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Exploring educational needs and design aspects of Internet-enabled patient education for diabetics

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Abstract

Objective:

The objective of this article is to explore the educational needs and design aspects of personalized Internet-enabled education for patients with diabetes in Iran.

Design:

Data were collected using semi-structured interviews and then qualitatively analysed using inductive content analysis.

Participants:

Nine diabetic type 2 patients were included. Inclusion criteria were access to and knowledge on how to use the Internet. The selection ensured representation based on gender, age, occupation and educational background.

Setting:

The sample population was diabetic patients who were admitted to an outpatient diabetic clinic in Mashhad, a large city with about three million inhabitants in Iran.

Results:

Four core categories emerged from the data: (I) Seeking knowledge about diabetes, including specific knowledge acquisition, patient's interactions and learning requirements; (II) Teaching and learning, including using different teaching methods and different ways to learn about the disease; (III) Facilitators, including Internet and mobile use to learn about the disease; (IV) Barriers, including lack of Internet access, uncertainty of access to the Internet and lack of site in local language but also perceived cultural barriers, such as patients' fears of the Internet, lack of time and awareness.

Conclusions:

This study provides a better understanding of patient's educational expectations and technical needs in relation to Internet-enabled education. This knowledge will inform the development of functional mock-ups in the next research phase using a design-based research approach in order to design Internet-enabled patient education for self-care management of diabetes.

Article Summary

- Use of a design-based research approach to study needs-oriented Internet-enabled education for patients with type-2 diabetes.
- This study provides empirical evidence on patients' educational needs and different ways to learn about their disease.
- This study also identifies facilitators and barriers to the effective use of Internet-enabled patient education.
- The sample group was relatively small and came from one diabetic clinic, but our results were relevant to middle-income countries and more specifically to countries with a similar health culture and technical Internet infrastructure.

INTRODUCTION

The International Diabetes Federation estimates that the global number of patients with diabetes mellitus (DM) today exceeds 415 million people [1]. Having doubled worldwide from 1980 to 2008, it is estimated that the number of diabetics will increase to more than 550 million by the year 2030, leaving diabetes the seventh leading cause of death [2]. About 80% of all diabetics live in low- and middle-income countries, with most of them between the age of 40–60 years [3]. Type 2 diabetes (T2D) is the most prevalent form of diabetes, and in high-income countries, up to 91% of adults with the disease have T2D [1].

There is currently no cure for diabetes, but effective treatments exist [4]. Medications to lower the glucose level or insulin together with quality of care and good medical advice can help diabetics lead an active and healthy life and can reduce the risks of developing complications. Daily physical activity is recommended and, together with weight loss, can improve insulin resistance and an optimal level of blood glucose and lipids while reducing blood pressure [5].

Patient education

Patient education is an important factor for enabling diabetic patients to successfully take care of their health [6], and diabetics need structured high-quality education and support to develop their self-care [7]. Patient education aims to improve health by encouraging compliance with medical treatment regimens and promoting healthy lifestyles. Several successful educational programs have focused on empowerment of diabetic patients [8]. Previous research has shown that patients who use self-monitoring techniques, including monitoring food intake, physical activity, and glucose levels, have better control of their disease [9].

Technology-enabled patient education

New technology, such as mobile phones and web-based services (i.e. Internet-enabled) are inexpensive and convenient means of communication, and their use has increased, even in middle- and low-income countries [10]. This widespread distribution of mobile phones, across socioeconomic, gender, and age groups, combined with their unique ability to communicate data in real-time makes them an ideal platform to create Internet-enabled services for real-time diabetes management programs [11]. Despite the huge numbers of diabetes apps, most

offer a small number of similar functionalities. In addition, patients are not involved during the app development, which excludes important patients' needs [12].

Studies have demonstrated an improvement in knowledge scores when computer-based patient education was compared with traditional instruction [13]. However, studies have also shown that self-monitoring measures had little effects on blood glucose control [8,14,15]. This highlights the need for more patient education research that considers clinically relevant empirical knowledge. Online portals and apps are convenient, cost-effective and easy to use anywhere at any time to know more about diabetes and how to individualize and self-manage care [16].

According to statistics provided by the Internet World State in November 2015, more than half of the Iranian population (57.2%) used the Internet, while in 2000, approximately only 0.5% used it. This shows a rapid growth of Internet use by the Iranian population [17]. In our previous study, we found that 26.5% of a diabetic patient population had routine access to the Internet, and 77.8% of those were positive about using an official Iranian website for medical information. However, 55% of the respondents still preferred to obtain health-related information from television, radio and educational films [18]. Both technology use [19] and the incident of diabetes [6] have been increasing in Iran. It has become of national and general interest to bring forward research on Internet-enabled patient education to determine future self-care management patterns of T2D.

The objective of this study is to explore the educational needs and design features of personalized Internet-enabled education of a sample of diabetics in Iran as an example of a middle-income country. The research questions we address are: What are the educational needs for self-care management of type 2 diabetic patients? Which structure, components and features of a technology-based instructional design should be included in a system for self-care management?

METHODS

Study design

The design-based research framework was adopted to guide the researchers to ultimately improve educational practice through better design of technology enhanced learning environments[19]. A qualitative approach was then used to explore the objective of this study.

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3 The researchers used inductive content analysis to provide a systematic and objective means
4 of describing the educational needs and design features of personalized web-based and mobile
5 education among the studied diabetic population [20]. Semi-structured and personal
6 interviews were conducted. We followed an in-depth protocol to further investigate a number
7 of subjects introduced by the participants [21]. The interviews were tape recorded and
8 transcribed verbatim, and every interview lasted between 30 and 45 minutes. The interviews
9 were led in Persian by the first author, while the analysis of the interview data was conducted
10 by two of the authors and translated into English.
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17 **Participants and context of study**

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19 The sample population consisted of nine diabetic patients admitted to an outpatient diabetic
20 clinic in Mashhad, a large city with about three million inhabitants in Iran. All interviews
21 were conducted at the participant's convenience with regard to time. The diabetes clinic had
22 about 7000 patients annually who visited the clinic for care and check-up. The interviewer
23 was a medical doctor and PhD student who had worked in the clinic for about 6 years; he had
24 experience with diabetic patients and the clinical environment also he was trained about how
25 to do qualitative research by passing courses in the PhD period.
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32 Participants were selected based on purposive sampling that considered gender, age,
33 occupation and educational background. All participants signed a consent form prior to the
34 interview. Participants were recruited on the basis of willingness to participate in the study,
35 confirmed diagnosis of T2D at least 1 year prior to the study, had access to the Internet at
36 home or in the work place, had more than 9 years of formal education and were cognitively
37 and physically able to participate personally in the study. To enhance the rigor of qualitative
38 studies, we followed the four criteria proposed by Lincoln and Guba: credibility,
39 transferability, dependability and confirmability [22].
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46 **Procedures**

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48 Data were collected in July 2015. For verifying the accuracy, the data were coded and
49 categorized independently by two authors, and the emerged themes were compared [20]. To
50 provide transferability, participants varied in gender, age, educational level, occupation,
51 diabetes duration and Internet use. The data recorded from each face-to-face interview were
52 quickly transcribed and analysed immediately after the interview to obtain information on
53 data saturation, which was reached with nine patients, and dependability. The transcribed raw
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3 data of all interviews were read through several times to produce an overall general
4 impression and field notes were made during interviews.
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7 The questions were based on the Persian Diabetes Self-Management Education program
8 (PDSME) [23] and educational needs of T2D for self-care [24] and questions pilot tested with
9 one patient. Through the interviews, the researcher explored which structure, components and
10 features of Internet-enabled instructional design should be suitable for diabetic patients,
11 besides the obstacles and benefits of using new technology.
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16 An inductive thematic analysis [25] was used to identify themes describing the diabetics'
17 educational needs and design features of Internet-enabled education. In the first step, all
18 interviews were read and re-read as whole entities to better understand the data. Ideas or
19 patterns of interest were marked in the text. The second step involved identifying and coding
20 meaningful groups of text. Thereafter, the different codes were collated into categories and
21 subsequently into potential themes. Finally, the themes were reviewed in relation to the codes,
22 and the specifics of each theme and the overall narrative were refined. During the analysis, the
23 entire dataset, the coded meaningful groups of text, and the ongoing analysis of the data were
24 iteratively performed. The entire analysis process and consensus were conducted by two of
25 the authors supported by the whole research team through discussions to confirm the
26 consistency of the findings.
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36 **Ethical considerations**

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38 All participants received oral and written information about the study and read and signed a
39 consent form. Participants were assured confidentiality of the gathered data as well as
40 anonymity. They were also informed of their right to withdraw from the study at any time.
41 One participant chose not to participate when asked to sign the consent form, leaving nine
42 participants in total.
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47 Interviews were conducted at the clinic. The study was approved by the ethics committee of
48 Mashhad University of Medical Sciences (No: IR.MUMS.REC.1395.108).
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52 **RESULTS**

The mean age of the participants was 43.3 years, and the average number of years since being diagnosed was 7.8 years. The participants had been using the Internet on average for 7.6 years.

Data analysis

We derived 207 codes from the interviews; these resulted in 38 subcategories, ten categories and four themes. Categories and themes are shown in Table 1.

Table 1: Categories and themes derived from the interview data

Categories	Themes
Requirements for learning Acquisition of knowledge Specific knowledge acquisition Interaction	(I) Seeking knowledge about diabetes
Teaching methods Different ways to learn	(II) Teaching and learning
Facilitators for using Internet Facilitators for using mobile	(III) Facilitators
Barriers for using Internet Perceived cultural barriers	(IV) Barriers

(I) Seeking knowledge about diabetes

Seeking knowledge about diabetes was the theme to which patients contributed the most. This theme indicated the types of learning requirements, technology-allowed interaction and the acquisition of knowledge about general and specific diabetes issues that the patients regarded as important to include in Internet-enabled patient education. Participants indicated that gaining awareness about diabetes and how to better control blood sugar are important matters to them.

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2
3 *'To know more is better, especially about food intake. I think that if I know more it is much*
4 *better for me, and the most important thing to know is about eating behaviour.'* Patient 9,
5 male (M), 23 years
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9 A number of participants asked to have access to and find information about diabetes by using
10 new technologies, like smart phones, in order to receive updated information.
11

12
13 *'I feel that the information should always be available. For example, via mobile phone or*
14 *SMS is a good way.'* Patient 8, M, 44 years
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18 Other participants insisted on getting more information, for example, about diet, stress and
19 drug complications in their daily life. Diet was a major concern for many patients, and they
20 did not know how they could control their regimen. Stress was also a main issue, and they
21 wanted to know how they could control or decrease stress.
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23

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25 *'I'd like to know which things can lower the blood sugar and what kind of food I can eat.'*
26 Patient 2, female (F), 44 years
27
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29
30 *'I would like to know more about stress, and I think I have a lot of stress because of my*
31 *disease. Why do I have this stress? I fear eating food, and why do I have this fear?'* Patient 7,
32 F, 52 years
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36 *'I would like to know what the side effects are from medications that we take and what their*
37 *long-term side effects are on the body.'* Patient 7, F, 52 years
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41 Participants preferred to having access to consultation through technology and getting help
42 from others, especially physicians. Most of them did not find a Persian website about
43 diabetes, and they noted how helpful it would be if one existed.
44
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47 *'My doctor told me something useful about nutrition that had a good influence on me. He told*
48 *me that I should eat less and try to eat snacks and fruit.'* Patient 5, M, 40 years
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52 *'If a Persian website were available, I would definitely use it, but I do not know whether or*
53 *not one is available.'* Patient 9, M, 23 years
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56 **(II) Teaching and learning**

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3 The Teaching and learning theme included using different teaching methods and different
4 ways to learn about diabetes that should be included in on-line patient education. The
5 participants showed interest in getting educational material to read and learn about diabetes,
6 both in formal educational classes but also through a 'question and answer' feature with a
7 direct connection to doctors and peers.
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13 *'I think the Internet is a good option if we can have a specific website that could allow us to*
14 *ask questions about our problem and also communicate with physicians and other patients*
15 *who have the same problem.'* Patient 8, M, 44 years
16
17

18
19 The participants suggested that they would like to get information on diabetes by watching
20 videos, reading educational material and receiving text messages. Participants stated that they
21 would like to have pre- and post-tests of the educational material they read to test their
22 understanding. However, they also stated that receiving too much information on diabetes,
23 possibly via text messages, could be irritating.
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29 *'Best of all is to watch educational movies, questions and answers. Communication between*
30 *other patients and physician is also good.'* Patient 1, M, 56 years
31
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34 *'SMS is an effective way, and three times per week is good. Once a week may be forgotten,*
35 *and every day could be boring. One should consider the psychological aspects of its effect.*
36 *'Patient 6, M, 58 years*
37
38

39
40 *'I do not read a lot but I try to watch and listen since I believe I remember better.'* Patient 3,
41 F, 26 years
42

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44 Some of the participants had experience in searching the Internet and could find helpful
45 information, but they did not find information in Persian about diabetes. They also preferred
46 to get updates about the disease.
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50 *'I like to search the web and see what is good for diabetic patients. So far I have read on the*
51 *Internet, and I know there is good information but it is not in Persian.'* Patient 2, F, 44 years
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3 *'If new information about diabetes comes up, then notification by SMS is a good thing. New*
4 *information via email is also good, but rarely do people check their email.'* Patient 3, F, 26
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6 years

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9 *'SMS should be sent only when there is something new that they [the caregivers] want to tell*
10 *us.'* Patient 3, F, 26 years

11 12 13 **(III) Facilitators**

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16 Facilitators to patient education were the Internet and mobile phones, as expressed by the
17 participants. They also mentioned facilitating characteristics, such as well-designed, easy to
18 use, well optimized for search, quick startup time, responsiveness and a focused purpose. The
19 participants welcomed an Iranian educational website.

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21
22 *'If we could have a site that patients could have access to, like "Iran Diabetes Association"*
23 *site, it would be very good, but it does not exist.'* Patient 6, M, 58 years

24
25
26 *'It is good to use the mobile phone with interesting content about diabetes that could increase*
27 *life expectancy. I do not like today's technology because we are missing a lot of things, like*
28 *human contact and being together, but unfortunately we should accept them because they*
29 *became a part of every day's life.'* Patient 3, F, 26 years

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31
32 *'It would be nice if we could ask questions to solve our problems because sometimes we*
33 *simply don't have access to our physician.'* Patient 3, F, 26 years

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35
36 *'I think the Internet is good for patients as long as we can have access to a specific [diabetes]*
37 *website quickly in order to ask questions and add my comments and also to communicate with*
38 *other patients.'* Patient 8, M, 44 years

39 40 41 **(IV) Barriers**

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44 The barriers to Internet-enabled patient education, as stated by the participants, included
45 proper lack of Internet access, uncertainty of connectivity to the Internet and lack of a proper
46 Persian site. The participants also perceived cultural barriers, such as fears about the Internet,
47 as well as a lack of time and awareness.

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3 *I have not seen any comprehensive website in Persian. I like a reputable site that my doctor*
4 *confirms; this is very important to me.* 'Patient 3, F, 26 years

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7 *I am not sure about the content on the Internet because it is different from one site to*
8 *another. For example, about herbal medicine and eating fruit, I don't know which fruit has*
9 *sugar and I don't know how much watermelon I should eat.* 'Patient 8, M, 44 years

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12 *I did not search the Internet about diabetes because I did not have the time. I have had the*
13 *Internet for 10 years but was diagnosed three years ago with diabetes.* 'Patient 9, M, 23 years

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17 Participants complained about the variation in information and content that is available on the
18 Internet as well as opposing views of doctors.

19
20
21 *There is a lot of information about diabetes on websites, but when I look at them they have*
22 *prospective in eating habits, yet the physician's treatment is the same.* 'Patient 8, M, 44 years

23
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25 Some participants complained of having access to the Internet and mentioned that using the
26 Internet and computers are not popular yet with the Iranian population.

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28
29 *All [Iranian] people do not have access to the Internet, and some of them do not like having a*
30 *computer or laptop.* 'Patient 1, M, 56 years

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33 *Internet access is not widely available but [on-line] accessibility to a diabetes physician is*
34 *hard.* 'Patient 8, M, 44 years

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38 There were some cultural barriers that participants mentioned, such as lack of awareness and
39 lack of time to think about diabetes, as well as physicians not taking their time to talk to
40 patients and educate them.

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43 *I am afraid to eat food that I do not know if it is good for me to eat. I am afraid of insulin. I*
44 *do not know where this fear comes from; perhaps because one of my relatives died young of*
45 *diabetes and was using insulin.* 'Patient 7, F, 52 years

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48
49 *I do not know what my blood glucose should be. I asked one time and they told me 94 to 110*
50 *is good, and I do not know if I have diabetes type one or two. I need information.* 'Patient 8,
51 M, 44 years

1
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3 *'Doctors do not have time to give information that patients need. In Iran, physicians look like*
4 *businessmen, and unfortunately they do not have time for patients.'* Patient 8, M, 44 years
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7 **DISCUSSION**

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10 In this study, we explored the educational needs and design features of personalized web-
11 based and mobile education with a sample of Iranian diabetic patients. Through interviews,
12 four themes emerged from the data. The first theme was seeking knowledge about diabetes,
13 and it included specific knowledge acquisition, patient's interactions and learning
14 requirements. The second theme was teaching and learning, and it included using different
15 teaching methods and different ways to learn about the disease. The third theme was
16 facilitators, and it included features of Internet and mobile use to learn about the disease. The
17 last theme was barriers, and it included the lack of both proper Internet access and a local
18 language site about diabetes. Between barriers there were also perceived cultural barriers,
19 such as patient's uncertainty about the Internet, lack of time and awareness.
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27 Patients' educational and technological needs are flexible and specific at the same time. As
28 another study has shown [26], the participants prefer educational material that is
29 comprehensive and well organized and want access to what they want to know and when they
30 need to know it; this is thought to be helpful for confident decision making. Supplemental
31 information should be produced with cultural sensitivity and an appropriate literacy level.
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36 The results of our study highlight the importance for patients of receiving standardised
37 general diabetes education with a specific focus on dietary interventions and the importance
38 of physical activity, which has direct relevance to clinical outcomes [27].
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42 Although not prevalent as communication tools for patients in Iran, Internet and mobile
43 phones can act as facilitators, as expressed by the participants; especially when they have
44 certain features, such as being well-designed, easy to use, well optimized for searches, a quick
45 startup time, responsive, and a focused purpose. The results of this study partially confirm a
46 review study [28] that showed data export and communication are some of the most common
47 features of mobile diabetes applications. However, the same study noted that personalized
48 education is an underrepresented feature. The participants particularly welcomed a local
49 language educational website.
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3 There are a large number of diabetes apps that have been developed and are available, but
4 many of them are not suited to one's own needs and a number of those lack proper usability
5 and needs orientation [12]. In this study, the researcher tried to identify the educational and
6 technical needs of the target group in order to prepare Internet-enabled services that can help
7 improve the patients' self-care management of the disease.
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11 The results confirmed that there is a mix of barriers to patient education, including what can
12 be interpreted as an inadequate health system with challenging communication interfaces that
13 make it difficult, for diabetics, to use Internet-enabled technology. In addition, low health
14 literacy or inability to identify the need and health information resources results in difficulty
15 to apply disease-related knowledge in daily life. This is an important barrier that has been
16 previously addressed; as researchers have expressed, there is no doubt that development of
17 educational programs is the least expensive and most practical way to meet consumers of
18 health [29]. Some studies have shown other barriers to using digital tools for diabetes
19 management, including cost, insufficient scientific evidence, not useful in certain populations,
20 data protection and data security [16]. Despite many barriers, the digital industry is growing
21 rapidly, and it is estimated that in the future all electronic health record systems will be
22 integrated using a common platform [16].
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33 Research in England shows that only 6.0% of all people with T2D have been offered a
34 diabetes self-management educational program that could help them take action against the
35 chronic disease [8]. In Iran, based on the PDSME [23], researchers will offer and use this
36 educational program by making use of new technology for improving the daily life of people
37 with diabetes.
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42 Our study demonstrates that despite the significant amount of work needed in Iran to
43 understand patients' needs and to design technology to best serve these needs, new
44 technology can serve as a catalyst for change. Research continues to provide evidence that an
45 online diabetes self-management program is acceptable for diabetics [30] and that mobile
46 phones can help improve self-management behaviour [31].
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51 The results of this research have identified patient-tailored information, interactivity, content
52 credibility, clear presentation of content, use of multimedia and language contextualization as
53 essential design features of technology directed at patient education of chronic disease
54 management in an Iranian population. Our findings confirm those of earlier research [32].
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Limitations

A limitation of this study is that the sample was selected from one diabetic clinic in a large city, and therefore the findings may not be transferable to a broader diabetic population. However, our results are useful for middle-income and middle-eastern countries, which have a similar culture, similar problems for diabetic patients and similar problems with technology penetration.

Conclusion

The patients' needs and technology design features resulting from this research are essential for designing functional mock-ups of a personalized diabetes education that the researchers will use in the next phase of the study. Through design-based research, the researchers will design Internet-enabled educational material for self-care management of diabetic patients in Iran. Our objective is to reach diabetics with empirically designed Internet-enabled learning services that are clinically relevant and that can help improve the patients' self-care management of the disease.

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Contributorship statement

J J conceived and designed the study, obtained funding, conducted interviews and analyzed the data, drafted the manuscript and prepared the tables. HKM conducted data analysis and edited the manuscript. NZ assisted in the design of the study and edited the manuscript. I M assisted in the design of the study and reviewed drafts of the paper. All authors were involved in writing the paper.

Competing interests None.

Patient consent Obtained.

Ethics approval The study was approved by the ethics committee of Mashhad University of Medical Sciences.

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Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

Domain 1: Research team and reflexivity			Responses	Page number
Personal Characteristics				
1.	Interviewer/facilitator	Which author/s conducted the interview?	Javad Jafari	1
2.	Credentials	What were the researcher's credentials?	MD	6
3.	Occupation	What was their occupation at the time of the study?	PhD student	6
4.	Gender	Was the researcher male or female?	Male	6
5.	Experience and training	What experience or training did the researcher have?	Experience as a physician in the clinic and training about how to do qualitative research	6
Relationship with participants				
6.	Relationship established	Was a relationship established prior to study commencement?	No	
7.	Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	Reasons for doing the research	6
8.	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	Interviewer was a MD who knows the diabetic patients complications and interested to help them	6
Domain 2: study design				
Theoretical framework				
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study?	Design-based research and content analysis	5, 6
Participant selection				
10.	Sampling	How were participants selected?	Purposive	6
11.	Method of approach	How were participants approached?	Face-to-face	6

12.	Sample size	How many participants were in the study?	Nine diabetic patients	6, 7
13.	Non-participation	How many people refused to participate or dropped out? Reasons?	One person because he did not like to sign the consonant form	7
Setting				
14.	Setting of data collection	Where was the data collected?	In the clinic	7
15.	Presence of non-participants	Was anyone else present besides the participants and researchers?	No	
16.	Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	gender, age, occupation and educational background	6
Data collection				
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	They pilot tested with one patient	7
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many?	No	
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data?	Yes, he used audio recording	6
20.	Field notes	Were field notes made during and/or after the interview?	During the interview	7
21.	Duration	What was the duration of the interviews or focus group?	30 to 45 minutes	6
22.	Data saturation	Was data saturation discussed?	Yes	7
23.	Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No	
Domain 3: analysis and findings				
Data analysis				
24.	Number of data coders	How many data coders coded the data?	207 codes	8

25.	Description of the coding tree	Did authors provide a description of the coding tree?	Yes	7
26.	Derivation of themes	Were themes identified in advance or derived from the data?	Derived from the data	7, 8
27.	Software	What software, if applicable, was used to manage the data?	Researcher did not use software	
28.	Participant checking	Did participants provide feedback on the findings?	No	
Reporting				
29.	Quotations presented	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.g. participant number	Yes	7
30.	Data and findings consistent	Was there consistency between the data presented and the findings?	Yes	8
31.	Clarity of major themes	Were major themes clearly presented in the findings?	Yes	8
32.	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Yes	8

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Exploring educational needs and design aspects of Internet-enabled patient education for diabetics: a qualitative interview study

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Exploring educational needs and design aspects of Internet-enabled patient education for diabetics: a qualitative interview study

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Abstract

Objective:

The objective of this article is to explore the educational needs and design aspects of personalized Internet-enabled education for patients with diabetes in Iran.

Design:

Data were collected using semi-structured interviews and then qualitatively analysed using inductive content analysis.

Participants:

Nine diabetic type 2 patients were included. Inclusion criteria were access to and knowledge on how to use the Internet. The selection ensured representation based on gender, age, occupation and educational background.

Setting:

The sample population was diabetic patients who were admitted to an outpatient diabetic clinic in Mashhad, a large city with about three million inhabitants in Iran.

Results:

Four core categories emerged from the data: (I) Seeking knowledge about diabetes, including specific knowledge acquisition, patient's interactions and learning requirements; (II) Teaching and learning, including using different teaching methods and different ways to learn about the disease; (III) Facilitators, including Internet and mobile use to learn about the disease; (IV) Barriers, including lack of Internet access, uncertainty of access to the Internet and lack of site in local language but also perceived cultural barriers, such as patients' fears of the Internet, lack of time and awareness.

Conclusions:

This study provides a better understanding of patient's educational expectations and technical needs in relation to Internet-enabled education. This knowledge will inform the development of functional mock-ups in the next research phase using a design-based research approach in order to design Internet-enabled patient education for self-care management of diabetes.

Article Summary

- Use of a design-based research approach to study needs-oriented Internet-enabled education for patients with type-2 diabetes.
- This study provides empirical evidence on patients' educational needs and different ways to learn about their disease.
- This study also identifies facilitators and barriers to the effective use of Internet-enabled patient education.
- The sample group was relatively small and came from one diabetic clinic, but our results were relevant to middle-income countries and more specifically to countries with a similar health culture and technical Internet infrastructure.

INTRODUCTION

The International Diabetes Federation estimates that the global number of patients with diabetes mellitus (DM) today exceeds 415 million people [1]. Having doubled worldwide from 1980 to 2008, it is estimated that the number of diabetics will increase to more than 550 million by the year 2030, leaving diabetes the seventh leading cause of death [2]. About 80% of all diabetics live in low- and middle-income countries, with most of them between the age of 40–60 years [3]. Type 2 diabetes (T2D) is the most prevalent form of diabetes, and in high-income countries, up to 91% of adults with the disease have T2D [1].

There is currently no cure for diabetes, but effective treatments exist [4]. Medications to lower the glucose level, including insulin, together with quality of care, food intake, physical activity levels and good medical advice can help diabetics lead an active and healthy life and can reduce the risks of developing complications. Daily physical activity is recommended and, together with weight loss, can improve insulin resistance and an optimal level of blood glucose and lipids while reducing blood pressure [5]. Lifestyle interventions planned to influence an individual's physical activity levels and diet are critical parts of type 2 diabetes management[6].

Patient education

Patient education is an important factor for enabling diabetic patients to successfully take care of their health [7], and diabetics need structured high-quality education and support to develop their self-care [8]. Patient education aims to improve health by encouraging compliance with medical treatment regimens and promoting healthy lifestyles. However, the value of self-monitoring blood glucose for T2D patients has mixed outcomes [9,10]. Research suggests that self-monitoring does not improve glycaemic control and may even increase anxiety [9]. Qualitative studies report that self-monitoring is perceived to have negative impact on quality of life when identified problems in the monitoring of blood glucose levels are not taken care of quickly [11]. Whereas, when clinical information is timely shared with the healthcare provider blood glucose control is improved in T2D patients [12]. Research has shown that patients who use self-monitoring techniques, including monitoring food intake, physical activity, and glucose levels, have better control of their disease [13], even though a recent UK study suggest that the improvement of blood glucose control may not be large

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2
3 enough to be clinically relevant [14]. Therefore, the acceptability of self-monitoring in T2D
4 patient is unclear. Nonetheless, several successful educational programs have focused on
5 empowerment of diabetic patients [15].
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8 9 **Technology-enabled patient education**

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11 New technology, such as mobile phones and web-based services (i.e. Internet-enabled) are
12 inexpensive and convenient means of communication, and their use has increased, even in
13 middle- and low-income countries [16]. This widespread distribution of mobile phones, across
14 socioeconomic, gender, and age groups, combined with their unique ability to communicate
15 data in real-time makes them an ideal platform to create Internet-enabled services for real-
16 time diabetes management programs [17]. Despite the huge numbers of diabetes apps, most
17 offer a small number of similar functionalities. In addition, patients are not involved during
18 the app development, which excludes important patients' needs [18]. Online portals and apps
19 are convenient, cost-effective and easy to use anywhere at any time to know more about
20 diabetes and how to individualize and self-manage care [19].
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24 According to statistics provided by the Internet World State in November 2015, more than
25 half of the Iranian population (57.2%) used the Internet, while in 2000, approximately only
26 0.5% used it. This shows a rapid growth of Internet use by the Iranian population [20]. In our
27 previous study, we found that 26.5% of a diabetic patient population had routine access to the
28 Internet, and 77.8% of those were positive about using an official Iranian website for medical
29 information. However, 55% of the respondents still preferred to obtain health-related
30 information from television, radio and educational films [21]. Both technology use [19] and
31 the incident of diabetes [6] have been increasing in Iran. It has become of national and general
32 interest to bring forward research on Internet-enabled patient education to determine future
33 self-care management patterns of T2D.
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37 The objective of this study is to explore the educational needs and design features of
38 personalized Internet-enabled education of a sample of diabetics in Iran as an example of a
39 middle-income country. The research questions we address are: What are the educational
40 needs for self-care management of type 2 diabetic patients? Which structure, components and
41 features of a technology-based instructional design should be included in a system for self-
42 care management?
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45 46 47 48 49 50 51 52 53 54 55 56 57 **METHODS**

Study design

The design-based research framework was adopted to guide the researchers to ultimately improve educational practice through better design of technology enhanced learning environments[22]. A qualitative approach was then used to explore the objective of this study. The researchers used inductive content analysis to provide a systematic and objective means of describing the educational needs and design features of personalized web-based and mobile education among the studied diabetic population [23]. Semi-structured and personal interviews were conducted. We followed an in-depth protocol to further investigate a number of subjects introduced by the participants [24]. The interviews were tape recorded and transcribed verbatim, and every interview lasted between 30 and 45 minutes. The interviews were led in Persian by the first author, while the analysis of the interview data was conducted by two of the authors and translated into English.

Participants and context of study

The sample population consisted of nine diabetic patients admitted to an outpatient diabetic clinic in Mashhad, a large city with about three million inhabitants in Iran. All interviews were conducted in a separate room of the diabetic clinic and at the participant's convenience with regard to time. The diabetes clinic had about 7000 patients annually who visited the clinic for care and check-up. A number of patients fitting the study's criteria were asked to participate in the project when they came to the clinic for routine check-up. Only one patient who refused to sign the consent form withdrew from the study. The interviewer was a medical doctor and PhD student who had worked in the clinic for about 6 years; he had experience with diabetic patients and the clinical environment also he was trained about how to do qualitative research by passing courses in the PhD period.

Participants were selected based on purposive sampling that considered gender, age, occupation and educational background. All participants signed a consent form prior to the interview. Participants were recruited on the basis of willingness to participate in the study, confirmed diagnosis of T2D at least 1 year prior to the study, had access to the Internet at home or in the work place, had more than 9 years of formal education and were cognitively and physically able to participate personally in the study. To enhance the rigor of qualitative studies, we followed the four criteria proposed by Lincoln and Guba: credibility, transferability, dependability and confirmability [25].

Procedures

Data were collected in July 2015. For verifying the accuracy, the data were coded and categorized independently by two authors, and the emerged themes were compared [23]. To provide transferability, participants varied in gender, age, educational level, occupation, diabetes duration and Internet use. The data recorded from each face-to-face interview were quickly transcribed and analysed immediately after the interview to obtain information on data saturation, which was reached with nine patients, and dependability. This study was limited to two research questions, hence, the analysis quickly yielded data that did not add new information to the number of categories found, which suggested data saturation. The transcribed raw data of all interviews were read through several times to produce an overall general impression and field notes were made during interviews.

The questions were based on the Persian Diabetes Self-Management Education program (PDSME) [26] and educational needs of T2D for self-care [27] and pilot tested with one patient. Through the interviews, the researcher explored which structure, components and features of Internet-enabled instructional design should be suitable for diabetic patients, besides the obstacles and benefits of using new technology.

An inductive thematic analysis [28] was used to identify themes describing the diabetics' educational needs and design features of Internet-enabled education. In the first step, all interviews were read and re-read as whole entities to better understand the data. Ideas or patterns of interest were marked in the text. The second step involved identifying and coding meaningful groups of text. Thereafter, the different codes were collated into categories and subsequently into potential themes. Finally, the themes were reviewed in relation to the codes, and the specifics of each theme and the overall narrative were refined. During the analysis, the entire dataset, the coded meaningful groups of text, and the ongoing analysis of the data were iteratively performed. The entire analysis process and consensus were conducted by two of the authors supported by the whole research team through discussions to confirm the consistency of the findings.

Ethical considerations

All participants received oral and written information about the study and read and signed a consent form. Participants were assured confidentiality of the gathered data as well as anonymity. They were also informed of their right to withdraw from the study at any time.

RESULTS

The nine participants were 5 males and 4 females with a mean age of 43.3 years, and the average number of years since being diagnosed was 7.8 years. The participants had been using the Internet on average for 7.6 years.

Data analysis

We derived 207 codes from the interviews; these resulted in 38 subcategories, ten categories and four themes. Categories and themes are shown in Table 1.

Table 1: Categories and themes derived from the interview data

Categories	Themes
Requirements for learning Acquisition of knowledge Specific knowledge acquisition Interaction	(I) Seeking knowledge about diabetes
Teaching methods Different ways to learn	(II) Teaching and learning
Facilitators for using Internet Facilitators for using mobile	(III) Facilitators
Barriers for using Internet Perceived cultural barriers	(IV) Barriers

(I) Seeking knowledge about diabetes

Seeking knowledge about diabetes was the theme to which patients contributed the most. This theme indicated the types of learning requirements, technology-allowed interaction and the acquisition of knowledge about general and specific diabetes issues that the patients regarded as important to include in Internet-enabled patient education. Participants indicated that

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3 gaining awareness about diabetes and how to better control blood sugar are important matters
4 to them.
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7 *'To know more is better, especially about food intake. I think that if I know more it is much*
8 *better for me, and the most important thing to know is about eating behaviour.'* Patient 9,
9 male (M), 23 years
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13 A number of participants asked to have access to and find information about diabetes by using
14 new technologies, like smart phones, in order to receive updated information.
15
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18 *'I feel that the information should always be available. For example, via mobile phone or*
19 *SMS is a good way.'* Patient 8, M, 44 years
20
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22
23 Other participants insisted on getting more information, for example, about diet, stress and
24 drug complications in their daily life. Diet was a major concern for many patients, and they
25 did not know how they could control their regimen. Stress was also a main issue, and they
26 wanted to know how they could control or decrease stress.
27
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30 *'I'd like to know which things can lower the blood sugar and what kind of food I can eat.'*
31 Patient 2, female (F), 44 years
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35 *'I would like to know more about stress, and I think I have a lot of stress because of my*
36 *disease. Why do I have this stress? I fear eating food, and why do I have this fear?'* Patient 7,
37 F, 52 years
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41 *'I would like to know what the side effects are from medications that we take and what their*
42 *long-term side effects are on the body.'* Patient 7, F, 52 years
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46 Participants preferred to having access to consultation through technology and getting help
47 from others, especially physicians. Most of them did not find a Persian website about
48 diabetes, and they noted how helpful it would be if one existed.
49
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52 *'My doctor told me something useful about nutrition that had a good influence on me. He told*
53 *me that I should eat less and try to eat snacks and fruit.'* Patient 5, M, 40 years
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3 *'If a Persian website were available, I would definitely use it, but I do not know whether one*
4 *is available.'* Patient 9, M, 23 years
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7 **(II) Teaching and learning**

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10 The Teaching and learning theme included using different teaching methods and different
11 ways to learn about diabetes that should be included in on-line patient education. The
12 participants showed interest in getting educational material to read and learn about diabetes,
13 both in formal educational classes but also through a 'question and answer' feature with a
14 direct connection to doctors and peers.
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20 *'I think the Internet is a good option if we can have a specific website that could allow us to*
21 *ask questions about our problem and also communicate with physicians and other patients*
22 *who have the same problem.'* Patient 8, M, 44 years
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24

25
26 The participants suggested that they would like to get information on diabetes by watching
27 videos, reading educational material and receiving text messages. Participants stated that they
28 would like to have pre- and post-tests of the educational material they read to test their
29 understanding. However, they also stated that receiving too much information on diabetes,
30 possibly via text messages, could be irritating.
31
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36 *'Best of all is to watch educational movies, questions and answers. Communication between*
37 *other patients and physician is also good.'* Patient 1, M, 56 years
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39

40 *'SMS is an effective way, and three times per week is good. Once a week may be forgotten,*
41 *and every day could be boring. One should consider the psychological aspects of its effect.*
42 *'Patient 6, M, 58 years*
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44

45
46 *'I do not read a lot but I try to watch and listen since I believe I remember better.'* Patient 3,
47 F, 26 years
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50 Some of the participants had experience in searching the Internet and could find helpful
51 information, but they did not find information in Persian about diabetes. They also preferred
52 to get updates about the disease.
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3 *'I like to search the web and see what is good for diabetic patients. So far I have read on the*
4 *Internet, and I know there is good information but it is not in Persian.'* Patient 2, F, 44 years

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7 *'If new information about diabetes comes up, then notification by SMS is a good thing. New*
8 *information via email is also good, but rarely do people check their email.'* Patient 3, F, 26
9 years

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11
12 *'SMS should be sent only when there is something new that they [the caregivers] want to tell*
13 *us.'* Patient 3, F, 26 years

14 15 16 17 18 **(III) Facilitators**

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20 Facilitators to patient education were the Internet and mobile phones, as expressed by the
21 participants. They also mentioned facilitating characteristics, such as well-designed, easy to
22 use, well optimized for search, quick startup time, responsiveness and a focused purpose. The
23 participants welcomed an Iranian educational website.

24
25 *'If we could have a site that patients could have access to, like "Iran Diabetes Association"*
26 *site, it would be very good, but it does not exist.'* Patient 6, M, 58 years

27
28 *'It is good to use the mobile phone with interesting content about diabetes that could increase*
29 *life expectancy. I do not like today's technology because we are missing a lot of things, like*
30 *human contact and being together, but unfortunately we should accept them because they*
31 *became a part of every day's life.'* Patient 3, F, 26 years

32
33 *'It would be nice if we could ask questions to solve our problems because sometimes we*
34 *simply don't have access to our physician.'* Patient 3, F, 26 years

35
36 *'I think the Internet is good for patients as long as we can have access to a specific [diabetes]*
37 *website quickly in order to ask questions and add my comments and also to communicate with*
38 *other patients.'* Patient 8, M, 44 years

39 40 41 42 43 44 **(IV) Barriers**

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46 The barriers to Internet-enabled patient education, as stated by the participants, included
47 proper lack of Internet access, uncertainty of connectivity to the Internet and lack of a proper
48

Persian site. The participants also perceived cultural barriers, such as fears about the Internet, as well as a lack of time and awareness.

'I have not seen any comprehensive website in Persian. I like a reputable site that my doctor confirms; this is very important to me.' Patient 3, F, 26 years

'I am not sure about the content on the Internet because it is different from one site to another. For example, about herbal medicine and eating fruit, I don't know which fruit has sugar and I don't know how much watermelon I should eat.' Patient 8, M, 44 years

'I did not search the Internet about diabetes because I did not have the time. I have had the Internet for 10 years but was diagnosed three years ago with diabetes.' Patient 9, M, 23 years

Participants complained about the variation in information and content that is available on the Internet as well as opposing views of doctors.

'There is a lot of information about diabetes on websites, but when I look at them they have several prospective in eating habits, yet the physician's treatment is the same.' Patient 8, M, 44 years

Some participants complained of having access to the Internet and mentioned that using the Internet and computers are not popular yet with the Iranian population.

'All [Iranian] people do not have access to the Internet, and some of them do not like having a computer or laptop.' Patient 1, M, 56 years

'Internet access is not widely available and [on-line] accessibility to a diabetes physician is hard.' Patient 8, M, 44 years

There were some cultural barriers that participants mentioned, such as lack of awareness and lack of time to think about diabetes, as well as physicians not taking their time to talk to patients and educate them.

'I am afraid to eat food that I do not know if it is ok for me to eat. I am afraid of insulin. I do not know where this fear comes from; perhaps it is because one of my relatives died of diabetes in a young age, and he was using insulin.' Patient 7, F, 52 years

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3 *I do not know what my blood glucose should be. I asked one time and they told me 94 to 110*
4 *is good, and I do not know if I have diabetes type one or two. I need information.* Patient 8,
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6 M, 44 years
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9 *Doctors do not have time to give information that patients need. In Iran, physicians look like*
10 *businessmen, and unfortunately they do not have time for patients.* Patient 8, M, 44 years
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13 DISCUSSION

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15 In this study, we explored the educational needs and design features of personalized web-
16 based and mobile education with a sample of Iranian diabetic patients. Through interviews,
17 four themes emerged from the data. The first theme was seeking knowledge about diabetes,
18 and it included specific knowledge acquisition, patient's interactions and learning
19 requirements. The second theme was teaching and learning, and it included using different
20 teaching methods and different ways to learn about the disease. The third theme was
21 facilitators, and it included features of Internet and mobile use to learn about the disease. The
22 last theme was barriers, and it included the lack of both proper Internet access and a local
23 language site about diabetes. Between barriers there were also perceived cultural barriers,
24 such as patient's uncertainty about the Internet, lack of time and awareness.
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28 Patients' educational and technological needs are flexible and specific at the same time. As
29 another study has shown [29], the participants prefer educational material that is
30 comprehensive and well organized and want access to what they want to know and when they
31 need to know it; this is thought to be helpful for confident decision making. Supplemental
32 information should be produced with cultural sensitivity and an appropriate literacy level.
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36 The results of our study highlight the importance for patients of receiving standardised
37 general diabetes education with a specific focus on dietary interventions and the importance
38 of physical activity, which has direct relevance to clinical outcomes [6].
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42 Although not prevalent as communication tools for patients in Iran, Internet and mobile
43 phones can act as facilitators, as expressed by the participants; especially when they have
44 certain features, such as being well-designed, easy to use, well optimized for searches, a quick
45 startup time, responsive, and a focused purpose. The results of this study partially confirm a
46 review study [30] that showed data export and communication are some of the most common
47 features of mobile diabetes applications. However, the same study noted that personalized
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3 education is an underrepresented feature. The participants particularly welcomed a local
4 language educational website.
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8 There are a large number of diabetes apps that have been developed and are available, but
9 many of them are not suited to one's own needs and a number of those lack proper usability
10 and needs orientation [18]. In this study, the researcher tried to identify the educational and
11 technical needs of the target group in order to prepare Internet-enabled services that can help
12 improve the patients' self-care management of the disease.
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16 The results confirmed that there is a mix of barriers to patient education, including what can
17 be interpreted as an inadequate health system with challenging communication interfaces that
18 make it difficult, for diabetics, to use Internet-enabled technology. In addition, low health
19 literacy or inability to identify the need and health information resources results in difficulty
20 to apply disease-related knowledge in daily life. This is an important barrier that has been
21 previously addressed; as researchers have expressed, there is no doubt that development of
22 educational programs is the least expensive and most practical way to meet consumers of
23 health [31]. Some studies have shown other barriers to using digital tools for diabetes
24 management, including cost, insufficient scientific evidence, not useful in certain populations,
25 data protection and data security [19]. Despite many barriers, the digital industry is growing
26 rapidly, and it is estimated that in the future all electronic health record systems will be
27 integrated using a common platform [19].
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31 Research in England shows that only 6.0% of all people with T2D have been offered a
32 diabetes self-management educational program that could help them take action against the
33 chronic disease [15]. In Iran, based on the PDSME [26], researchers will offer and use this
34 educational program by making use of new technology for improving the daily life of people
35 with diabetes.
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39 Our study demonstrates that despite the significant amount of work needed in Iran to
40 understand patients' needs and to design technology to best serve these needs, new
41 technology can serve as a catalyst for change. Research continues to provide evidence that an
42 online diabetes self-management program is acceptable for diabetics [32] and that mobile
43 phones can help improve self-management behaviour [33].
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3 The results of this research have identified patient-tailored information, interactivity, content
4 credibility, clear presentation of content, use of multimedia and language contextualization as
5 essential design features of technology directed at patient education of chronic disease
6 management in an Iranian population. Our findings confirm those of earlier research [34].
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10 **Limitations**

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12 A limitation of this study is that the sample was selected from one diabetic clinic in a large
13 city, and therefore the findings may not be transferable to a broader diabetic population.
14 However, our results are useful for middle-income and middle-eastern countries, which have
15 a similar culture, similar problems for diabetic patients and similar problems with technology
16 penetration.
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21 **Conclusion**

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23 The patients' needs and technology design features resulting from this research are essential
24 for designing functional mock-ups of a personalized diabetes education that the researchers
25 will use in the next phase of the study. Through design-based research, the researchers will
26 design Internet-enabled educational material for self-care management of diabetic patients in
27 Iran. Our objective is to reach diabetics with empirically designed Internet-enabled learning
28 services that are clinically relevant and that can help improve the patients' self-care
29 management of the disease.
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37
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39 who supported this study. The authors also thank all participants and staff at the Mashhad
40 Diabetes Clinic for their cooperation in conducting this research.
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46 conducted interviews and analyzed the data, drafted the manuscript and prepared the tables.
47 HKM conducted data analysis and edited the manuscript. NZ assisted in the design of the
48 study and edited the manuscript. IM assisted in the design of the study, drafted and edited the
49 manuscript. All authors were involved in writing the paper.
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56 **Competing interests:** None declared.
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Patient consent: Obtained

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Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

Domain 1: Research team and reflexivity			Responses	Page number
Personal Characteristics				
1.	Interviewer/facilitator	Which author/s conducted the interview?	Javad Jafari	1
2.	Credentials	What were the researcher's credentials?	MD	6
3.	Occupation	What was their occupation at the time of the study?	PhD student	6
4.	Gender	Was the researcher male or female?	Male	6
5.	Experience and training	What experience or training did the researcher have?	Experience as a physician in the clinic and training about how to do qualitative research	6
Relationship with participants				
6.	Relationship established	Was a relationship established prior to study commencement?	No	
7.	Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	Reasons for doing the research	6
8.	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	Interviewer was a MD who knows the diabetic patients complications and interested to help them	6
Domain 2: study design				
Theoretical framework				
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study?	Design-based research and content analysis	5, 6
Participant selection				
10.	Sampling	How were participants selected?	Purposive	6
11.	Method of approach	How were participants approached?	Face-to-face	6

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12.	Sample size	How many participants were in the study?	Nine diabetic patients	6, 7
13.	Non-participation	How many people refused to participate or dropped out? Reasons?	One person because he did not like to sign the consonant form	7
Setting				
14.	Setting of data collection	Where was the data collected?	In the clinic	7
15.	Presence of non-participants	Was anyone else present besides the participants and researchers?	No	
16.	Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	gender, age, occupation and educational background	6
Data collection				
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	They pilot tested with one patient	7
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many?	No	
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data?	Yes, he used audio recording	6
20.	Field notes	Were field notes made during and/or after the interview?	During the interview	7
21.	Duration	What was the duration of the interviews or focus group?	30 to 45 minutes	6
22.	Data saturation	Was data saturation discussed?	Yes	7
23.	Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No	
Domain 3: analysis and findings				
Data analysis				
24.	Number of data coders	How many data coders coded the data?	207 codes	8

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25.	Description of the coding tree	Did authors provide a description of the coding tree?	Yes	7
26.	Derivation of themes	Were themes identified in advance or derived from the data?	Derived from the data	7, 8
27.	Software	What software, if applicable, was used to manage the data?	Researcher did not use software	
28.	Participant checking	Did participants provide feedback on the findings?	No	
Reporting				
29.	Quotations presented	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.g. participant number	Yes	7
30.	Data and findings consistent	Was there consistency between the data presented and the findings?	Yes	8
31.	Clarity of major themes	Were major themes clearly presented in the findings?	Yes	8
32.	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Yes	8