Exploring Barriers that Affect Telerehabilitation Readiness: A Case Study of Rehabilitation Centre in Malaysia

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Abstract. TeleRehab enables the rehabilitation services to be delivered in distance by providing information exchange between patient with disabilities and the clinical professionals. The readiness step in any adoption of healthcare services should always be one of the requirements for a successful implementation of an innovation. However, little scholarly has been undertaken to study its influence on TeleRehab and the various barrier factors that influence its adoption. This research explores the barrier factors that influence the readiness of healthcare institution to adopt TeleRehab. This paper presents a semi-structured interview involving 23 clinical professionals of a case study on the issues of TeleRehab readiness in one rehabilitation centre in Malaysia. By applying thematic analysis, the study uncovers seven barriers that affect the TeleRehab readiness. This includes barriers of no urgency to change, less awareness, less involvement in planning, not enough exposure on e-Healthcare knowledge, resistance to change, low usage of hardware and software, and less connectivity. The study contributes to both TeleRehab management and technology readiness research in hospitals.

Keywords: TeleRehab · TeleRehab readiness · Clinical professionals
Thematic analysis

1 Introduction

The successful introduction of telerehabilitation (TeleRehab) services has the potential to solve crucial problems faced by healthcare institution, including geographical barrier and quality of care [1, 2]. TeleRehab seems to be the best healthcare service that can be provided to allow rural patients to get the best treatment [3]. There are few studies conducted on TeleRehab adoption in healthcare domain. For instance, a study conducted to the patients with chronic obstructive pulmonary disease (COPD) which aims to

explore the factors affecting satisfaction and potential for services improvements in long-term telerehabilitation implementation [4]. In addition, another study was also conducted to the patients with multiple sclerosis (PwPS) to measure the level of acceptance and patients' ability to carry out exercises using telerehabilitation system without supervision [5]. However, in order to adopt TeleRehab successfully, the research on readiness aspect is necessary since readiness shall be one of the requirements for a successful implementation of an innovation [6].

Nonetheless, most studies in TeleRehab were focused on its applications (e.g., telemonitoring, teleconsultation, teletherapy) [7–9], benefits (e.g., cost-effectiveness, overcomes barriers) [10, 11], and methods in delivering TeleRehab services [11, 12]. The study on TeleRehab readiness that uncovers the factors dominating the clinical professionals (e.g., physicians, therapists, nurses) in adopting TeleRehab, however, is still limited. As "readiness is an integral and preliminary step in the successful adoption of an innovation" [13], thus, a thorough study on TeleRehab readiness is important to prevent failure.

The purpose of this study is, therefore, to explore the factors that influence the readiness of healthcare institution to adopt TeleRehab. In doing so, one case study in rehabilitation centre in Malaysia is developed through the utilization of case study research approach. The paper is structured as follows: the following section presents the brief overview of background related studies; the third section will describe the methodology employed by this study; the fourth section reports the findings and discussions. The final section concludes the study and provides some possible future research direction.

2   Literature Review

In delivering good quality health service over distance, a strong engagement between advance telecommunication technologies and healthcare is needed [13]. TeleRehab is the example of modern medical rehabilitation delivery that minimizes the loss and maximizes the patient's abilities with the use of strong internet connection [14]. Generally, TeleRehab is defined as the practice of effective communication and information technologies solution to deliver clinical rehabilitation services from a distance [15]. It offers the advantages over the old-style way of face-to-face rehabilitation sessions to more organized, specialized, and efficient service delivery. Although the service usually involves a long period of time, it becomes popular due to economic potential in reducing cost [16]. It is the best choice for patient doing rehabilitation at home [17] by offering cost-effectiveness solutions [11, 18] with the use of internet connection as the platform to enhance rehabilitation delivery.

Although TeleRehab offers such benefits which can be utilized by stakeholders, healthcare institutions, and healthcare system itself, it is important to study the readiness aspect to make sure all the benefits can be useful. Furthermore, Abouzahra [19] posits that failure to identify stakeholders who involved in healthcare IT project is one of the reasons for its implementation failure. To adopt TeleRehab, the healthcare institution's stakeholders such as clinical professionals need to be mentally and physically prepared. This includes their behavior to resist or support an innovation

which is illustrated as readiness towards the innovation's failure or success [20]. This means that clinical professionals need to be ready to open for change and toleration with regards to TeleRehab.

According to Schein [21], the clinical professionals who work directly with patients should consist of physicians, therapists, and nurses. However, existing studies on TeleRehab only concern with the perspective of the patient [22], physician [23], and service provider [24]. For instance, Tan [23] discussed the role of the physician in conducting the assessment of video data transfer. The study shows that physician's readiness has managed to minimize the burden of delivering TeleRehab services. In another study, Kairy [22] explored the perception of patients regarding TeleRehab services. The result of this study shows that a better understanding of patients in TeleRehab service allows the program to be continued and implemented wisely. Next, Cottrell [24] in her study provided the critical steps in determining the readiness of service providers for the implementation of TeleRehab. In this regard, it can be said that existing studies on TeleRehab readiness only concern with physicians, while neglecting therapists' and nurses' perspectives. It is also interesting to highlight that the scope of all these studies did not cover the factors influencing those stakeholders in adopting TeleRehab.

Thus, it is necessary to combine these three groups of profession – physicians, therapists, and nurses, in one study towards TeleRehab readiness since the high level of their engagement and responses to change is the key for the success of system implementation. This leads the researchers to identify all possible factors that need to be considered as important for clinical professionals in adopting TeleRehab.

3   Research Methodology

In this study, the researchers conducted a single case study at one rehabilitation centre in Malaysia. A single case study was chosen because it is a good way to describe case for an easier understanding [25, 26]. In addition, since this study focused on a group of clinical professionals, [27] single case was suitable as it is less time consuming and less expensive [28]. In addition, the chosen rehabilitation centre works in ensuring patients to get the suitable treatment for better recovery. The centre is divided into three units which are prosthetic and orthotic, physiotherapy, and occupational therapy. Few technological innovations related to rehabilitation matters such as Shock Wave (i.e., low energy placed on the skin surface to restore blood flow), ROM (i.e., game base for hand movement) and self-innovated rehabilitation product (i.e., exercise tools to assist in the recovery process of all limbs) can be seen and applied in the centre. All data from the prescribed treatments were recorded in the Folder (i.e., manual). Besides that, there is a system that allowed the patients to book their appointment (i.e., computerized appointment system) for a treatment session.

One-to-one interview sessions with clinical professionals including physician (i.e., 1 interview), therapists (i.e., 10 interviews), and nurses (i.e., 12 interviews) were conducted throughout this case study. The details of the respondents are shown in Table 1.

Table 1. Characteristics of the respondents.

Demographics	Number
Gender	
Male	4
Female	19
Age	
<=30	10
<=40	10
>41	3
Range (year)	22–52
Education	
Secondary	4
Tertiary (Diploma)	8
Tertiary (Degree)	10
Tertiary (Master)	1
Working experience	
<=10 years	15
<=20 years	5
<=30 years	3

Once the data has been collected, next, thematic analysis approach is applied [29]. As claimed by [30], thematic analysis is useful method for exploring the perspective of different research participants. In this case, the participants are clinical professionals which consists of physicians, research participants, thus can produce similarities and differences, and create unanticipated insights. All the interviews' data were then systematized and structured according to categories. In doing so, the interview transcripts were read in search of incidents and facts. The incidents were then compared with each other to discover or redevelop the code.

4   Findings

There are seven issues emerged from the data analysis.

4.1   No Urgency for Change

The result from the case study shows that most of the interviewees are satisfied with the current system. As one of the therapists expressed,

> "*In my opinion, the need to change is important as we should deliver the best services to patients. If there is a new innovation suitable to be implemented, that offers many advantages to patients and also to us (therapists), it could be great for us to use it. But, we are comfortable with what we have now (current system)*"

In addition, another therapist said,

> *"So far, this department leads other departments by providing numbering system. This system allows patients to book their appointment with the therapists. So, the patients do not have to wait long to get the treatment"*

They tend to feel comfortable with the current system causing the clinical professionals not have desire to change. It means that they are still not ready to adopt TeleRehab or there are some limitations such as individual attitudes and acceptance that restrain them from accepting changes. The need to change is an important aspect in convincing the clinical professionals to advance with the service delivery.

4.2   Less Awareness

Awareness is the state where those affected by the IT project at the healthcare institution is aware of the existence of new technology that can be used to advance the current system [31]. The result from the case study shows that only a few of clinical professionals are actually aware of TeleRehab and other healthcare technologies as an advancement for the rehabilitation ecosystem such as telehealth and telemedicine. Majority of them are still not aware of any of the healthcare technologies. As the physician mentioned,

> *"TeleRehab is a good medium for better service delivery. However, all the therapists and nurses here prefer to use manual system because it has been practiced since this unit was established"*

Besides, one of the therapists also mentioned,

> *"I do not aware of advantages and functions of TeleRehab. This is my first time get know about it"*

The less awareness towards TeleRehab causes the lack of exposure to its advantages. The need to always keep updated with current technology with an advancement is important because it can deliver positive impact to the health field and allow the clinical professionals to provide the best services.

4.3   Less Involvement in Planning

In the case study, only a few clinical professionals involved in generating ideas of new innovation and committed in the planning. This means that no one acted as the key champion. In fact, majority of them prefer to use current technology or use small innovation brought from their top management. However, they are free to bring out any ideas for improvement if there would be a meeting or discussion conducted by staff and the top management. As one of the nurses stated,

> *"Normally, only the top management and few specialists involved in the planning for adopting any new technologies. The rest of nurses and therapists only use it. However, we are free to give any ideas for improvement"*

A proper of budget allocation is also an important element in the planning. Although the involvement of the clinical professional in the innovation is very encouraging, they still not be able to use that achievement for the organization and patients. A physician also mentioned this,

"The low budgetary allocation is one of the reasons for the lack adaptation of the new innovation. Hence we were not involved greatly in the planning"

4.4   Not Enough Exposure on E-Healthcare Knowledge

The case study shows that only a few numbers of clinical professionals are exposed to the knowledge of TeleRehab. This knowledge was learned during their studies before they were appointed as clinical professionals in the rehabilitation area. However, this only involved the younger interviewees while the older one such as therapists and the nurses who have been working for more than 15 years claimed that they are not exposed to this knowledge. This may be due to the different curriculum that they followed while doing their courses. As one of the therapists stated,

"During my study, I never learn about any healthcare services such as telehealth, telemedicine, and telerehabilitation. Due to that, I am not exposed to the knowledge"

Another therapist also said,

"I only know the basic knowledge about healthcare services and do not really exposed to the new innovation such as TeleRehab"

However, this situation is not applicable to both physicians as they are already knowledgeable about TeleRehab technology.

4.5   Resistance to Change

The case study reported that most of the clinical professionals agreed that they have the feeling to resist the changes. This is due to budget constraint and financial prioritisation, self-innovated rehabilitation product need to be creatively financially sustainable and less dependent to the budget given by the management. As a consequence, not all of them have the opportunity to use the innovation and apply to their rehab patients.

One of the therapists mentioned that patient's acceptance towards the technology will also influence their attitude; either to resist it or not. As she stated,

"At our rehabilitation centre, before any new innovation will be implemented, it needs to be tested and used wisely to the patients. The patients' acceptance leads to our attitude acceptance"

Another therapist also mentioned,

"The patients treated here live in rural area with less exposure to the internet connection. This caused them to resist changes"

This means that if the tendency of the patient's acceptance is low, definitely such innovation will not be implemented.

4.6   Less Use of Hardware and Software

Hardware and computers are necessary components for any technology adoption in an organization [32]. Certain criteria such as level of computer usage and the availability of compatible computer in accordance to the need of software need to be measured prior

to the adoption of new innovation. However, the result from the case study shows low availability of computers in the centre. As mentioned by one therapist,

"The quantity of computer here is limited. We need to share it in order to do daily report"

The usage of hardware and software is also at medium level. This is supported by one of the therapists,

"We only use the computers and internet when necessary. In daily routine, we update the patient's record in the folder and prepare the overall report by the end of the day"

This is because the rehabilitation services in the case study are still delivered manually without using any computers. The low availability of computers and low usage level indirectly show low readiness of clinical professionals to adopt TeleRehab. Both indicators give the rough perspectives about clinical professional's readiness towards TeleRehab. If their level of usage for hardware and software is high, it is easier for them to adopt TeleRehab and vice versa.

4.7   Low Connectivity

The high speed and good quality of internet connection are necessary for TeleRehab adoption since the data need to be transferred from the patient's house to the rehabilitation centre. Strong internet connection is needed from both parties to ensure all the data could be transferred and analyzed [33]. In the case study, all clinical professionals stated that internet connection in the rehabilitation is in very good quality with high speed for access. However, they are worried about the one in the patient's house. As one of the therapists stated,

"There is no problem with internet and phone connection at our rehabilitation unit as the line is above than average level every day. However, I was thinking that it would be a problem with the patient's side as most of them live in rural areas. So, the internet connection may not be available at all or in poor condition"

A nurse also stated,

"If the connectivity issue can be solved, it allows the patients to accept TeleRehab"

5   Discussion and Conclusions

This study helps to identify the main issues concerning TeleRehab readiness from qualitative perspective. The study is novel in that it provides description of clinical professional views on TeleRehab with a focused on readiness aspect. An exploration of why clinical professionals is using rehabilitation delivery services and the ways in which they use it, what they see and feel as the most persistent barriers, are useful in informing TeleRehab readiness. Our study suggests that although few clinical professionals are beginning to understand the nature of TeleRehab, the data analysis from the case study discusses seven (7) issues that hinder for the TeleRehab readiness. This includes no urgency for change, less awareness, less involvement in planning, not enough exposure on e-Healthcare knowledge, resistance to change, less use of hardware and software,

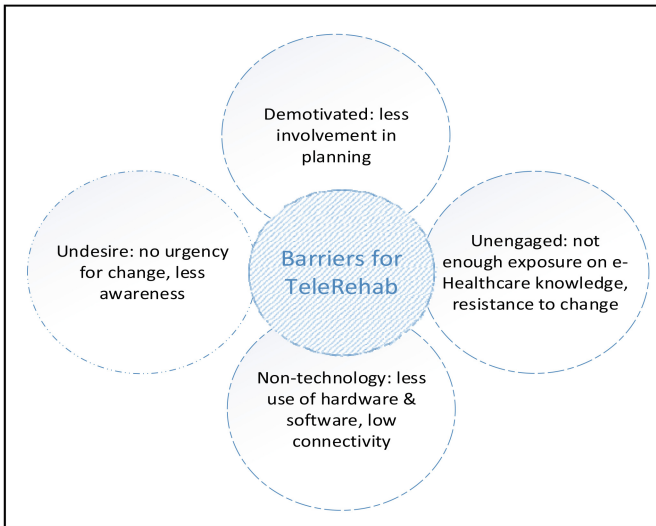and low connectivity. These barriers can be clustered into four (4) themes as shown in Fig. 1.

Fig. 1. Classification of TeleRehab barriers into themes

The undesired barrier refers to the clinical professionals' expressions of no urgency and unawareness that leads to the undesired to adopt TeleRehab. In this regard, the undesired barriers include factors of no urgency for change and less awareness about TeleRehab. Respondents expressed that they are not ready to adopt for TeleRehab services and still comfortable with the current system provided by the healthcare institution. They also not concern or less awareness towards new technology needs in the rehabilitation delivery services. These situations cause them not have desire to change. This is contradicting with Yusif [34] study who argued when the desire of readiness at individual level is high, individual will tend to accept for technology innovation. Hence, this theme is the most important theme because it is the root of not to change for adopting TeleRehab. Next, the demotivated barrier refers to the clinical professionals' expression of not showing interest to use technology innovation in the future. The only barrier that falls under motivation theme is less involvement in planning. Respondents stressed that no one acted as the key champion of generating ideas for TeleRehab. They are not totally invited in making a proper plan towards providing a better rehabilitation delivery services, and thus demotivated them to use TeleRehab in the future.

Next, the unengaged barrier refers to the clinical professionals' expressions of not actively engaged with the idea of innovation. This includes factors of not enough exposure on e-Healthcare knowledge and resistance to change. Respondents expressed that only small numbers of them are exposed to e-Healthcare knowledge. This makes them less aware towards the advantages of TeleRehab and just prefer to use current technology instead of becoming an innovator or key champion. In addition, respondents tend to

resist the changes due to felt that TeleRehab technology will not suitable for patient. Issue such as less exposure to the internet connection for patients who are living in rural areas affected for the TeleRehab readiness. Finally, the non-technology barrier is the context of the clinical professionals' expressions of not meeting the necessary technological requirements in adopting TeleRehab. This includes factors of less use of hardware and software and less connectivity. Respondents stressed that the usage of hardware and software, and the availability of computer in the case study are at low level. The low availability of computers and low usage level indirectly show low readiness of clinical professionals to adopt TeleRehab. In addition, the quality of internet between the healthcare institution and patient's house is another issue. Although the case study is coverage with good internet connection, but not the case for patients especially those who are in rural areas. This is supported by Ross [35] who stated that complexity (i.e., connectivity issue, unplanned downtime, software and hardware difficulty, data handling), and adaptability (i.e., acceptance and use, technical adjustment) could become the main barrier to adoption and implementation of innovation.

The classification above leads to the conclusion that these barriers avert the case study towards adopting TeleRehab. There is still a lot of attention and hard work to be done by the top management to ensure their clinical professionals are more ready and willing to adopt TeleRehab. Not only the top management, the clinical professionals themselves need to seek initiatives to be more physically and mentally prepared for TeleRehab.

The strength of this study was using interviews that allowed attitudes and perceptions of clinical professionals towards TeleRehab to be explored in greater depth. This study used a relatively small number of respondents, but included a diverse group of clinical professionals which encompasses of physician, therapist and nurse positions, and by age, gender, education tertiary and working experience. Since the study was conducted at one healthcare institution in Malaysia, so findings may not reflect all healthcare institutions in the country.

Future studies shall extend these barriers that impact TeleRehab adoption to higher than just individual level; this issue shall be discussed further in organizational level or national level. Thus, future research shall be considered in recently published TeleRehab studies such as the barriers issues from this study for the purpose of knowledge sharing. This will help increase awareness in the field among researchers and clinical professionals especially with the continuous advancement of new technology used for TeleRehab implementation.

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