

Acceptance of Integrated Mobile Healthcare App to Bridge Medical Personnel and Patients

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Abstract

This research aims to study the perceptions of both public and healthcare providers in using an integrated mobile healthcare App. This study adopted a mix-method to elicit data. A survey was administered among 150 members of the public and 40 medical experts. To validate the survey response, five representatives from the public and four from the service providers were interviewed. The results revealed that most of the respondents strongly approved to digitize their medical records using a mobile medical app in compliance with the Personal Data Protection Act as they believe that using mobile health apps to manage appointments, schedules, and notifications will improve patient safety. They also reckoned that building a one-stop medical App that will allow easy access to both patients and their health care providers. The semi-structured interview results concluded with five major themes; effective and efficient, accurate reports, easy access to medical reports, immediate access to healthcare and save time where the participants stressed about the significance of developing a mobile App in the medical field. Future study recommendations are made to develop and implement a healthcare mobile App to interconnect medical service providers and receivers.

Keywords: Healthcare Mobile App, Access, Accurate, Records.

Introduction

Appropriate consumption of health care is important and necessary to keep maintaining or improving an individual's health other than practicing a balanced diet and healthy lifestyle. Mobile Health applications (mHealth apps) are health Apps for medicine and public health services which are available on a mobile device such as a smartphone, tablet, or phablet and they can be used by both patients and their health care providers (Zapata et al., 2015; Mikulic, 2020). The ubiquity of smartphones in society makes mHealth apps a crucial role in the digitalization of nationwide healthcare services for better health outcomes (Ali et al., 2016;

Bhavnani et al., 2016; Birkhoff & Moriarty, 2020; Messner et al., 2019). There are six main reasons for using mHealth Apps, namely; consulting medical information and references, communicating and sharing the information, fulfilling a contextual need, obtaining educational tools, managing health professionals' activities and for facilitating health-related management of patients (Yasini & Marchand 2015). mHealth technology is capable of revolutionizing health care especially in developing countries (Goel et al., 2013) and the overall healthcare system could be improved by enhancing the efficiency, communication, costs as well as healthcare services quality of the mHealth apps (Mikulic, 2020) especially during the pandemic. With the combination of technological innovations and healthcare, mobile health (mHealth) technology has been widely adopted in many countries worldwide (Vo et al., 2019).

Vo et al., (2019) argued that mHealth technology can improve patients' compliance with treatment and help them manage their health by conducting monitoring and diagnostic activities as well as increasing their knowledge concerning their state of health or their disease. There are 112 countries that have reported the existence of at least one mHealth initiative (Benjumea et al., 2020; Larson, 2018). The data of health app users in selected countries shared by Stewart (2020) based on the Statista Global Consumer Survey conducted in several countries shows China and India as the leading countries when it comes to health app usage with 65% and 63% respectively. Therefore, it is timely for Malaysia to develop an mHealth App to overcome the challenges and bridge patients with service care providers.

Statement of the Problem

Digital tablets and mobile phones are widely used by people all over the world that leads to an integrated healthcare system that provides various health-related services to public consumers and medical professionals (Vo et al., 2019). There is general acceptance from both public and medical professionals in implying advanced technologies into the current healthcare system (Lim et al., 2020). One of the leading countries in utilizing the digital application in the health system in Denmark which known as the Beveridge health system (Gimpel, 2021). The implementation of integrated mobile health digital can improve instant diseases information and increases the accessibility between medical practitioners with their patients (Bharti & Kumari, 2020). Despite the advantages of using healthcare mobile App technology, there is still a lack of research in Malaysia on how these medical health apps consumed can bridge the gap between personal users and medical personnel. Therefore, this study aims to explore the perceptions from both public and medical officers in using an integrated mobile healthcare App by addressing the following research questions below:

1. What are the perceptions of public consumers and medical officers toward integrated mobile healthcare App?
2. To what extent does the integrated mobile healthcare App will be helpful in the healthcare system?

Methodology

The study is adopted a mix method. Quantitative data will help in providing structural data analysis which is then supported by a qualitative method that evaluates the perspective from specifically targeted people which might influence the results. A set of questionnaires was administered randomly among 150 members of the public and 40 service care providers in the Klang Valley. The questionnaire had bilingual (Bahasa Malaysia and English) instructions and questions to make it reader friendly. Five patients who have regular medical checkup at the

general hospitals were interviewed. Besides, four medical personnel too were selected randomly for structured interviews. The medical personnel involved in service providing sector have more than 10 years of work experience at public hospitals. The respondents are identified as the followings: Patients as P1, P2, P3, P4 and P5 while service providers as SP1, SP2, SP3 and SP4.

Results and Discussion

What are the perceptions of public consumers and medical officers toward integrated mobile healthcare App?

Bharti and Kumari (2020) pointed out that health literacy has become one of the major concerns of policymakers today. With the increasing acceptability and easy access, mobile healthcare App facilitates communication in the health areas. It is used not only by the general public and patients to seek healthcare information, but it is also actively used by medical professionals, healthcare organizations, and activists to create and spread health-related content.

Table 1

The Perception of Public Consumer Officer towards Integrated Mobile Healthcare App

No	Items	Mean	Std. Deviation
1	Waiting time for consultation will be reduced if I use mobile healthcare App	4.16	.601
2	I am afraid of getting other contagious diseases while waiting for their appointment.	4.05	.629
3	Mobile healthcare app will be helpful in making appointments, medical scheduling, receiving notifications before a visit.	4.30	.735
4	I prefer to digitalize my medical records in mobile healthcare app	4.26	.632
5	This mobile healthcare App will enable me to manage my medical records health records.	4.41	.535

Table 1 shows that the public have a positive outlook towards the mobile healthcare app as the mean values were above 3.5 in a 5-point Likert scale type of responses. The values of standard deviation were low, thus these indicated that the data were clustered closely around the means and not widely spread (more reliable). Based on the means, the highest level of perception in using medical app is to manage their medical records health records (M=4.41, SD=.535). This indicates that most of the respondents prefer to use mobile healthcare app that can enable them to self-monitor and self-manage their health (Martinez & Rico, 2015). In addition, patients who were highly engaged in self-management described the use of mHealth apps as beneficial rather than a barrier or an interference. Desveaux et al., (2018) revealed in their study that high engagers were interested in using mobile technology to enhance their health and enthusiastically engaged with the app immediately and consistently.

The next was reporting of the helpfulness of the mobile healthcare app in making appointments, medical scheduling, receiving notifications before a visit (M=4.30, SD=.735). Then, the preference of digitalizing their medical records in mobile Apps (M= 4.26, SD=.632).

In many cases, the apps consist of information about a specific disease or condition, as well as available medications, to assist patients in dealing with their situation. Patients who used the more educational apps expressed gratitude for the opportunity to learn more about health topics related to their disease or condition (VanAnh Vo, 2019). However, there are some respondents who view otherwise like Lubberding et al. (2015) who pointed out that some patients, such as cancer survivors, do not want more information and advice than they have already received at the hospital, because receiving more information may increase their anxiety.

Next, the respondents also hope that their waiting time for consultation will be reduced if they use mobile healthcare App (M=4.16) with the (SD=.601). This is a known fact where many patients critically spend almost half-a-day at the hospital just for their monthly appointments. Caffery, Farjian, and Smith's (2016) advocated that electronic consultations, and image-based triage of referrals are often effective in reducing waiting lists and waiting times. Finally, they shared that they were afraid of getting other contagious diseases while waiting for their appointment (M=4.05, SD=.629). Although this item fair the lowest mean, the current situation with the pandemic, we need to take this item seriously to address the life-threatening COVID-19 virus. Hasselfeld, (n.d.) to help prevent the spread of COVID-19, flu, and other infectious diseases, doctors can use telemedicine to prescreen patients for possible infectious diseases. It also saves sick people from having to come into the hospital. Less exposure to other people's germs helps everyone, especially those who are chronically ill, pregnant, elderly, or immunocompromised.

The next section will explain the perceptions of medical officers in using mobile healthcare app.

Table 2

The Perception of Medical Officer towards Integrated Mobile Healthcare App

No	Items	Mean	Std. Deviation
1	Mobile Healthcare App will increase patient safety by managing appointments, scheduling, and notifications.	4.19	.617
2	Must digitalize patients' medical records in accordance with the Personal Data Protection Act to a mobile medical app.	4.48	.522
3	When a patient arrives at the hospital/unit, by scanning the patient's barcode, it will allow you to access their health records (lab reports, x-rays & medications).	4.30	.735
4	Creating a one-stop medical app that will allow the patients to have access to various healthcare services (allied health, auxiliary health) available to all patients.	4.41	.532

In terms of the needs in learning English as a means of communication, it was discovered that the government officials also had a high level of needs as the mean values were above 4.0 in

a 5-point Likert scale type of responses as illustrated in Table 2. The values of standard deviation were low, thus these indicated that the data were clustered closely around the means and not widely spread (more reliable). The practicing medical personnel indicated that mobile healthcare app will increase patients' safety by managing appointments, scheduling, and notifications ($M=4.19$, $SD=.617$). Mobile devices have repeatedly been found to improve the completeness and accuracy of patient documentation; an effect that has often been attributed to ease of use (Aungst, 2013). There has been more accurate diagnostic coding, more frequent documentation of side effects, and increased medication safety due to fewer medical errors. According to Mickan, Tilson, Atherton, and Heneghan (2013), documentation prepared using a mobile device was judged to be of higher quality than documentation prepared using paper records due to a more detailed description of clinical findings and an accurate progress assessment.

The medical personnel perceived that it need to digitalise patients' medical records in accordance with the Personal Data Protection Act to a mobile Healthcare App ($M=4.48$, $SD=.522$). The use of mobile devices by health care professionals has transformed many aspects of clinical practice. Wallace, Clark, and White, (2012) have argued that mobile devices have become commonplace in health care settings, leading to rapid growth in the development of medical software applications for these platforms. However, Bourri and Ravi (2014) emphasized that the application of existing legal and privacy provisions should be addressed continuously as mobile personal health records develop. Because personal health records and mobile personal health records are emerging health information technologies, legal and privacy concerns regarding their use may change as technologies and their roles in health information technology evolve more broadly. The Health Insurance Portability and Accountability Act of 1996 Privacy Rule applies to certain personal health records offered by health care providers and health plans.

Next, the medical personnel opined that when a patient arrives at the hospital/unit, by scanning the patient's barcode, it will allow them (medical personnel) to access their health records (lab reports, x-rays & medications) etcetera ($M=4.30$, $SD=.735$). Evidence has shown that mobile devices allow medical personnel to be more efficient in their work practices (Mickan, et. al., 2013). Kim (2011) asserted that most doctors believe that meaningful adoption of health information technology (Electronic health records, e-prescribing, health information exchange, analytics/decision support, patient support tools) can improve the efficiency of clinical practice.

This was followed by their opinion that the one-stop medical app will enable all patients to have access to various healthcare services (allied health, auxiliary health) ($M=4.41$, $SD=.532$). Mobile apps have made the practice of evidence-based medicine at the point of care more convenient (Mosa & Yoo, 2012; Modley, Mangino, & Goff, 2013). Using a mobile device in clinical practice provides numerous benefits to health care professionals, including portability, quick access to information and multimedia resources, flexible communications, and a wide range of powerful apps for a variety of tasks (Boulos et al., 2011). Wallace, Clark, and White, (2012) revealed that medical schools and students cite access to information instantaneously at the time of need as a major convenience.

Now that we have entered the digital era, our smartphones have become such an integral part of our lives that we continue to rely on them in order to manage our schedules, organize our work and business processes, stay informed and connected through social networks, and booking doctor appointments and healthcare check-ups. App development for healthcare has become both a necessity as well as a luxury.

Research Question 2

To what extent will the integrated mobile healthcare app be helpful in the healthcare system?

The Healthcare industry has witnessed an enormous transformation due to continuous technological advancement. Digitisation of clinical data, laboratory test results and medical imaging has further allowed for the possibility of better integration with a mobile healthcare app on a digital platform. An app like this could help patients and clinicians in the current COVID-19 pandemic in various ways. The analysis of the structured interview responses led to five major themes; effective and efficient, accurate reports, easy access to medical reports, immediate access to healthcare and save time.

Effective and Efficient

Healthcare facilities that use mobile app services can handle emergency cases efficiently. The app can alert the doctors about the emergency and all the important information will be sent to the doctor's device. This saves a lot of time, and the doctor can be ready to treat the patient in advance.

SP1 shared that "As a practitioner, I will be able to utilize mobile app just in a click and will be able to effectively communicate and negotiate with stakeholders and contribute to the outcomes that improve treatment to patients and keep them informed."

Besides, such an App also can speed up the documentation and treatment procedure. It can be a lifesaver for healthcare providers in critical situations. SP 2 highlighted that this product will close the gap by integrating healthcare with digital technology. "I am able to make more informed decisions confidently as history of the patients are recorded systematically." Study revealed that doctors who are using apps to enhance their knowledge about the health conditions of their patients. If there is a reliable healthcare mobile app, it helps to view patients' report through the app to take quick decision in emergency cases (Naina Thorat & Kulkarni, 2019; Stewart, 2020).

Accurate Reports

Mobile medical health app is useful to produce an accurate report of the patients' health condition and it helps to prescribe the most accurate medicine with write dosage. In other words, With the help of mobile app, correct reports can be provided to the patient with more accurate and efficient. When doctors handle too many cases, there is a tendency to make an inaccurate diagnosis, but the consequences are much lethal as they are human too. Therefore, mobile app can reduce the wrong diagnosis and missing of reports.

SP1 said, "at times when we have too many emergency cases, we naturally rush from one room to another room to treat patients. This is not only for doctors but also the nurses. There may have some complications or confusion when they have the same names or similar

identity, which we try our best to be careful". Naina Thorat and Kulkarni, (2019) mobile app technology can reduce the risk of wrong diagnosis as well as help to prescribe the most accurate medicine with write dosage.

Immediate Access to Healthcare

The digitalised mobile app can replace physical visits with digital visits. This app will help patients to look out for doctors nearby and book an appointment on the spot. This app can also be interactive to allow patients to ask general health questions from doctors who available 24-hours are.

P2 and P4 opined that, "The doctors from different departments can refer to each other's notes, comments and communicate about what's going on with me. It makes me comfortable with the care I'm getting and of course I know there are CT scans, but I am unable to interpret it."

P3 added that, "Sometimes, we may misplace or lose the reports. So it will be better if everything is saved in my phone. Besides, it also saves me from carrying all my x-ray and lab reports." With digitization the healthcare industry has improved its patient-centered approach and is maintaining patient's health while providing a smooth user experience through mobile app solutions (Messner et al., 2019; Mikulic, 2020).

Easy Access to Medical Reports

It is due to medical apps that the patient and the doctor can access the medical reports anytime, anywhere. In situations when a patient hops from one healthcare professional to another, this data can be accessed to make quick medical decisions. Mobile medical app can take the role as interoperability system. P5 shared, "If I have access to such app, it will give me more confidence in undertaking treatment from doctors. It also gives me space to do cross-referrals to get a second opinion". Bharti and Kumari (2020) advocated that having a medical App would make one's report easy available and they can be used by both patients and their health care providers (Zapata et al., 2015; Mikulic, 2020).

Save Time

With the help of mobile health app, I can find a doctor, book an appointment and view all my medical test reports from my end. Due to the ongoing global pandemic, some especially those who are immobile, video call their doctors and nutritionists to discuss health issues online. Patients also feel at ease by using healthy lifestyle apps and health monitoring apps to keep themselves in check regularly. Using the integrated mobile app, the doctors can monitor their patients' health by referring to their history.

P1 indicated that having a mobile app in medical field will make his life much easier. He added that "It (mobile app) makes my visit go smoother. The hospital staff can just click the system to pull out my record fast. They don't have to flip through a long list of my record. It saves a lot time. The doctors and nurses can go back and look at important test results and they have all records at their fingertips. I can also share the records with my family to keep them informed of my health."

Mobile app also allows patients to have the access to all the information they need in order to finalize a doctor for their treatment. I can choose the hospital and doctors based on ratings, cost, expertise and reviews from other patients. With these details, I can make a well-informed decision for myself based on my affordability and needs.” This finding is in consistent with Benjumea et al, (2020) who argued that a mobile app in the medical field has played an integral role in empowering patients with quick information.

It was also found that Healthcare providers especially private hospitals want to harness the power of payments. As this mobile app is interoperable, among patients, doctors and payers (insurance company), it makes easy and efficient payments of the bills. People do not have to wait in a long queue to make the payment. This mobile app can be set with secured payment methods that allow us to make instant payments for ourselves and for our loved ones.

Medical service provider across the country will need to develop the skill set necessary to function in the increasing advancement of digital health technological environment in order to provide effective care. Once we have acquired the IT infrastructure that comes equip with IT skill personals, our healthcare industry will be revolutionized and at par will the develop countries the ability to monitor and safe effective patient care will be invaluable. It is worth noting that health promotion is raising public understanding about health and its determinants to enhance healthcare outcomes. The iniquitousness of a mobile App in society plays a crucial role in the healthcare services for better health outcomes (Ali et al., 2016; Bhavnani et al., 2016; Birkhoff & Moriarty, 2020).

Mobile healthcare app not only help patients but also facilitate doctors and medical personnel to gather and store patients’ health data in a hassle-free manner. Patients can directly submit their insurance cards and other information to mobile App and it helps healthcare professionals to reduce errors in their paperwork (Zapata et al., 2015; Mikulic, 2020). The pandemic, COVID-19 crisis has brought with itself amongst destruction and distress is the digitization approach for different industries.

Conclusion

It is worth noting that health promotion is raising public understanding about health and its determinants to enhance healthcare outcomes. People's health awareness is promoted through a variety of mainstream media. One such medium is the internet. In the healthcare industry, digital platforms have made advances. Users have become accustomed to using online health portals. Because the Internet is a convergent platform, it allows patients and health specialists to engage conveniently and cost-effectively. Although many of the patients thought that mHealth apps are a helpful tool, some major issues arose regarding the optimal use of mHealth technologies, including the need for more highly tailored designs, their cost, the validity of the information they provide, and privacy and security concerns.

The willingness of customers to use a digital health administration mobile app was observed in this study. The identification of essential qualities of more acceptable apps provides developers of similar digital health management technologies with valuable data and recommendations. This would boost the chances of consumers accepting and using the product successfully. The time it took to register on the app and the app's data governance structure were the two most important dimensions, with the electronic management of personal information submitted on the app causing anxiety. This highlights important features

of the broader research that point to the need for greater public awareness of data security and transparency of consumers' online data. Although there are major impediments to digital health technology adoption, there are potential development areas that might be explored further. Especially in areas like data collecting for research, medical error reduction, bridging the language barrier for all users and potentially enhancing access to healthcare services for individuals living in rural locations.

Recommendation

The findings of the study suggest that it is important to have integrated mobile healthcare app to bridge medical personnel and patients in healthcare management despite having issues such as the accuracy of the data they supply, as well as privacy and security concerns. To address this issue among patients and medical personnel, careful attention and corrective steps should be taken. It would be preferable if providers could back up the data transmitted by apps. It is recommended that app developers include evidence-based information and cite the sources of the information they deliver to verify its accuracy. Goetz's study, particularly pregnant women, stressed the necessity for scientifically valid data. The most common concerns raised by consumers about these apps were privacy and security. Additionally, patients were concerned about the apps' security, the number of others who may see their data, and the possibility of a data breach. Apps that support governmental or medical center governance are preferred. Nevertheless, patients are willing to give their information for research purposes or to reduce medical errors. By treating this as a critical issue, the public understanding of data security and transparency of consumers' online data will grow. To assess the efficacy of mobile healthcare app in greater detail, further research is needed.

Implication

To the researchers' knowledge, there is no mobile healthcare app in Malaysian public hospitals. Having such app could improve clinical care, enhance communication, guide management and help in scheduling timely follow up for patients. The app can create a blockchain-based system to monitor changes in patients' medical records. The blockchain system is useful for informing patients of changes in their records via the app without uploading the medical record itself to the network. This ensures the transparency of medical records as well as patient empowerment. Growth and advancements of a healthcare mobile app will increase the reach of healthcare and change the perception of the health industry globally. It is also hoped to promote better clinical health outcomes. The app is also expected to manage their health in comparison to users of conventional care.

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