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Original Article

Digital Healthcare Technologies in a Comparative Perspective: The Case of Taiwan and Sweden

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ABSTRACT

In discussing the potential benefits and drawbacks of healthcare technologies, questions arise within a social perspective as to what digital healthcare technologies have to offer. **Objective:** To analyze the symbolic interaction framework to understand the implementation of digital healthcare technologies and the resulting interaction with medical doctors. **Methods:** Interviews were conducted with eight doctors; five Taiwanese and three Swedish doctors were participated. Semi-structured interviews were used to collect data from the participants. Interviews were audio-recorded, transcribed, and data analysis guided by symbolic interaction theory. **Results**: Four themes were identified from the interviews: 1) Interpreting digital healthcare technologies, 2) Interaction with digital healthcare technologies, 3) Digital dilemma and (4) Future of digital culture. **Conclusions:** The results reveal many issues regarding digital healthcare technologies, such as: symbolic meanings, purposes of usage, expectations, problems, and possible solutions. To the best of the author's knowledge, this is the first study to explore the perspectives of Taiwanese and Swedish medical doctors towards digital healthcare technologies using symbolic interactionism.

INTRODUCTION

Innovations bring heterogeneous objects that extend the recognized boundaries of society and spark dialogues regarding the benefits and drawbacks. Thus, social change takes place [1]. In 2005, Wired magazine reported that healthcare is the most deteriorated and simultaneously most adaptable area for innovation. However, it needs a minimum of thirty years to standardize scientific findings in the area [2]. New solutions often incorporate new problems, which could be in the realm of ethics, cultural values, politics, beliefs, the economy, etc. Clinical research and practices are rapidly being transformed by the digital healthcare system to help cure rare diseases and lessen "cognition error" [1, 3]. Symbolic interactionism is a theory within sociology and psychology that explores meanings [4]. Symbolic interactionism analyzes the meanings appearing from the corresponding interaction of individuals in a social context with other individuals, and it describes how society is formed and perpetuated [4, 5]. The theory is a systematic approach for empirical research to understand the interpretation process and knowledge generation [6]. Taiwan and Sweden have different histories, cultures, beliefs, and healthcare systems [7, 8]. The healthcare expenditure of Taiwan is 6.3% of GDP, and in Sweden, it is 11.0% [9]. Life expectancy in Taiwan is 80 years, and in Sweden, it is slightly higher at 83 years [9]. During the current pandemic (SARS-COV-2), Taiwan and Sweden employed digital technologies along with the manual approach, which

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worked well without going through a national lockdown [10-13]. Thus, it is important to know the attitude of local doctors towards digital healthcare technologies. Moreover, there are few studies conducted on the attitude of doctors towards digital healthcare technologies [14, 15], yet none has used symbolic interactionism. In this work, the symbolic interaction framework is employed to understand the implementation of digital healthcare technologies and the resulting interaction with medical doctors. Moreover, a symbolic interaction framework helps to understand the digitalization process and its impact on the healthcare system and policies, as well as the issues digitalization brings and their potential solutions.

METHODS

Human-environment interaction is culturally bound; therefore, cross-cultural studies enrich perspectives and refine interdisciplinary rationality [16]. This paper aims to understand and analyze the "meaning" of digital healthcare technologies by exploring the perspectives of Taiwanese and Swedish doctors and their interactions with such. Moreover, this project seeks to generate new knowledge about the good, bad, and irrelevant innovations in digital healthcare technologies. The main focus was on the following questions:

1. How do you describe digital healthcare technologies?
2. How do you describe the digital healthcare technologies in your country?
3. How do you perceive the interaction between patients and digital healthcare technologies in your country?
4. How would you define the situation in your country with satisfaction/frustration?
5. How would you describe the practice of medicine in your country after 10 years?

Medical doctors were identified through Google searches, LinkedIn profiles, and social connections in Taiwan and Sweden with the expectation of diverse views on medicine. Five Taiwanese medical doctors were interviewed in-person in various cities at their office or a nearby café. Three Swedish medical doctors were interviewed via Skype or Zoom. This group possesses diverse backgrounds. For example: one Taiwanese doctor has both clinical and academic involvements; one Taiwanese and one Swedish doctor are full-time academic scholars with research involvements; one Taiwanese and two Swedish participants are currently residents; one Taiwanese participant is a 6th year MD student with internship experiences; and one Taiwanese participant is a dentist. Semi-structured interviews were used to collect data from the participants. Data collection was carried out between October of 2020 and November of 2020. Before each interview, the goal of the study was described and participants were asked for permission to allow the interview to be recorded with assurances of the confidentiality and anonymity regarding interview data. Interviews were later transcribed using Speechnotes (https://speechnotes.co/). The data presented in this article is the republication of a chapter from the author's master's thesis available in the [Swedish University of Agricultural Sciences] repository [https://stud.epsilon.slu.se/17166/][17].

RESULTS

1) Interpreting digital healthcare technologies
2) Interaction with digital healthcare technologies
3) Digital dilemmas
4) The future of digital culture

Theme 1: Interpreting digital healthcare technologies

Taiwanese perspective

The doctors described digital healthcare technologies as new tools that provide them with more weapons to fight against disease and as a convenient and cost-effective way to obtain reports of complex genomic testing. They endorsed digital healthcare technologies, such as electrosurgery, portable devices, and electronic charts. *"The new technologies provide us [with] information about the specific gene related to a disease, but it's a problem if we don't have [the corresponding] treatment."* They further elaborated that artificial intelligence (AI) is also very interesting. *"New technology [has an] effect on our behavior [because] it may replace some of us, but it also induces new working opportunities."* The doctors said that it is interesting to employ AI in diagnosis and treatment, but AI needs a lot of training. AI also helps in surgery by improving the way doctors treat patients.

Swedish perspective

The doctors said that digitalization provides more tools to deal with patients. Software makes communication more effective during the Corona pandemic, which involves multiple applications (apps) through which doctors and therapists can exchange information and prescribe medicine. Digital tools also enable better access to healthcare for individuals living in remote areas or isolation. Moreover, digitalization benefits other issues; for example, it helps doctors know more about a patient's situation, ranging from X-rays to medicine being taken, all of which is stored in a computer data system. Thus, it is easier for doctors to keep track of patients without losing anything. Additionally, doctors described how digitalization can help patients when used in a sensible way. Such can improve healthcare practices in part because Sweden is a large country and, as such, many inhabitants live far from their clinic. One doctor said: *"Traditional pathologists have used the microscope for more*

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than a hundred years, but now we can scan images on the computer, [which] helps in clinical work." Doctors also said that clinical practices have become more digitalized, so we can expect to use more computer applications and AI to help with diagnosis in the future.

Theme 2: Interaction with digital healthcare technologies

Taiwanese perspective

The doctors said they use digital technology to obtain information about new drugs, other new technologies or injections, and even clinical trial data from the academic world. *"When we graduated, some of the technologies did not exist. [Now, I am] learning new knowledge, so I can take my new knowledge and help my patients. It's very easy, [except my] experience using AI [is] not [as] sure." "We can accept AI, such as eyescope, [for] use [in] diagnostics, and [such is] approved by the US-FDA. This kind of AI can be used in a remote area without an ophthalmologist. Since Taiwanese regulations don't update fast, it limits use of AI to remote areas. However, in the USA, they are treating patients online, but in Taiwan, it's face-to-face."* Another doctor said it is an assisting tool and good for doctors to have advanced technology. However, regarding AI, such may or may not replace doctors but is interesting, nevertheless. *"It's like a black box. You don't know [what] it comes up with someday."* The doctors added that X-ray, CT (computerized tomography), and ultrasound are playing an evolving role in breast cancer diagnosis. Moreover, some patients accept the use of new technology, whereas others reject it, such as many elderly patients.

Swedish perspective

A Swedish doctor said: *"I think for some patients, it works very well, [...] especially younger patients who are more digitally savvy. I think they are very content with having digital options for healthcare, like booking an appointment online [and] maybe having a video chat with the doctor through an app. I think for some patients, younger patients especially, it probably works very well, but it doesn't replace real human interaction, especially for the examination. I mean, we can't do any examination of the patient through a digital app, so it doesn't really replace the patient's examination and the interaction like in a clinic or emergency room. And I think it's more difficult probably for older patients."* They said that it is good to have new technologies, because patients don't need to carry files, and all information is stored on the computer. There is a general practitioner healthcare app, where a patient can meet with a doctor easily, which increases availability to meet doctors. Internal medicine specialists can perform a cardiac ultrasound using digital healthcare. In northern Sweden, where a small population inhabits a large area, a few doctors consider it useful but think digital healthcare technologies should be used in a sensible way rather than just to save money.

Theme 3: Digital dilemmas

Taiwanese perspective

The greatest frustration mentioned regards aspects of patient compliance. A treatment's effectiveness is not always easy to see in the real world; many barriers are connected with the patients themselves: their level of trust in general and whether they take their drugs properly, due to time, memory, or fear of adverse side-effects. Regarding new technology and drugs, the doctors spent more time describing why they personally want to use them, what possible adverse side-effects could be, and why they would attempt to persuade patients to adopt these things. They also mentioned that patients in Taiwan often want doctors to provide the newest technology, but popular medical news is not as advanced in their society. They said patients know of new technology, but accessible information can be sparse. Taiwanese often use Facebook, but most knowledge provided there is superficial or commercial, such as a dentist posting a picture of a patient's mouth on the website to display technique. The privacy of the patient should be preserved, however, so such is not good practice. The doctors also noted that there is a defensive strategy in place. Sometimes, medical doctors want to protect themselves and request many tests, because there are too many patients, especially in the clinics. Thus, medical doctors have limited time to diagnose and explain information, as healthcare fees are inexpensive in Taiwan.

Swedish perspective

Doctors mentioned that due to long waiting times and few specialists at the hospital, many doctors need to perform extra administrative work. Swedish doctors see more patients than their counterparts in certain other European countries. In addition to administrative work, they also need to attend courses about how to become leaders. *"I think the Swedish doctor meets [twice] as [many] patients as the German doctor, or even more."* They also said that due to the current pandemic (SARS-COV-2), doctors need to work longer hours because some of their colleagues became sick, and that there is more pressure on the healthcare system in general.

Theme 4: The future of digital culture

Taiwanese perspective

A doctor said that in the next ten years, the National Health Insurance (NHI) will not be changed, because it is important to the Taiwanese from a political perspective, and the government will maintain promises to run the NHI. New technologies will still be acquired, but patient-doctor relationships may not change much. The NHI may be open to AI, but more of this kind of medicine is not possible. Another doctor said that in the next 10 years, technology

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will rule, but health insurance will become worse because fewer people will have access to the NHI due to rising costs. This doctor also mentioned that due to technological evolution, doctors will have more weapons and skills to help treat and communicate with patients. Information on the internet will also expand rapidly. Multiple doctors said that everyone would enjoy advanced medication; patients would easily get CT and MRI; and that medical treatment may develop two extremes: the costs of NHI may rise due to more advanced medical services being rendered. Thus, NHI fees will increase, and medical centers will receive more advanced technology. As the budget increases, field expenditures will increase, and quality of care will improve. If the political situation is stable, and the NHI does not face bankruptcy, people will go to the hospital in a natural order. One doctor said that certain laws need to be improved. Taiwanese law is not progressing well if the system only follows what the USA and Japan have developed. Instead, Taiwan should develop its own system and cooperate more with Singapore. Another participant said that after ten years, there will be widespread AI, many statistical models, and doctors will want AI to contribute in a correct way.

Swedish perspective

Swedish doctors mentioned that there will be more digital development, which will be like normal interaction with a patient, but that digital interaction cannot fully replace doctors or the need to meet in person. Sweden has many geographically isolated rural areas, so digitalization will improve the situation for patients living in small towns by providing access to specialists in various fields like in big cities. Moreover, doctors said that it is hard to predict technological trends, as everything in medicine is evolving. It is not likely that robots are going to fully replace humans or perform surgery without supervision. The pandemic is certainly affecting the system and will likely result in significant change. Swedish general medical practices will be handled over Skype, and laboratory personnel will utilize AI more to help with diagnosis.

DISCUSSION

Mead stated that societies continuously undergo a process of change, and this process brings about new solutions for old problems but also creates novel problems. Symbolic meanings are mainly shared inside the culture by principal actors [18]. Within the confines of this study, medical doctors respond to technologies differently, making sense of their context and expectations according to the framework of symbolic interactionism. Interestingly, certain symbolic meanings of digital healthcare technologies are consistent in both cultures examined, such as how medical doctors from Taiwan and Sweden the technologies as providing them with more "weapons" or "tools." These terms are linked to concepts of efficiency and changes in the organization. However, there is also variation in the interpretation of the different symbolic realities based on their routine interaction or specialty in medicine, which supports the employment of symbolic interactionism. Blumer stated that industrial change is inevitable and is a contributing factor that also triggers societal change [19]. Industrialization is a diverse process and is not necessarily concerned with social change [20]. Therefore, technological development appears differently across various cultures, institutions, and circumstances. The symbolism of digital healthcare technologies prominently shapes the clinical environment. The acquisition of said technologies is often perceived as favorable, allowing doctors to actively engage in clinical settings with novel knowledge and combat disease with extraordinary tools. The fact that AI may replace aspects of their jobs in the future is worrisome, however. Mead stated that frustration occurs when a clash of interests takes place. This may be due to an error in perception of law or meaning from the perspective of the actors. This sense of narrow self-sacrifice leads to larger self-development which advances the interests of others [18]. In this study, doctors discussed problems that focused on the understanding of their meaningful experiences with patients and digital healthcare technologies. They experienced various kinds of frustration working in the current system, especially obtaining the trust of patients by providing them with the pros and cons of the new technologies, which in turn demands a great deal of time, often because of a patient's ignorance regarding the complexity of regulatory issues. Mead stated that our mind can predict possible alternative futures in reference to an object, and the response intentionally selects from various environmental issues, predicting the solution as the most satisfactory to an individual. The future cannot be predicted precisely, but it is relevant to the past and can be wisely controlled [18]. In this study, doctors predicted changes to healthcare may depend on the political situation, legal regulation, and other influences on the medical practice, in addition to the idea that more technologies would be available and adopted by the healthcare system. Technological advancement may require more funding, but the addition of new technologies should provide better facilities for patients as well as easier access to medical consultation and improved diagnosis. In the next ten years, machines will not likely replace medical doctors outright, but the involvement of AI should increase. Doctors from both countries reflected on their diverse views regarding digital healthcare technologies, which is not surprising, because they make sense of the technology in terms of their self-image and context. They shared some

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common meaning regarding the benefits of digital healthcare technologies in terms of assisting their work, providing more weapons to combat diseases, and improving communication with patients. Taiwanese doctors emphasized the NHI and the cost of medical services, whereas Swedish doctors were not as worried about monetary issues. This difference in perspectives is likely due to the support of the local social environment.

CONCLUSIONS

This empirical study explores the perspectives of eight Taiwanese and Swedish medical doctors regarding digital healthcare technologies during the SARS-COV-2 pandemic and considers the meanings of digital healthcare technologies in a communication context. Furthermore, the doctors communicated their perceived problems and cultural limitations within their healthcare system, while also suggesting possible future developments. To the best of the author's knowledge, this is the first study to explore the perspectives of Taiwanese and Swedish medical doctors towards digital healthcare technologies using symbolic interactionism. The main limitation of this study is its small sample size. Future investigations may need to extend cross-cultural collaboration in order to better understand the relationships between digital healthcare technologies and their various environments and institutional changes.

Conflicts of Interest

The authors declare no conflict of interest

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