

Patient Experience with Non-Clinical Aspects of Virtual Clinics: Beyond User Experience Design

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Abstract—eHealth practices bring many opportunities to the healthcare sector, such as increasing accessibility to healthcare services while controlling cost and resource allocation. Virtual clinics are one of the essential components of the eHealth system. Virtual clinics have been widely implemented, especially during the Covid-19 pandemic and after it. Hence, it is important to evaluate patient satisfaction with the quality of the care services provided by those clinics. Many studies attempted to evaluate the patient experience with virtual clinics from the angle of user interface design and user experience when interacting with virtual clinics applications. However, there is a lack of studies investigating patient experience and satisfaction regarding non-clinical aspects that are related to clinical tasks in the context of virtual clinic applications. Hence, the main objectives of this study are to evaluate patient experience with non-clinical aspects of virtual clinics using a standardized tool and analyze opinions of multi-perspectives of users (patients, physicians, and software engineers) to enhance patient experience design regarding the non-clinical aspects. This study utilized the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey to evaluate patient satisfaction with non-clinical aspects of virtual clinics. In addition, a focus group session was conducted to collect data on the issues related to non-clinical aspects and how to resolve those issues and enhance the patient experience when designing virtual clinics. The results showed that participants are generally satisfied with the quality of communication with doctors in virtual consultations and with using the virtual clinics overall. However, participants have a negative experience regarding information availability of patient health record and medicines and their side effects. Moreover, the participants of the focus group session emphasized the importance of enhancing human communication and integration of human value when designing virtual clinic applications, and providing better support after the online session is over.

Index Terms—Software Engineering; Healthcare; eHealth; Patient Experience.

I. INTRODUCTION

Patient satisfaction has been one of the essential dimensions to evaluate the quality of provided healthcare services [1]. Patient satisfaction evaluates the perception of patients about the quality of the provided services. If the quality of provided services do not match patient expectations, patient satisfaction

is expected to be low. Patient experience (PX) is another concept that evaluates patient experience before, after, and during receiving healthcare services [1]. The Beryl Institute defines the patient experience as “the sum of all interactions, shaped by an organization’s culture, that influence patient perceptions across the continuum of care” [2]. However, a unified, clear, and standardized definition of PX does not exist yet, which makes measuring and evaluating PX a challenging task [3].

The rapid implementation of digital health transformation and the wide adoption of virtual clinics applications lead to a new concept called Digital Patient Experience (DPX). In current literature, PX or User Experience (UX) are used interchangeably with DPX as a specific definition of DPX is still missing [4]. Studies conducted about DPX focused on understanding factors and components that influence DPX. Those factors are clinical and non-clinical aspects of virtual clinics applications. Examples of the non-clinical aspects are the usability of virtual clinic applications (user interface, personalization, profiling, readability, etc.) [4]. An example of non-clinical aspects that are associated with clinical tasks is communication with doctors [5]. Most studies conducted to evaluate PX with virtual clinics focused on evaluating the technical part of virtual clinics (usability and user interaction). Despite the fact that DPX has its own nature compared to the PX in physical visits, there is a paucity of literature that evaluate the other non-clinical aspects of virtual clinics, such as communication with doctors, information availability, and medicines explanations.

In this study, we attempted to evaluate PX regarding the non-clinical aspects of virtual clinics using a customized version of the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. In addition, we conducted a focus group session that brought multiple perspectives of users (patients, physicians, and software engineers) to have a deep analysis of their reactions regarding the non-clinical aspects, and to collect their input on how to improve the non-clinical aspects and the overall PX when using virtual clinics.

We believe that this study contributes to the body of knowledge by 1) using a standardized tool to evaluate PX regarding non-clinical aspects on virtual clinics, and 2) establishing a multi-perspective analysis of PX regarding non-clinical aspects of virtual clinics that is reported to be missing in literature [5]. The results showed that patients are satisfied with virtual clinics in general and when the medical case is not urgent. However, to improve patient experience, participants mentioned that human communication, incorporation of human values, and adequate support services after the consultation need to be enhanced.

The rest of the paper is organized as follows. Section II provides background about the evaluation of patient satisfaction and experience factors and tools. Section III illustrates the research methodology followed in this work. Section IV presents the survey and focus group results. Lastly, Section V discusses the findings of the study, and Section VI draws conclusions and discusses some future research opportunities.

II. RELATED WORK

There are many studies that attempted to evaluate and investigate what influences patient satisfaction. One of the most widely used and approved tools is the HCAHPS survey (<https://www.hcahpsonline.org/>). It assesses nine aspects of patient perception of the hospital environment and the quality of the provided care that are communication between doctors and nurses, the responsiveness of hospital staff, pain management, communication about medicines, discharge information, hospital environment (cleanliness and quietness), and transition of care. Kuper and Bonds argued that is true that patient satisfaction is strongly correlated with their expectations about healthcare services (the quality of services); however, there are multiple factors that impact patient satisfaction, such as the environment, culture, pain, healthcare providers, etc. [6]. In addition, Weston and Robers [7] indicated that access to healthcare providers' teams increases patient satisfaction. Another study confirmed the same that patient interaction with the healthcare teams is strongly associated with patient satisfaction [8] [9]. Gualandi et al. [10] investigated patient experience while exploring the hospital patient journey. They found that the significant issues that impact patient experience are lack of information, patient/professional relationships, family closeness, and efficient integration of clinical-related tasks.

In terms of e-health, Wang et al. [4] found that the digital patient experience is influenced by many factors, such as personalization of patient profile, availability of information (health information and educational material, communication and accessibility to professionals, functionalities such as reminders, rewards, etc.), and visualization and navigation. The study emphasized the lack of knowledge about the digital patient experience. In addition, it highlighted the absence of multiple perspectives (such as healthcare professionals, patients, designers, etc.) when designing digital patient experience. Clinician perspectives of e-health are absent, and real interaction between designers and patients when designing e-health applications is not available [11] [12]. Vitonen et al. [5]

conducted an SLR to investigate the factors that influence PX and their components. Some of the factors are the support of e-health care processes (communication, remote interaction, and risks and concerns with e-health applications), and the quality of eHealth solutions that include usability, accessibility, and readability issues.

For conducting the evaluation of DPX, most of the existing studies focused on evaluating the technology part of virtual clinics by conducting usability studies. Broekhuis et al. [13] proposed an ontology of usability issues of eHealth applications from the perspective of users. Alkhomsan et al. [14] emphasized the importance of incorporating patient emotions into virtual clinics design as emotions play a pivotal role in patient acceptance of eHealth technologies. Other studies focused on evaluating patient experience [15] [16] and the usability of virtual clinics [17] [18] during the Covid-19 pandemic.

The related work showed that existing studies either discuss what constitutes PX or evaluate the virtual clinic applications from the usability and technology aspects only. Hence, in this study, we attempted to fill the gap by evaluating the quality of non-clinical aspects of virtual clinics, other than the technical aspects, from the perspective of patients. Also, we performed a focus group session to bring multiple perspectives of patients, doctors, and software developers to evaluate and suggest how to enhance PX with virtual clinics.

III. STUDY METHODOLOGY

In order to achieve the research objectives, two research methods were applied that are survey and a focus group. The following sections explain each research method in detail.

A. Survey

The survey method was selected to collect data on patient experience with non-clinical aspects of virtual clinics. Yet, there are no clear measures to measure PX; however, it is claimed that patient satisfaction and patient perception contribute to patient experience [6] [19]. Hence, this study customized and utilized HCAHPS survey, which is known to be the stander tool to collect data on patient experience regarding the non-clinical aspects. HCAHPS survey covers all non-clinical aspects that have been discussed in the relevant literature. However, in this study, HCAHPS was customized to suit the nature of virtual clinics as the HCAHPS is intended to be used with physical visits to hospitals. The original survey is found online(<https://www.hcahpsonline.org/>). For our study, I attempted to map the factors, see section II, that HCAHPS evaluates, after an actual stay of the visit to hospitals, to the virtual clinics' context. All factors of the HCAHPS suit the virtual clinics except for two: the hospital environment aspect that corresponds to the virtual clinic application design and communication with nurses that does not exist in most virtual clinics. Hence, both factors were eliminated. For communication with nurses, in most virtual clinics that replaces regular visits to the hospital nurse role does not exist. The reason for the elimination of non-clinical aspects related to

technical design aspects is that many studies have already covered and focused on this part. In addition, the design of virtual clinics may vary from one application to another which will lead to an inaccurate evaluation in general. In this study, we focus on the non-clinical aspects that are related to clinical activities. The customized version of the survey is available online(<https://forms.gle/4QFYjGgufev83LrB6>). Those aspects are going to be the main focus in the focus group session as well.

The survey was distributed by email invitations using a randomized snowballing technique. We received 20 complete responses. All participants used virtual clinic applications at least once. In addition, in terms of participants' educational background, most of the participants have more than 4-year college degree, while four are four years college graduates and one has an 8th grade or less. All participants are in an excellent or a good state of health and mental health.

B. focus group

The focus group enables a thorough understanding and deep analysis of a group of users' reactions to a common experience. Hence, we conducted a focus group session that brought rich and diverse perspectives of patients, physicians, and software development experts about the following topics:

- **Motivations of using virtual clinics:** what are the motivations for using virtual clinics instead of actual visits?
- **Communication - Doctors' Respect and courtesy:** how patients evaluate it and it could be enhanced.
- **Data and information availability:** what are the data and information that are important to have available all time and what is the best way to present it?
- **Medicines and symptoms:** what is the best way to get information on medicines and patient symptoms? health conditions explanations
- **Follow ups:** what is the best way to get follow-ups?
- **Absence of nurse role:** does it impact the experience negatively or positively?
- **Overall improvements:** How to improve overall patient experience of non-clinical aspects when using virtual clinics?

The session lasted for an hour. The participants in the session are four patients, a software development expert, and a physician. All participants have either bachelor degree or higher. The age of participants ranged from 28 to 40.

IV. RESULTS

This section reports on the study findings.

A. Patient satisfaction regarding non-clinical aspects

Table I illustrates the participants' responses to the non-clinical aspects of virtual clinics that are communication with doctors, experience during the virtual clinics in terms of medication explanation, experience after leaving the virtual clinics in terms of information availability (patient medical case and responsibilities to manage their health), and overall experience.

1) **Communication with doctors:** Regarding communication with doctors, more than half of the participants indicated that they were always treated with respect and courtesy during the virtual consultations. The majority of participants felt that doctors always or usually listened to them carefully during the virtual visits. However, five responses indicated that doctors sometimes listened to them carefully. Around 12 participants indicated that doctors always or usually explain things in a way they can understand. But the other responses are negative about the way doctors explain things clearly.

2) **Experience during the virtual clinics: Medication Explanation:** The participants' reactions to the explanations they received about their medicines were divided equally into positive (always and usually) and negative (sometimes and never). In addition, most of the participants (6) indicated that they were not informed about the side effect of their medications, or they were informed sometimes (8).

3) **Experience after leaving the virtual clinics: Information availability and understanding the patient care:** In terms of information availability, 13 participants indicated that they did not receive information about what symptoms or health problems to look out for after they left the virtual consultations. In addition, almost all participants (15) mentioned that they were not contacted by the healthcare team after the virtual clinics to ask if they found the support/help they needed. Moving to understanding patient care, most participants agreed that when they left the virtual consultation, they had a good understanding of how to manage their health. In addition, half of the participants mentioned their preferences and those of their families or caregiver into account in deciding on the treatment plan.

4) **Overall experience with virtual clinics:** The participants were asked to rate their overall experience with virtual clinics on a scale from 1 to 10, where one is the worst and ten is the best. Five participants rated four, five rated six, five rated 7, one rated 9, two rated 10, and two rated 2. The participants' opinions about not recommending the virtual clinics over the actual visits to their family and friend vary. Also, they sometimes prefer virtual consultations over actual visits. Six participants left comments on the major issues of virtual clinics that affect patient experience and satisfaction negatively. The major issues are poor examinations, lack of physical examination, poor communication, and lack of information and follow-ups.

B. Focus groups

The focus group covered four main topics: motivations for using virtual clinics, communication with doctors, availability of information (patient health records, and medicines), follow-ups and the role of nurse, and general improvements suggestions.

1) **Motivation for using virtual clinics:** The participants mentioned that they use virtual clinics mainly in four cases that are when they do not have time for actual visits, when they need medicines to refill only, when they want to get an initial consultation on non-urgent or non-critical symptoms,

and when they have minor health issues, such as cold or flu. However, the physician mentioned that most of the cases are about acquiring sick leave report.

2) **Communication with doctors:** This part started by asking the patients the following question: how do you know that a doctor listened to you carefully and treated you with courtesy in a virtual consultation? Two participants mentioned that when doctors have follow-up questions, they feel that he or she was listening and caring about their case. Also, other participants mentioned that when a doctor read their health record before the start of the consultation, it is a sign that the doctor respects them. Other signs said are using video calls and making eye contact, voice tone, and understanding patients' questions. Then, all participants were invited to suggest how to enhance patient experience regarding communication with doctors. Two participants mentioned that video calls should be mandatory. The physician also suggested using video calls may partially eliminate the negative impact of the absence of face-to-face communication. However, the technical expert indicated that mandating video calls for both doctors and patients is not feasible as some patients do not prefer to open the camera. The solution might be for doctors to open the camera.

3) **Information availability:** All participants agreed that the availability of information regarding patient health symptoms or medicines and their side effects is important. The participants (patients) mentioned that they need the health record to be used in future actual or virtual visits on different platforms. They request that the report of patient health symptoms, diagnosis, and medicines should be shared with the patient right after the virtual consultation. In addition, information about the medicines, how to use them, and what are the expected side-effect is also essential to be available. However, one participant (patient) mentioned that she does not want to know the side effect as this may influence her perception of the medicines negatively and may lead to unreal feelings of side effect symptoms. It was suggested by the technical expert to have all medicines, their explanations, and side effects to be available online after the consultation session. In addition, it was suggested to use a chatbot to introduce patients to medicines and answer their questions. All participants agreed on this solution as long as they could customize the level of details of the provided information by the chatbot. However, the physician did not agree with this solution, as medicines and their related explanations should be monitored and provided by certified practitioners.

4) **The role of nurse and follow-ups:** All participants agree that the absence of the nurse role does not affect the virtual clinic experience. However, an assistant is needed to provide the required support before and after the consultation. One participant (patient) suggested using chatbots to interact with patients before and after the virtual consultations. Chatbots also can do follow-up communications. Alternatively, follow-ups could be done by phone calls.

5) **General improvements suggestions:** Participants mentioned that chatbots are acceptable solutions to solve most

communication and needed support issues. However, two participants (patients) mentioned that technology should not override the role of human communication. Effective human communication with empathy and understanding should be incorporated into the design of virtual clinics. In addition, One participant (patient) mentioned that trust and human values should be a part of the virtual clinics' design. The physician mentioned that those technologies should be designed to suit all ages of patients with different educational backgrounds. Also, it was suggested that for elderly or under 18 patients, a family member could be allowed to attend the virtual consultations. Three participants suggested having evaluation records for each healthcare provider, and the evaluation should be visible to patients to increase trust in the provided care through virtual consultations. Moreover, a brief introduction of the healthcare providers should be available before the session. For this, a short video of the bio and experience of the healthcare providers could be provided to patients. The physician suggested that there should be new performance evaluation metrics when it comes to virtual clinics. The metrics shall provide means to evaluate the quality, not the quantity only, of the provided care services from a clinical perspective. TableII summarized the recommendations to improve DPX using virtual clinics from the perspective of the focus group participants.

V. DISCUSSION

The study attempted to provide an understanding of patient satisfaction and experience regarding the non-clinical aspects of virtual clinics. First, the HCAHPS was customized and used to collect the required data. With the absence of standardized evaluation tools for patient satisfaction with non-clinical aspects of virtual clinics, we found an opportunity to explore the use of HCAHPS tool in evaluating patient satisfaction with virtual clinics. The findings of the survey were consistent with the result of the focus group session. As participants in the focus group session tend to provide observations and discussion points that are covered by the survey. However, there is a need to examine the effectiveness of this tool in evaluating patient satisfaction with virtual clinics empirically and customize it accordingly.

In the survey results, it was noticed that most participants who are always satisfied with virtual clinics used virtual clinics that are provided by a private healthcare provider, while the ones who are less satisfied used virtual clinics provided by the public healthcare sector. Another observation is that most of the participants who mentioned that they were not given a new medication, used virtual clinics for follow-ups and medication refills. Moreover, participants who have a positive experience with the medication explanations during the virtual clinics share the same opinion as other participants that the side effects of the medications were not explained to them.

The result of the survey and the focus group confirmed that information availability is a big issue as it received the most negative reactions among all non-clinical aspects. In addition, assuring that the patient received all help before and after

TABLE I
PATIENT SATISFACTION WITH NON-CLINICAL ASPECTS OF VIRTUAL CLINICS

Communication with doctors	Always	Usually	Sometimes	Never
During the virtual consultations, how often did doctors treat you with courtesy and respect?	12	4	4	0
During the virtual consultations, how often did doctors always listen carefully to you?	9	6	5	0
During the virtual consultations, how often did doctors explain to you things in a way you could understand?	6	6	2	2
Experience during the virtual clinics: Medication Explanation	Yes		No	
During the virtual consultations, were you given any medicine that you had not taken before?	11		9	
	Always	Often	Sometimes	Never
Before giving you any new medicine, how often did doctors in virtual clinics tell you what the medicine was for?	4	6	6	4
Before giving you any new medicine, how often did doctors in virtual clinics describe possible side effects in a way you could understand?	3	3	8	6
Experience after leaving the virtual clinics: Information availability and understanding the patient care	Strongly agree	Agree	Disagree	Strongly disagree
When I left the virtual consultation, I had a good understanding of the things I was responsible for in managing my health.	3	13	2	2
When I left the virtual consultations, I clearly understood the purpose for taking each of my medications.	3	10	2	2
	Yes		No	
After the virtual consultations, did doctors, or other virtual clinics staff talk with you about whether you would have the help you needed when you left the virtual consultations?	5		15	
During or after the virtual consultations, did you get information in writing about what symptoms or health problems to look out for after you left the virtual clinics?	7		13	
Overall experience with virtual clinics	definitely yes	probably yes	probably no	definitely no
Would you recommend this virtual clinics over actual hospital to your friends and family?	6	7	5	2
	Strongly agree	Agree	Disagree	Strongly disagree
During the virtual consultation, doctors took my preferences and those of my family or caregiver into account in deciding what my health care needs would be when I left.	2	7	6	3

TABLE II
SUMMARY OF THE RECOMMENDATIONS OF THE PARTICIPANTS IN THE FOCUS GROUP SESSION

Participant	Recommendation
Patient	<ul style="list-style-type: none"> • Read patient health record before the consultation • physicians should use video calls, make eye contact, and use appropriate voice tone • provide a report of patient health symptoms, diagnosis, and medicines • use chatbots to interact with patients before and after the virtual consultations • effective human communication with empathy should be incorporated into the design of virtual clinics • trust and human values should be a part of the virtual clinics' design • a family member should be allowed to attend the virtual consultations • have evaluation records for each healthcare provider to be viewed by patients • a short video of the bio and experience of the healthcare providers could be provided to patients
Technical expert	<ul style="list-style-type: none"> • have all medicines, their explanations, and side effects available online after the consultation session • Use chatbots to answer the patients' questions about medications
Physician	<ul style="list-style-type: none"> • technologies should be designed to suit all ages of patients with different educational backgrounds • provide new performance evaluation metrics for virtual clinics that captures the quality of services not quantity only.

the virtual clinics was missing. This could be solved by the solutions suggested in the focus group, such as chatbots or phone calls. In the focus group session, participants gave many solutions to enhancing patient experience with non-clinical aspects of virtual clinics. Technical-wise, all solutions are visible. However, the participants' acceptance, including the physician, varies about those solutions. Most of the participants suggested that patient experience will be enhanced when effective human interaction and communication are incorporated into the design. In addition, there was a demand to incorporate human values, families, and preferences into the clinical processes of virtual clinics.

Despite the potential benefits of this study, there are limitations that are worth mentioning. This study is only preliminary that intended to explore using HCAHPS survey and multi-perspective focus group sessions to enhance patient experience with non-clinical aspects of virtual clinics. However, the validity of using the HCAHPS survey in the context of virtual clinics is not validated yet. In addition, the size of participants in the survey and the focus group session is small, and the participants have good mental health in general. Hence, the results of this study could not be generalized. Moreover, in this study, the focus was on non-clinical aspects of virtual clinics with the exclusion of the technical part evaluation, such as user interface design, which may impact the analysis of the results and the participants' reactions.

VI. CONCLUSION

This study attempts to evaluate patient satisfaction and experience with non-clinical aspects of virtual clinics. The HCAHPS survey was customized and used to evaluate patient satisfaction, while a multi-perspective focus group session was conducted to explore how to enhance patient experience about non-clinical aspects. The survey findings showed that patients have a positive reaction toward non-clinical aspects of virtual clinics. However, the major issue was related to the information availability of patient health records, medication explanations, and receiving support after the end of the virtual consultations. In the focus group session, the participants illustrated acceptance of solving some existing issues by chatbots or other technology-related solutions. However, they also highlighted the need to improve human interaction and communication and to integrate human values into the design of virtual clinic applications.

For future studies, we plan to evaluate the validity and reliability of the customized version of HCAHPS survey in evaluating patient satisfaction with virtual clinics. In addition, a larger sample of participants, including patients who have mental health issues, will be recruited to ensure that the finding is generalizable and valid. Also, we plan to employ the design thinking approach with multi-perspectives participants to generate and evaluate new solutions in terms of enhancing patient experience with virtual clinics.

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