate also has a simple and user-friendly web interface, which further allows easier usage by most patients and doctors alike.

Google Translate was the software application of choice in most studies that were conducted to compare the degree of accuracy and consistency of machine versus human language translation. Other translation software/systems are also available, such as the Moses-based system used by Pecina et al. (14) in their study, but these applications were not as commonly used or available to the general public, thus they were not investigated as much as Google Translate. Therefore, most of the current data and statistics presented in the following discussions are related to Google Translate.

Potential Uses of Interpreting Services on Mobile Phones

Using a free interpreting service on a mobile device can be a convenient, inexpensive, and effective alternative way of communication when other methods of translation are unavailable or inadequate. Translation tools may even be used as an initial mode of communication, particularly in rural- or regional-based practices where the immediate availability of

professional interpreters is limited aside from phone services. Even with phone interpretation services, several physicians nowadays communicate with the use of images and anatomical models to illustrate their explanations. Communicating and illustrating simultaneously using the translation application on a mobile device can be easier rather than via a phone interpreter who cannot see and describe the illustration or anatomical model.

Patient review and ward rounds can be done impromptu at the convenience of the treating team even after standard working hours. Simple procedures such as an indwelling catheter change and intravenous cannulation could be conveniently performed by describing the procedure using Google Translate instead of having to arrange a telephone or on-site interpreting services. In addition, Google Translate-enabled smartphones, tablets, or computers have no shortage, as nowadays, most members of the treating team had access to one in the workplace. The simple and quick access to automated translation technologies via mobile devices allows doctors to customize their questions and responses appropriately at the patient's bedside.

Patients unable to speak the local language also stand to benefit from easily-accessible interpretation software on mobile devices. Using this technology, nursing staff could also describe the medications prescribed to the patient and respond better to patient requests for analgesia and antiemetics. Furthermore, some of the older patients who do not speak the local language may have difficulties with mobilization and have their bed railings set up to prevent any falls. However, these patients will have difficulty in communicating their desire to go to the bathroom with their nurse without readily available

Table 1. Indicative cost of professional interpreting services in Australia within regular business hours compared with base hourly pay rates for doctors in Western Australia

Indicative cost of professional interpreting service in Australia*			
Service	Description	Charge in Australian dollars	Equivalent hourly rate
Immediate phone interpreting	Every 15 minutes	\$27.50	\$110.00
Pre-booked telephone interpreting	First 30 minutes	\$73.59	\$147.18
	Each additional 15 minutes	\$20.24	\$80.96
On-site interpreting	First 90 minutes	\$157.52	\$105.01
	Each additional 30 minutes	\$32.67	\$65.34
Telehealth video	First 90 minutes	\$157.52	\$105.01
	Each additional 30 minutes	\$32.67	\$65.34
Base hourly pay rate of doctors in Western Australia**			
Year 3 resident medical officer	Standard business hours	\$50.06	\$50.06
Year 3 registrar	Standard business hours	\$59.33	\$59.33
Year 7 registrar	Standard business hours	\$72.11	\$72.11

*Note: Bookings that start at 10.00 a.m. were used to represent regular business hours. These cost quotations exclude cancellation charges, services after regular business hours, and pre-reading before the appointment. **Base working hours of 40 hours per week were used to calculate the hourly pay rate of doctors

language translation service, especially if they have diarrhea or urinary urgency, as they not uncommonly do. Making the patient wait while organizing for phone interpreters each time the patient wants to talk to the nurse is possible; however, it quickly adds up to the burgeoning cost to the health system and the added inconvenience to both the patient and the nursing staff. Kitchen staff could discuss appropriate food options with the patient using these translation applications when patients have religious food restrictions or allergies. Patients are unlikely to express dissatisfaction with their care if Google Translate was utilized wisely along with good non-verbal communication skills to answer most, if not all, of their questions.

Validity of Using Interpreting Services on Mobile Phones

Accuracy of interpreting services is very important to ensure appropriate healthcare delivery. The available data on the accuracy of professional interpreters and translation software on electronic devices is somewhat conflicting. A study by Flores et al. (15) revealed that ad hoc interpreters were significantly more likely to make errors with potential clinical consequences than professional interpreters (77% vs. 53%, $p < 0.0001$). However, a rate of 53% for professional interpreters is still worryingly high, even if they were to be the next best thing after a doctor who speaks the same language as the patient. The same study found no statistically significant difference in the mean number of errors committed by hospital and ad hoc interpreters in each clinical encounter; however, professional interpreters were more likely to use an incorrect or non-existent word/phrase than ad hoc interpreters (22% vs. 9%, $p = 0.007$) (15).

A wide variance is found in the accuracy of translation between different languages. A study on the accuracy of Google Translate in 51 languages revealed a wide variation of Bilingual Evaluation Understudy (BLEU) scores, ranging from 0 up to 93 out of a possible 100. In terms of translating to/from English, languages with the highest BLEU scores (>90) were Danish (93), Indonesian (93), Estonian (93), French (92), Bulgarian (91), Greek (91), Norwegian (91), and Swedish (91) (16). However, the translation accuracy in this study was not checked by human translators but rather was compared with a single "correct" reference text, thus languages with very different grammatical structures may suffer lower BLEU scores (16). The accuracy of translations made with Google Translate also varied based on the geographical origins of languages, with the best accuracy for Western European languages, followed by Eastern European, Asian, and African languages (17).

The impact of grammar on translation accuracy was also reported in a study by Beh and Canty (18), in which English-Mandarin/Chinese translation via Google Translate deteriorated with longer phrases compared with short phrases (grammar has smaller roles with shorter phrases). Similarly, the study

by Anazawa et al. (19,20) found Google Translate to be mostly just partially useful in English-Japanese translation of scientific abstracts, but performed better with Korean-Japanese translations, presumably due to similar grammatical structure. A recent study showed that it was possible to improve the accuracy of translations made by machine translators by configuring its system data up to an average of 55% from its baseline BLEU scores (14). The same machine translator also achieved consistently higher BLEU scores compared with Google Translate for translations between English and French, German, and Czech languages (14).

In a direct comparison between machine translation and professional interpreters, a randomized controlled trial involving a small cohort of French-speaking Burundians found that patient satisfaction outcomes were comparable between using machine translation and trained interpreters during patient-doctor encounters (21). This study suggested that machine translation is a suitable alternative in the absence of a trained professional interpreter (21). Examples include use in clinical practice in rural areas where little or no services are provided by professional interpreters. These automated translation tools are timely and attractive language technology that can be well-utilized in times of need within the healthcare system (22,23).

A study reported by the agency for healthcare research and quality (United States of America) compared the accuracy of translations performed by Google Translate against clinicians who are fluent in the language assessed and found that $>60\%$ of articles in Portuguese and German that were translated into English by Google Translate had high levels of agreement with the translations made by clinicians who are fluent in these languages (24). In the same study, none of the scientific papers in Chinese translated into English by Google Translate had at least 80% of agreement with the translations made by the clinicians (24). Similarly, most of the papers in Hebrew, which is written from right to left, were not satisfactorily translated using Google Translate (24). These findings illustrate the impact of grammatical differences on the accuracy of Google Translate. In a follow-up study a year later, the investigator group found that Spanish articles were instead translated with the highest accuracy into English, versus Chinese, French, German, and Japanese (25). The change in accuracy level between English-German and English-Spanish in the space of one year was less likely to be due to sample selection bias and may probably be due to improvement in the translation engine for the Spanish language.

Conclusion

Professional interpreting services are an important resource in healthcare, especially for patients who are unable to speak

the local language. Like all resources in hospitals, it needs to be used efficiently to minimize unnecessary costs. Outside of metropolitan hospitals, it can be quite useful for inter-language communication between a clinician and a patient if professional interpretation services are lacking, such as in poorer countries or rural areas. Google Translate has been shown to have variable translation accuracies depending on the language, with better results for languages with similar grammatical structures. Therefore, it is reasonable to suggest that language interpretation software applications on portable electronic devices may be used in certain situations that require rapid or convenient translation services for minor or non-medicolegal tasks while reserving professional interpretation services for major or medicolegal tasks. More research is required to substantiate the currently available data on the subject. The accuracy and consistency of applications such as Google Translate can be improved to support an adjunctive role in clinical settings in the future.

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