PATIENTS' AND PHYSICIANS' PERSPECTIVES ABOUT USING HEALTH INFORMATION TECHNOLOGY IN DIABETES MANAGEMENT IN IRAN: A QUALITATIVE STUDY

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By Haleh Ayatollahi

Abstract

Introduction: Diabetes mellitus is known as a major chronic disease that has a number of consequences affecting individuals' health conditions and socioeconomic aspects of life. These challenges require innovative interventions, such as self-management to improve patients' health condition and reduce the economic burden of healthcare systems. The current research aimed to identify patients' and physicians' perspectives about the use of health information technology in diabetes management in Iran.

Methods: This was a qualitative study conducted in 2019. In order to collect data, semi-structured interviews were conducted with eight patients and 10 specialists in an endocrine and metabolism research center and in a teaching hospital. The interviews were digitally recorded and transcribed verbatim. Finally, data were analyzed by using framework analysis method and MAXQDA version 10.

Results: According to the results, both patients and physicians believed that while using health information technology can improve access to healthcare services, the high cost of technology may hinder its usage. Factors such as government and health system support can motivate users to use the technology, and factors such as lack of user training and technical problems may have a negative impact on technology usage.

Conclusion: As a number of motivational and inhibitory factors may influence the use of health information technology in diabetes management, it is imperative to take each of these factors into account before designing and implementing new technologies, especially for diabetes management.

Keywords: health information technology, health informatics, remote healthcare, disease management, self-management, diabetes mellitus

Introduction

Diabetes is known as one of the most common chronic diseases in developed and developing countries.[1] According to the literature, more than 336 million people were diagnosed with diabetes in 2016, and this figure may rise to 552 million by 2030. The most common complications of diabetes are blindness, renal failure, ischemia, cardiovascular diseases, and amputation. Moreover, diabetes imposes a high cost on patients and their families, as well as the healthcare system.[2-4]

Similar to other developing and developed countries, the prevalence of diabetes is increasing in Iran, and this imposes a great responsibility on those in charge of controlling the disease. It has been reported that over 4 million people have been diagnosed with diabetes in Iran in 2017.[5] According to the World Health Organization (WHO), this number will rise to 7 million in 2030 if no effective action

is taken.[6] It seems that patient empowerment can be a solution to manage the disease.[7] In fact, empowering patients can help them to control their health behaviors, and their needs for the healthcare support will be reduced, which may lead to decreasing healthcare costs.[8,9]

Today, with the advancement of information and communication technology and greater access to telecommunication services, the use of modern technologies in empowering patients with chronic diseases such as diabetes has received more attention than before.[10] Moreover, the distribution of the disease in different geographical areas has encouraged healthcare providers to use virtual methods for training, patient education, and follow-up visits to control the disease.[11]

Accordingly, patients have been engaged in the process of treatment and follow-up of their health condition by using different types of technologies.[11] For example, a variety of health information technologies have been offered to empower patients with diabetes.[12-16] However, the development of technology is different from the actual use of it, and a number of motivational and inhibitory factors should be taken into account.[17] Some of these factors are concerns over privacy and confidentiality, usability of technology, users' access to the internet, physical and cognitive disabilities of patients, inadequacy of computer and health literacy, unfamiliarity with the jargon and technical terms, and uncertainty about the availability of information.[18,19] Laxman et al. highlighted the role of other factors, such as legal barriers, internet speed and connectivity, cost, resistance against change, insurance reimbursements, and a lack of technical support.[20]

In order to facilitate using technology, introducing the potential advantages of health information technology to the users, training, creating a suitable and user-friendly interface, reassuring users about security and privacy, and focusing on the motivational factors have been suggested.[21]

It is notable that although a number of previous studies have investigated the topic of health information management and health information seeking behavior among patients with different diseases such as diabetes, the use of technology among these patients was not the main focus of many studies.[22]

Currently, the advancement of technology has changed the management of health information and information-seeking behavior. As patients with chronic diseases such as diabetes need obtaining health information and staying informed for maintaining self-care, their perspectives about using health information technology needs to be investigated to improve patient outcomes and promote healthcare services.[23] Moreover, the traditional role of health information management professionals has been affected by changes in the health care environment due to the increased use of health information technology. For example, entering patient data into different applications and systems

creates many opportunities for health information management professionals to be involved in improving data quality, privacy, confidentiality, and information governance within digital health.[24] Therefore, this research aimed to identify patients' and physicians' perspectives about the use of health information technology in diabetes management in Iran.

Methods

This qualitative study was conducted in 2019 after obtaining the ethics approval from the ethics committee of Iran University of Medical Sciences in Iran (IR. IUMS.REC.1396/9411304003). The participants included 10 physicians and eight patients with diabetes (n=18). The settings of the study were two endocrinology and metabolism clinics, and the convenience sampling method was used to recruit the participants. For recruiting patients, they should have experience of using any kind of applications and health information technologies in the field of diabetes management. All interviews were conducted in the clinics and in a quiet place with the interviewee's permission. Before conducting interviews, two interview guides (one for patients and one for physicians (see **Appendix I**)) was developed based on the literature review.[25-31] Then, the participants signed an informed consent form, and in-depth semi-structured interviews were conducted by one of the researchers (ZD) until data saturation was reached. The interviews were digitally recorded, and the audio files were transcribed verbatim. To analyze the data, the framework analysis method was used. This method has five steps, including orientation, or becoming familiar with the text of the interviews; identification of a conceptual framework; indexing and tabulation; and analysis and interpretation of the data. According to this method, the interview transcripts were studied several times by one of the researchers (ZD). During the orientation stage, the main concepts related to the aim of the study were extracted and, finally, a conceptual framework was identified by the first researcher (ZD). The interviews were coded by using MAXQDA version 10. After coding the transcripts, the themes, subthemes, and categories were summarized into a table, and the final interpretation was provided. The qualitative findings were reviewed by other researchers independently to avoid any misinterpretation in reporting the results.

Results

According to **Table 1**, most of the physicians were men (n=6; 60 percent. The highest frequency belonged to the age range of 30-39 years for both physicians (n=5; 50 percent) and patients (n=3; 37.5 percent).

Having analyzed the data, five main themes emerged, which are summarized in **Table 2**. To report the direct quotes of physicians (MD) and patients (P), their initials were used followed by the number of the interviewee.

Theme One: Information Sources Used by Patients With Diabetes

The findings indicated that patients used various information sources for the management of

diabetes. This theme included physicians, trusted people, mass media, and printed media. Most of the patients expressed that the first and the safest way to obtain information was communication with their physicians. Similarly, their physicians noted that the best way that patients could receive information was consulting with their own physicians. One of the physicians said:

"Definitely, for a person who first notices his/her disease and enters the treatment path, it is the physician that can tell him/her about diabetes and its complications." (MD6)

Similarly, one of the patients noted:

"I have been suffering from diabetes for 13 years. I didn't know much about diabetes at the beginning, and every time I visited the physician, he would explain diabetes and its complications." (P5)

A small number of the interviewees considered their families, relatives, and other patients with diabetes as sources of information. Some expressed that if something happened to them and they could not get in touch with a physician, they would receive their needed information from trusted people. A majority of the interviewees cited the internet, social networks, and television as other sources of information. A few physicians believed that some patients use printed media, such as newspapers, magazines, educational brochures, and books, to obtain more information about the disease. However, none of the patients mentioned printed media as their source of information.

Theme Two: Advantages of Adopting Health Information Technology in Diabetes Management

The advantages of utilizing health information technology in diabetes management were divided into four subthemes: economic benefits, improving equity in the healthcare system, responding to the patients' needs, and improving patients' health status. In terms of economic benefits, many participants declared that the use of technology can reduce travel costs as well as the visit payments. In this regard, one of the patients declared:

"We have to spend a lot of money to visit a physician; from commuting costs to the doctor's visit payment. If we use these technologies and the internet, we can save a lot of money." (P4)

Most of the participants stated that adopting technologies could improve health equity. Furthermore, follow-up visits could be performed easier and faster by using technology. For instance, when the physician is abroad, patients can be still in touch with their physician. From the interviewees' perspectives, an increased access to healthcare services, especially for those living in remote areas, can be another advantage of technology. Ultimately, technology helps patients to be informed about new treatment methods.

According to the majority of the interviewees, another advantage of using health information technology in diabetes management was responding to the patients' information needs and group therapy by using the experiences of other physicians and patients. Some of the patients believed that they could obtain their required information using diabetes management applications before visiting their own physician. Finally, diabetes complications can be reduced in the long term and

self-management skills can be promoted by using health information technologies in diabetes management, which may help to improve patients' health status.

Theme Three: Disadvantages of Using Health Information Technology in Diabetes Management

According to the interviewees, financial issues, uncertainty about the accuracy of information, and the large volume of information presented to the patients were among the disadvantages of using health information technology for diabetes management. Some of the interviewees believed that the high cost of setting up and applying the technology were serious disadvantages of using the technology. Many patients were concerned about the accuracy and reliability of the information on the internet and other technologies. For instance, one of the patients mentioned:

"I don't know how scientific this information is. They might give me false information and I may use it; it is very bad. It may happen to me, as I frequently use these channels." (P3)

Another patient said:

"I read on the internet that ginger is helpful for diabetes, but when I asked the physician, he said that it might have negative effects on the kidneys and added that the texts on the internet are not very reliable. So, in my opinion, it is a great shortcoming, since I don't know which text is reliable and which one is not." (P5)

Most of the interviewees were also concerned about the large volume of information on the internet and stated that this excessive volume of information may confuse the patients.

Theme Four: Motivational Factors Influencing the Use of Health Information Technology in Diabetes Management

Generally, motivational factors were divided into organizational, economic, and technical subthemes. Organizational factors consisted of government and health system support, cultural readiness for technology, training and introducing the technology prior to use, and physicians' support. One of the physicians mentioned:

"The government and health system support of these technologies can be very effective. If the government first designs these technologies according to the needs of patients and implements them for several years, and then makes it obligatory, it can surely bring about good results." (MD3)

Most of the interviewees stated that if the technology was introduced by the physician, the usage rate would probably increase due to the patients' trust in the physician. Some patients noted that the use of the technology would probably increase if it was introduced by a patient who had used it before. For example, one of the patients said:

"If the physician introduces a good source that I know contains reliable information, I would surely use it." (P2)

Most of the interviewees discussed the importance of cultural readiness for technology and providing the patients and healthcare providers with adequate training prior to use it. Economic factors were mainly related to providing free healthcare services to the patients. Most of the interviewees expressed that effective use of technology may increase if free-of-charge technologies and applications are provided for the patients. Technical factors consisted of designing a user-friendly technology, verifying and validating the content by the specialists, and getting access to the up-to-date information. Regarding user-friendliness of technology, one of the patients said:

"I use technology if it is simple and beautifully designed, since I easily get tired when I use mobile phones. If the application and the page are appealing and contain pictures and films, I use it more." (P7)

Regarding the verification and validation of information and the content of technology by the specialists, one of the physicians noted:

"Technology can be effective if a think tank is considered beforehand to create these applications and technologies, and experts in each area are consulted so that the technology is approved by the health specialists." (MD5)

Theme Five: Inhibitory Factors Influencing the Use of Health Information Technology in Diabetes Management

Inhibitory factors were divided into organizational, economic, technical, and individual subthemes. Organizational factors included the lack of government and health system support, the lack of user training, and the lack of long-term plans. Economic factors mentioned by the interviewees included the high cost of technology and the financial status of the technology users, especially the elderly. One of the physicians stated:

"The first thing is that these applications should be free for the patients, especially for the elderly. Unfortunately, the elderly do not have good financial conditions, and this is something that worries us about following up their treatment. Therefore, if applications are free, they will be very effective." (MD9)

Most of the interviewees believed that technical problems, inaccessibility of the internet and mobile phones, and the lack of user-friendly technology were among the technical factors hindering the use of health information technology in diabetes management. From the interviewees' point of view, problems with having access to the internet and mobile phones were other major issues that could limit the use of technology. According to one the physicians:

"In some parts of our country, for example in villages and rural areas, we still have difficulty in establishing access to the internet; it may even be impossible to have access to a smartphone due to economic and social conditions." (MD5)

Some interviewees also indicated that the lack of user-friendly technology and the complexity of design may limit the use of technology. The individual factors hindering the use of health

information technology in diabetes management included old age, low level of education and income, ethnic and cultural differences, lack of health and computer literacy, physical problems, and patient preferences. As a physician mentioned:

"In my opinion, cultural, social, and economic conditions of the society have an impact on this issue. Illiterate patients who do not have a good income are reluctant to use these technologies; on the other hand, if they are forced to use them, we will surely face resistance." (MD7)

Discussion

Recently, the use of health information technology has increased mainly due to limited resources, increased healthcare costs, and a change in population and healthcare data. This technology has several benefits for patients, particularly patients with chronic diseases such as diabetes. For instance, patients can monitor their health status without having face-to-face visits with their healthcare providers. Although the use of health information technologies can change patients' behaviors and improve their health status, there are several factors that may influence their usage.

The findings of the current study revealed that economic benefits, improving equity in healthcare services, responding to the patients' needs, and improving patients' health status were some of the advantages of using health information technology in diabetes management. Similarly, Nundy et al. showed that mobile health improved the health status of patients with diabetes. In their study, internet-based interventions had a positive impact on patients' health by providing them with their needed information at the right time.[32]

The results also showed that financial issues, uncertainty about the accuracy of information, and the large volume of information presented to the patients were among the disadvantages of using health information technology in diabetes management. The results are in line with the finding reported by Maniam et al. In their study, factors such as fear of sharing private information when using technology and the large volume of information that might be unreliable were regarded as the disadvantages of using health information technology in diabetes management.[33]

According to the findings of the present study, factors influencing the use of health information technology in diabetes management can be generally divided into two categories of motivational and inhibitory factors. Motivational factors influencing the use of health information technology in diabetes management were: organizational factors (e.g., physicians' support, cultural readiness for technology), economic factors (e.g., providing free-of-charge healthcare services to the patients), and technical factors (e.g., user-friendly technology and up-to-date information). These motivational factors have been highlighted in other studies as well.[34]

Sun et al. showed that physicians' approval and support influenced the acceptance of health information technologies in diabetes management.[35] Moreover, in the study conducted by Boodoo

et al., patients mentioned that training on the new technology before actual use, providing user manuals, paying attention to the mental and psychological requirements of patients with diabetes when designing the technology, and receiving socioeconomic support would promote the use of technology.[36] Huygens et al. reported that factors such as technology portability and reliability can influence technology utilization. According to their findings, technology should be easy to use and suitable for the elderly who are unfamiliar with the internet and modern technologies.[37] In other studies, availability of reminders and alerts, exchanging messages with healthcare professionals, social support, and low cost of technology have been discussed as other motivational factors.[38-40]

Physicians who participated in the current study believed that the inhibitory factors influencing the use of health information technology in diabetes management included organizational factors (e.g., the lack of support from the health system), economic factors (e.g., high cost of implementation and use of technology), technical factors (e.g., problems with getting access to the internet and mobile phones), and individual factors (e.g., old age and low level of education). From the patients' perspectives, economic factors (e.g., high cost of technology), technical factors (e.g., getting access to the internet and mobile phones), and individual factors (e.g., lack of health and computer literacy, low level of education, and low level of income) were the most important inhibitory factors.

In Kruse et al.'s study, the violation of patients' privacy, increasing workloads, willingness to communicate with healthcare providers in person, and the high cost of setting up and using the portal were the factors deterring patient portal utilization.[41] Similarly, in a study conducted by Tieu et al., concerns about the lack of privacy and security, limited technology skills and limited health literacy, and interest in having in-person and face-to-face communication with physicians were found as barriers affecting the use of patient portal.[42] Moreover, the results of the study conducted by Duke et al. showed that, from the patients' perspectives, low socioeconomic status, cultural and language differences, and low interest in and awareness of technology were among the deterrents to the use of technology by patients.[43] Although the present study focused on the utilization of health information technology in diabetes management, it seems that the findings are in line with the results of other similar studies.

Given the variety of factors and their impact on the use of health information technology, it is imperative that healthcare providers pay adequate attention to each of these factors to promote use of the technology. In so doing, it can be expected that the developed technologies are used more effectively and the quality of healthcare services is enhanced. Future studies are recommended to evaluate different types of health information technologies in diabetes management from the perspective of patients and their physicians.

Research Limitations

The current research had some limitations. First, the number of participants, especially patients, was limited. The reasons for that might be related to the personal interests of eligible people to take part in the study. Moreover, as the interviews took place in the clinics in which patients were visited, most of them were not interested to stay more to take part in the interviews. Overall, physicians were more interested in taking part in the interviews than patients. However, as the interview guides and questions were relatively similar for patients and physicians, the results were presented for all participants together, and we did not separate them. So, we can claim that data saturation was reached. Another limitation of the study might be related to the limited number of clinics. In fact, due to limited time and resources, we could not reach other settings. As a result, more research to validate the current results in a larger sample is suggested.

Conflict of Interest

The authors declare that they have no conflict of interest.

Author Biographies

Zari Dehnavi, MSc, (zaridehnavi@gmail.com), School of Health Management and Information Sciences at Iran University of Medical Sciences in Tehran, Iran.

Haleh Ayatollahi, PhD, (ayatollahi.h@iums.ac.ir) is an associate professor of medical informatics in the Health Management and Economics Research Center at the Heath Management Research Institute at Iran University of Medical Sciences in Tehran, Iran.

Morteza Hemmat, PhD, (mortezahemmat@gmail.com) is an assistant professor of health information management at Saveh University of Medical Sciences in Saveh, Iran.

Rowshanak Abbasi, MD, (Abbasi.ro@iums.ac.ir) is an assistant professor of endocrinology in the Endocrine Research Center at the Institute of Endocrinology and Metabolism at Iran University of Medical Sciences in Tehran, Iran.

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There are no comments yet.