

TeLEE-SAFE: DEVELOPMENT OF DIGITAL PLATFORM FOR TELEREHABILITATION

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ABSTRACT

The worldwide COVID 19 pandemic is a nightmare where people around the world are caught unprepared. That, waking up in one morning everyone's life turns upside down. Despite this crisis, the new normal life must go on. Every aspect of one's life has changed like business, education, medical services, and others but these need to evolve. This pandemic affects most especially the health care services which has forced clinicians to shift from traditional face to face treatment to telerehabilitation. This descriptive developmental type of research aimed to develop a digital platform on telerehabilitation for Physical Therapy and Occupational Therapy in delivering health services in the advent of innovation in technology. Specifically, this study sought to answers to following sub questions: What are the current practices in telerehabilitation for Physical therapy and Occupational Therapy during the pandemic? What are the common problems encountered by the Physical therapists and Occupational Therapist in telerehabilitation using existing platforms? What specific digital platform can be designed and developed to facilitate effective telerehabilitation for Physical therapy and Occupational Therapy? What is the level of acceptance of the developed digital platform for telerehabilitation among the users of the system? What is of the level of usability of the developed digital platform for telerehabilitation as rated by IT Professionals based on ISO 9126, to wit; Functionality, reliability; usability; efficiency; maintainability; and portability? The respondents of the study were thirty (30) Physical Therapist and Occupational Therapist from rehabilitation facilities in Laguna who utilized telerehabilitation and four (4) IT professionals evaluated the usability of the developed digital platform. Results showed that respondents had problems in terms of documentation of patient record and treatment plan and professional fee collection since these are not integrated in the method of telerehabilitation that they are using. The respondents' level of acceptance of developed digital platform claimed that is acceptable as to its ease of use, completeness, and overall usability. As to the level of usability, the respondents stated that the developed digital platform is highly acceptable as to its functionality, reliability, usability, efficiency, maintainability, and portability. Therefore, the current practices in telerehabilitation this time of pandemic, the Physical Therapist and Occupational Therapist still found pen and paper useful for documentation. Videoconferencing is the commonly used platform for its accessibility. The common problems encountered by Physical Therapist and Occupational Therapist using the existing platform rested on its difficulty uploading the patient's laboratory findings, giving instructions and treatment plan, cannot give accurate feedback and hard time to collect professional fees for there is no direct

payment. The developed digital platform is found to be acceptable for its ease of use. As far as usability is concerned the developed digital platform is functionally suitable and has portability for telerehabilitation.

Keywords: TeLEE-SAFE, Telerehabilitation, Digital Platform, Level of Acceptability, Level of Usability.

INTRODUCTION

The worldwide pandemic COVID 19 is a nightmare where people around the world are caught unaware. That, waking up in one morning everyone's life turns upside down. Despite this crisis, the new normal life has to go on. Every aspect of one's life has changed business, education, medical services and others but these need to evolve. This pandemic affects most especially the health care services which brought the emergence of new technology like telerehabilitation. There were studies and literature that support the conduct of this research endeavour. Telerehabilitation as defined by Sarsak (2020) is the use of telecommunication technology in delivering rehabilitation health-care services. A new and developing field in telehealth that covers clinical application, consultative, preventative, diagnostic, and therapeutic services. Nowadays with the newly discovered coronavirus (COVID 19) put telehealth on the frontlines. It becomes imperative this time of pandemic and the answer for social distancing to flatten the curb of COVID19.

According to Shemesh et al., (2020) strengthened the aforementioned statement by saying that mobile health applications (mHealth apps) have now gained global popularity. Morris et al., (2020) stated that, mobile health and mobile rehabilitation (mHealth and mRehab) services and technologies have attracted considerable interest from healthcare providers, technology vendors, rehabilitation engineers, investors and policy makers in recent years. Telehealth is seen as evolving from clinics to the home. Its services paved its way fastly and remotely, but unfortunately not much on therapeutic practices in Physical Therapy and Occupational Therapy are classified essential health provider and applying health and telehealth or not losing any progress patients have made.

Several studies were conducted to evaluate the delivery of common rehabilitation internationally and locally, but not much has been carried out on the Physical Therapy and Occupational Therapy perspective as far as current practices in telerehabilitation and problems encountered in using the existing digital platform. Along this premise the researcher took a stride to evaluate the current practices of Physical Therapist and Occupational Therapist on telerehabilitation and common problems encountered in using the existing platform. Results from which are used as basis in the development of new digital platform for telerehabilitation. Level of acceptability and usability of the developed platform served as a major goal of the study to further its utilization. With these in mind, the researcher proposed to determine the practices, problems encountered, digital platform can be designed and developed to facilitate effective telerehabilitation for Physical therapy and Occupational Therapy, the level of acceptance of the developed digital platform for telerehabilitation among the users of the system as well as the level of usability of the developed digital platform for telerehabilitation as rated by IT Professionals.

METHODOLOGY

The study employed descriptive developmental type of research for the purpose of describing the nature, characteristics and components of population. As defined by Faltado et al. (2016), descriptive research is concerned with describing the nature, characteristics and components of the population or a phenomenon. While Beb (n.d.) defined developmental method a research that pertains to instructional development, which means a product will be created after conducting the research. Hence, descriptive developmental method is the systematic study of putting into design, developing and careful evaluation of programs, procedures and outcomes that must meet specific standards or criteria.

This design was used in the study to determine the current practices in telerehabilitation, and problems encountered, and problems encountered using the existing platform for Physical Therapist and Occupational Therapist. Results led to the developed digital platform for telerehabilitation. The level of acceptance of the developed digital platform was evaluated by the respondents. Alongside was the level of usability of the developed digital platform for telerehabilitation by IT professionals based on ISO 9126. The population of the study were Physical Therapist and Occupational Therapist from rehabilitation facilities in Laguna who utilized telerehabilitation. The study has a total population of forty-five (45) respondents who were the respondents for Part I- Current Practices in telerehabilitation and Part II- Problems encountered in using the existing platform for telerehabilitation. Part IV was about the level of acceptance of the developed digital platform, unfortunately thirty (30) respondents out of 45 managed to answer which served as its retrieval rate. For Part V, four (4) IT professionals evaluated the usability of the developed digital platform. The face validity of the survey-questionnaire for Part I and II were reviewed by the panel of experts consisted of statistician and experts in the field of the topical inquiry. The comments and suggestions posited were adopted by the researcher. For Part IV, the standardized questionnaire ISO 9126 was used which were rated by IT professionals.

RESULTS AND DISCUSSIONS

Table 1. The Current Practices in Telerehabilitation for Physical Therapy and Occupational Therapy during Pandemic

Indicators	Frequency	Percentage	Rank
1. Platform used in conducting telerehabilitation			
a. Telephone call	21	46.67	4.5
b. Video conferencing	24	53.33	3.5
2. Documentation when conducting telerehabilitation			
a. Pen and paper	27	60.00	1
b. Computerized	21	46.67	4.5
c. Others	1	2.22	9
3. Received instructions and treatment plan when conducting telerehabilitation			
a. Verbally over the phone	25	55.56	2
b. Electronically sent document	24	53.33	3.5
c. Others	6	13.33	7
4. Collection of professional fees or mode of payment			

a. Online banking	15	33.33	5
b. E-money	11	24.44	6
c. Others	3	6.67	8

Table 1 shows the current practices of the respondents in telerehabilitation during the pandemic. Results showed that documentation when conducting telerehabilitation was given the highest rank among the four indicators. There were 27 respondents equivalent to 60% used pen and paper. There were 21 respondents used computerized documentation comprises 46.67%. As regard on the received instructions and treatment plan when conducting telerehabilitation, there were 25 respondents equivalent to 55.56 % verbally over the phone, where there were 24 respondents equivalent to 53.33% electronically sent documents. On the platform used in conducting telerehabilitation, there were 24 respondents equivalent to 53.33% used video conferencing and 21 respondents, 46.67% used telephone call. On the area of collection of professional fees or mode of payment, there were 15 respondents equivalent to 33.33 % favors online banking and 11 respondents, 24.44% for E-money. Results imply that the Physical Therapy and Occupational Therapy practitioners were able to answer questions and statements, able to examine ideas and arriving at the answers on their own thinking. Also enable to evaluate statements based on the practices applicable in telerehabilitation this time of pandemic.

These findings can be correlated to the study of Leochico (2020) which revealed that, in teletherapy the patient received instructions and home exercises with the supervision of Physical Therapy and Occupational Therapy practitioners. The therapists together with rehabilitation nurses were involved in multi-disciplinary telerehabilitation sessions especially in remote community. The activity such as telementoring was done using a web-based application usually in asynchronous mode of transmitting health-related information to patients. Commonly used also are mobile text messaging or short messaging (SMS), video call and instant messaging via social media platform like Viber, Skype and others in telerehabilitation. Generally, positive experiences on telerehabilitation were noted. However, internet speed and data privacy are major concerns.

Table 2.1 The Common Problems Encountered by the Respondents in Telerehabilitation using Existing Platforms: Patient record documentation

Indicators	Frequency	Percentage	Rank
can't upload patient referral	10	22.22	5
can't encode the patient assessment such as initial evaluation, PT/OT notes and progress notes	15	33.33	2.5
can't record the treatment plan and management	8	17.78	6
can't encode the patient's past medical history and history of present illness	15	33.33	2.5
can't upload the patient laboratory findings, MRI, radiograph etc..	24	53.33	1
can't record the patient profile	13	28.89	4
Others (asynchronous file sent to email)	3	6.67	6

Table 2.1 shows the respondents common problems encountered in telerehabilitation using existing platform in patient record documentation. As shown in the table, indicators can't upload the patient laboratory findings like MRI and radiograph rated high by the 24 respondents equivalent to 53.33%; can't encode the patient assessment such as initial evaluation, PT/OT notes and progress notes and can't encode the patient's past medical history

and history of present illness affirmed by 15 respondents equivalent to 33.33%. Indicator cannot record the patient profile as claimed by 13 respondents comprises 28.89%. Indicator cannot upload patient referral affirmed by 10 respondents, 22.22% and indicator can't record the treatment plan and management as affirmed by 8 respondents equivalent to 17.78%; Indicator, others was asynchronous sent to email rated by 3 respondents equivalent to 6.67%

Results implied that the Physical Therapist and Occupational Therapist practitioners found difficulty in telerehabilitation using existing platform not specifically designed for patient record documentation from patient laboratory findings, patient assessment initial evaluation, PT/OT notes, progress notes, treatment, and management to patient profiling.

The findings conformed to the work of Fiani (2020) stating that remote assessment and giving accurate patient assessment. This help establish a functional baseline for the patient, evaluate how efficient is the treatment and integrate data to progression. Additionally, assessment needs patient interview which can be done via the remote assessment. A thorough physical exam including observation movement, standardized tests, specific testing may be done with some creative adaptation and utilization of technology. Moreover, on the study of Rush (2018) where 75 % of individuals on the study look for an answer online regarding their health condition. There were 40-67% of suggested online platforms including health related application to get basic healthcare information. To add, patients should be educated about telehealth, their general expectation from telerehabilitation and the information about the patient specific condition must presented clearly and concisely. Many patients often consider telehealth appropriate for follow up sessions rather than initial assessment.

Table 2.2 The Common Problems Encountered by the Repondents in Telerehabilitation using Existing Platforms: Giving Instructions and Treatment Plan

Indicators	Frequency	Percentage	Rank
too much time spending in preparing	20	44.44	2
too much effort in preparing activities	17	37.78	4
cannot give accurate feedback	27	60.00	1
can't clearly understand the instruction	19	42.22	3

Table 2.2 shows the common problems encountered by the respondents in telerehabilitation in giving instruction and treatment plan to patient. Indicator can't give accurate feedback is rated high by 27 respondents equivalent to 60%; Indicator, too much time spending in preparing rated by 20 respondents equivalent to 44.44%; Indicator cannot clearly understand the instruction rated by 19 respondents equivalent to 42.22% and indicator too much effort in preparing activities is rated by 17 respondents comprises 37.78%.

From the results, it can be inferred that the Physical Therapist and Occupational Therapist practitioners is experiencing dilemma in telerehabilitation using the existing platform in giving instructions and treatment plan to the patient. Such that, the practitioner cannot give accurate feedback, cannot clearly understand instruction, too much time is spent in preparing and too much effort in preparing activities. Fernandez et al., (2016) emerged as an anchorage of the study, in such a way that give suitable mechanism to patients and therapist interaction somehow like in face to face. The patients performed their exercises and considered all information about the schedule of the rehabilitation plan, description of exercises and feedback about their performance. For therapists, the system helps them gather information about the

accomplishment of the plan and the accuracy of the patients' performance. This will allow a fast and accurate assessment of the patients' progress and update of the rehabilitation plans.

Table 2.3 The Common Problems Encountered the Respondents in Telerehabilitation using Existing Platforms: Professional fees collection

Indicators	Frequency	Percentage	Rank
No direct payment	21	46.66	1
can't access the professional fees/charges	4	8.88	3.5
can't access the statement of account/invoice	4	8.88	3.5
None (government hospital no charges)	19	42.22	2

Table 2.3 shows the respondents common problems in collecting professional fees. As shown in the table, indicator, "no direct payment" is rated by 21 respondents equivalent to 46.66; Indicators, "can't access the professional fees/charges and "can't access the statement of account/invoice rated by 4 respondents equivalent to 8.88%; Indicators, claimed that none, other government hospital no charges rated by 19 respondents equivalent to 42.22%.

The result means that respondents have a hard time collecting professional fees for there is no direct payment. This is evidently proven by the number of respondents 19 out of 45 said it to be hard. The study of Sayra (2020) supports this study as it tackled the common problem in healthcare payments. It revealed that the most common way to pay remotely include over-the-phone payments, invoicing, and online payments. Paying over the phone is one of the oldest remote payment methods which is considered the worst option. Paying over the phone has a higher failure rate because miscommunication while paying for services is risky. Most of the time this method requires keying in card information and subject to human error. On the other hand paper invoicing is quite popular yet inefficient way of collecting payments remotely where payment is done using business mails, an invoice to the patient, fills it out and return mails back to the vendor in the form of a check, it is said to be slow, inefficient, and the checks can be lost or stolen while in transit. Online payments are typically fulfilled by a patient online with a credit card and increasingly popular for it is safe, more secure, fast, and efficient compared to other payment methods.

According to the study of Digital payment option for Telehealth services (2020), most people are starting to pay bills via mobile device or tablet. Studies showed that 84% of Americans reported that at least one mobile payment in the past year. Also, consider a complete solution that allows to send customized text or email messages with a link to a mobile-friendly payment solution. Patients are then given the option to "pay now" or enroll in an approved payment plan to spread their financial responsibility over a longer period of time. Most patients expect to view and pay bills online via online portal. This portal allows online bill payment and the option to enroll in an approved payment plan if necessary. This also ensures that patients can view their bills and enroll in auto payment options if desired. Digital payment can provide a solution that speeds up the payment cycle, improves the customer experience and helps support a healthier practice in the future. Therefore, the data gathered from Part I and II served as basis in the development of new digital platform which is the major aim of the study.

Developed Digital Platform

The new digital platform for telerehabilitation named TeLEE-Systematic, Accessible, Friendly and Efficacy (SAFE) came into life ready to serve telerehabilitation. Based from the result of the study as far problem encountered in using the existing digital platform for telerehabilitation

by the respondents the newly developed digital platform named TeLEE-SAFE is the tool to address and solve the problems encountered in patient record documentation such as can't upload the patient laboratory findings, MRI, radiograph and others, can't encode the patient assessment such as initial evaluation, PT/OT notes and progress notes; can't encode the patient's past medical history and history of patient illness, can't record the patient profile, cant upload the patient referral and treatment plan and management. In terms of giving instructions and treatment plan such as cannot give accurate feedback, too much time spending in preparing, can't clearly understand the instructions and too much effort in preparing activities. The result shown in terms of professional fees there is no direct payment, cannot access the professional fees, charges, statement of account and invoice.

To navigate TeLEE- SAFE the users have to follow the directions stated as:

For Administration Panel

1. Go and access the link
2. Proceed to Patient Registration Verification, click the name of patient to verified
3. Proceed to Physical Therapy/Occupational therapy Evaluation and be informed of the following:
 - 3.1. Select the name of patient and fill out the information of patient and evaluation.
 - 3.2. The ancillary procedure uploaded by the patient such as the results of Laboratory, X-ray, MRI and others.
 - 3.3. Uploaded documents of patient such as referral from the doctor, screenshots of transaction receipt and others.
 - 3.4. PT/OT notes and Progress report for documentation and evaluation
 - 3.5. Acknowledgement receipt 7charged and posted the amount to be paid by the patient in real time.
 - 3.6 Videoconference, the address link sends to patient.

For Patient Panel

1. Click register here, read the telerehabilitation consent form and click agree and accept
2. Log in to the account
- 3.1. Proceed to Physical Patient panel be informed of the following:
- 3.2. Click ancillary procedures filled out the result of laboratory and others
- 3.3. Uploaded documents of patients such as referral from the doctor and image of X-ray and MRI others
- 3.4. View and print PT/OT notes and progress report
- 3.5. View and print the acknowledgement receipt posted by the therapist
- 3.6. Rendered services, direct payment to the account name and number of the therapist through online bank transfer and e-money

Table 3. Level of Acceptance of the Developed Digital Platform for Telerehabilitation among the Users of the System

Indicators	Weighted Mean	Verbal Interpretation	Rank
Ease of Use			
1. Overall, I am satisfied on the easy use of the platform.	4.30	Acceptable	
2. I am able to navigate the platform quickly because of its simple design	4.47	Acceptable	
3. I learned the use of the platform easily.	4.53	Acceptable	

Average	4.43	Acceptable	1
Completeness			
1. The platform has the functions I need for the practice of telerehabilitation.	4.27	Acceptable	
2. The platform has the features I need for evaluation and documentation.	4.33	Acceptable	
3. The platform has the function I need for giving instructions to my clients.	4.10	Acceptable	
Average	4.23	Acceptable	2.5
Overall usability			
1. I like and would recommend using the platform for telerehabilitation.	4.30	Acceptable	
2. I foresee that treatment will be fast using the platform.	4.20	Acceptable	
3. I believe I could become more productive using the platform.	4.20	Acceptable	
Average	4.23	Acceptable	2.5
Overall Average	4.30	Acceptable	

Table 3 shows the level of acceptance of the developed digital platform. Figures showed that indicator “ease of use” ranked 1 with the weighted mean of 4.43; indicators “completeness” and overall usability” rank 2.5 equally with the weighted mean of 4.23. The result implied that the developed digital platform for telerehabilitation is acceptable. Its ease of use, completeness and usability are commendable.

The developed digital platform for telerehabilitation as to its level of acceptance, implied that the platform is friendly user operation and promote practicality in adherence to therapy. Its completeness and overall usability were acceptable likewise commendable. These results coincided with the study of Symsack (2021) where the Reload Usability Survey was modeled after the System Usability the Reload app was evaluated according to its ease of use where majority of respondents strongly agreed. As to the organization and information on the iPad screen, it was claimed as clear, easy movement of keys, understandable and easy to remember. Overall, the RELOAD app was easy to control.

Table 4. Level of Usability of the Developed Digital Platform for Telerehabilitation as rated by IT Professional based on ISO 9126

Indicators	Weighted Mean	Verbal Interpretation	Rank
Functionality			
1. Functional completeness	4.75	Highly Acceptable	
2. Functional correctness	5.00	Highly Acceptable	
3. Functional appropriateness	4.50	Highly Acceptable	
Average	4.75	Highly Acceptable	1.5
Reliability			
1. Maturity	4.50	Highly Acceptable	
2. Availability	4.75	Highly Acceptable	

3.	Fault Intolerance	4.25	Highly Acceptable	
4.	Recoverability	4.50	Highly Acceptable	
Average		4.50	Highly Acceptable	6
Usability				
1.	Appropriateness recognizability	5.00	Highly Acceptable	
2.	Learnability	4.50	Highly Acceptable	
3.	Operability	4.75	Highly Acceptable	
4.	User error protection	4.25	Highly Acceptable	
5.	User interface aesthetics	4.75	Highly Acceptable	
6.	Accessibility	4.50	Highly Acceptable	
Average		4.63	Highly Acceptable	4
Efficiency				
1.	Time behaviour.	5.00	Highly Acceptable	
2.	Resource utilization	4.25	Highly Acceptable	
3.	Capacity	4.75	Highly Acceptable	
Average		4.67	Highly Acceptable	3
Maintainability				
1.	Modularity	4.50	Highly Acceptable	
Table 4. continuation....				
2.	Reusability.	4.75	Highly Acceptable	
3.	Analysability	4.50	Highly Acceptable	
4.	Modifiability.	4.75	Highly Acceptable	
5.	Testability	4.50	Highly Acceptable	
Average		4.60	Highly Acceptable	5
Portability				
1.	Adaptability	4.75	Highly Acceptable	
2.	Installability	4.75	Highly Acceptable	
3.	Replaceability	4.75	Highly Acceptable	
Average		4.75	Highly Acceptable	1.5
Overall Average		4.65	Highly Acceptable	

Table 4 shows the level of usability of the developed digital platform. Figures show that indicators “functionality and portability” ranked 1 with the weighted mean of 4.75; indicator “efficiency” with the weighted mean of 4.67; indicator “usability” with the weighted mean of 4.63, indicator “maintainability” with the weighted mean of 4.60; indicator “reliability” with weighted mean of 4.50. The results implied that the developed platform for telerehabilitation as to its level of usability is highly commendable. Its functionality, reliability, usability, efficiency, maintainability, and portability revealed to be very useful to the users. The results implied that the developed digital platform for telerehabilitation offers competent technical and technological services evident of the high acceptability rating for functionality, reliability, usability, efficiency, maintainability, and portability. The platform may get huge clients in telerehabilitation.

The study is anchored to the study of Rolon et al. (2015) wherein the processes that were modeled with purposes to apply metrics for measuring the usability as a software quality attribute according to standard ISO/IEC 9126. The second phase of the study on evaluated the usability and understandability of the models. Usability was evaluated as a software quality attribute according to standard ISO/IEC 9126 on hospital process modeled with BPMN (Business Process Model and Notation) with reference to the usability and capability of a

software found to be easily understood, learned, used thus, attractive to the user. The study can also be anchored to the study of Wang et, al. (2019) conformed with this study which stated that, the system can be used to interface the design of the database. At this stage, the outputs are the design of the interface and the database in coding and programming of pre-defined application development. Quality and comprehensive testing is done after the application is finished to ensure that the product/services are good. Quality is creating comfortable and useful products that meet with user satisfaction. For software developers, development of high-quality software is the major goal. This is then subject to testing to identify errors, when done and passed, application is provided followed by implementation for use.

Data clearly revealed the acceptability and usability of the new developed platform TeLEE-SAFE, therefore its utilization in the future will contribute greatly in telerehabilitation for Physical Therapy and Occupational Therapy, respectively. This a contribution and an additional innovation in the field of telerehabilitation for Physical Therapy and Occupational Therapy in the Philippines.

FUTURE DIRECTIONS

The following recommendations were drafted in response to the findings of the study:

As to the current practices where pen and paper are used for documentation, it is recommended that using documentation checklist in patient general information and selection of calendar in applying daily PT/OT notes. Since, the respondents cannot upload laboratory findings MRI, radiograph and others, it is recommended to use the developed digital platform in the option menu for patient's uploaded documents. Likewise, the problems encountered in giving instructions and treatment plan, it is recommended to use developed digital platform in the option menu for administration panel for uploading documents such as pictures and online video demonstration (prerecorded video) in treating patient. In terms of professional fees collection of the therapist since there is no direct payment, it is recommended to use digital payment such as online banking and e-money for security and convenience.

The developed digital platform has been assessed acceptable by the respondents for its ease of use. Likewise, the IT professionals assessed the developed digital platform highly acceptable for both functional suitability and portability, as such it is highly recommended the utilization of the developed digital platform in telerehabilitation for Physical therapist and Occupational Therapists. It is said that in any health care services, fees are always attached to it, collection of professional fees has been also the concern of the practioners. For the payment of professional fee, patient may adapt "payment first scheme" where patient pays the fee before the calendar schedule of the treatment or session. Once paid the schedule is opened automatically likewise, blocked no payment. For future researcher, it is recommended to conduct a follow up study focus on its utilization for further improvement of Te-LEE SAFE digital platform for telerehabilitation. Also, may include Physiatrist and Speech Language Pathologist in addition to PT and OT respondent.

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