

# Interest in the Use of Computerized Patient Portals: Role of the Provider–Patient Relationship

Susan L. Zickmund, PhD<sup>1,2,3,8</sup>, Rachel Hess, MD, MSc<sup>2,3</sup>, Cindy L. Bryce, PhD<sup>2,3,4</sup>, Kathleen McTigue, MD, MS, MPH<sup>2,3,5</sup>, Ellen Olshansky, DNSc, RNC, FAAN<sup>6</sup>, Katharine Fitzgerald, MID<sup>3,7</sup>, and Gary S. Fischer, MD<sup>2</sup>

<sup>1</sup>Center for Health Equity Research and Promotion, VA Pittsburgh Healthcare System, 151C-U, University Drive C, Pittsburgh, PA 15240, USA; <sup>2</sup>Division of General Internal Medicine, Department of Medicine, University of Pittsburgh, Pittsburgh, PA, USA; <sup>3</sup>Center for Research on Health Care, University of Pittsburgh, Pittsburgh, PA, USA; <sup>4</sup>Department of Health Policy and Management, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA, USA; <sup>5</sup>Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA, USA; <sup>6</sup>Program in Nursing Science, University of California, Irvine, CA, USA; <sup>7</sup>Department of Behavioral and Community Health Sciences, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA, USA; <sup>8</sup>Department of Communications, University of Pittsburgh, Pittsburgh, PA, USA.

**BACKGROUND:** Bioinformatics experts are developing interactive patient portals to help those living with diabetes and other chronic diseases to better manage their conditions. However, little is known about what influences patients' desires to use this technology.

**OBJECTIVE:** To discern the impact of the provider–patient relationship on interest in using a web-based patient portal.

**DESIGN:** Qualitative analysis of focus groups.

**PARTICIPANTS:** Ten focus groups involving 39 patients (range 2–7) recruited from four primary care practices.

**APPROACH:** A qualitative approach was used, which involved reading transcribed texts until a consensus was reached on data interpretation. An intercoder reliability kappa score (0.89) was determined by comparing the provider–patient relationship talk selected by the two coders. A conceptual framework was developed, which involved the development and refinement of a codebook and the application of it to the transcripts.

**RESULTS:** Interest in the portal was linked to dissatisfaction with the provider–patient relationship, including dissatisfaction with provider communication/responsiveness, the inability to obtain medical information, and logistical problems with the office. Disinterest in the portal was linked to satisfaction with the provider–patient relationship, including provider communication/responsiveness, difficulty in using the portal, and fear of losing relationships and e-mail contact with the provider. No patient identified encrypted e-mail communication through the portal as an advantage.

**CONCLUSIONS:** Promoting the use of computerized portals requires patient-based adaptations. These should include ease of use, direct provider e-mail, and reassurances that access and interpersonal relationships will not be lost. Education is needed about privacy concerns regarding traditional e-mail communication.

**KEY WORDS:** patient portal; bioinformatics; provider–patient communication; diabetes; e-mail communication.

J Gen Intern Med 23(Suppl 1):20–6  
DOI: 10.1007/s11606-007-0273-6  
© Society of General Internal Medicine 2007

## INTRODUCTION

Medical practitioners, patients, and researchers are calling for the introduction of new technologies that will increase patient knowledge and self-management of their conditions and improve their health outcomes.<sup>1–3</sup> Nowhere is the call more urgent than the area of diabetes management.<sup>4</sup> Studies have shown that nearly 800,000 individuals each year receive a diagnosis,<sup>5</sup> which can lead to substantial morbidity.<sup>6,7</sup> The incidence and severity of complications can be reduced through tight metabolic control, something that can be attained through strict patient self-management.

Bioinformatics experts are in the process of developing interactive patient portal programs to help persons living with diabetes and other chronic diseases to use web-based systems to monitor their health.<sup>8–11</sup> Portals can allow patients to view their electronic health record, receive laboratory test results, and communicate electronically in a secure manner with their providers' office.<sup>9</sup> However, little is known about patients' attitudes toward this technology and what elements might potentially enhance their interest in its use.<sup>12</sup> Whereas studies have demonstrated that patients have embraced e-mail communication with their health care providers, it is less clear whether they are willing to learn to use the new bioinformatics programs that are being developed, let alone to pay for such services.<sup>13–15</sup> Currently, little is known about the impact that the traditional provider–patient relationship might have on patients' desires to use this technology.<sup>16</sup> Given the current push to develop educational patient portals, we raised the question of whether the provider–patient relationship might impact individual interest in using patient portals. We conducted focus group discussions with participants living with diabetes to enable us to better understand their motivations for using a patient education portal and the relationship this motivation could have on their current satisfaction with their provider.

## APPROACH

### Patient Portal

In 2005, the University of Pittsburgh Medical Center (UPMC) implemented UPMC HealthTrak, building upon a pilot portal. My UPMC, the pilot, originally offered online information, laboratory results, and an encrypted and secure method for e-mailing messages.<sup>9</sup> The enhanced HealthTrak portal included features to support patients living with diabetes, including online tracking of patient entered glucose, blood pressure, and physical activity. The portal was promoted to patients living with diabetes in two internal medicine and two family medicine practices in the greater Pittsburgh area.

### Focus Group Participants

To be eligible for the study, individuals in the participating practices were required to have a diagnosis of diabetes, be over the age of 21 years, and able to speak English. We recruited a total of 39 focus group participants in two waves (mean number of participants per group 4, range 2–7). In the first wave, *preportal* participants were recruited ( $n=21$ ) between August 2004 and January 2005, before UPMC HealthTrak was launched. Hence, none of the preportal participants had prior exposure to or familiarity with the diabetes portal. These participants were recruited through the practices scheduled to participate in UPMC HealthTrak using posters, flyers, and referrals from clinicians and diabetes educators. Participants recruited in the second wave (*postportal*) consisted of individuals ( $n=18$ ) enrolled in UPMC HealthTrak, who responded to an e-mail message sent to everyone who registered for UPMC HealthTrak. These participants participated in focus group discussions between August 2005 and January 2006. As part of a health systemwide initiative, this project was approved as a quality improvement project by the UPMC Total Quality Counsel, which is recognized by the University of Pittsburgh Institutional Review Board for this purpose. Participants recruited into the study in both waves were compensated \$25 for their time.

### Discussion Guide

A single moderator conducted all of the focus group discussions with a note taker recording which participants stated specific remarks. The moderator introduced the same set of topics to each group. The topics included living with diabetes, educational information considered most useful, current sources of information, the relationships with providers, feedback related to the diabetes patient portal, and attitudes about funding the portal. The moderator began by providing participants the general rules for the discussion before proceeding with questions (see Appendix). Prompts were given throughout the focus groups to facilitate discussion, redirect talk, allow participants the opportunity to speak, and resolve any conflicts that might occur.

### Qualitative Analysis

All focus groups were transcribed verbatim from the audiotapes by a professional transcriptionist with experience in focus groups and qualitative interviews. One focus group

involving seven participants (first focus group) was recorded using a defective audio recorder and was excluded from the analysis. The remaining focus group transcripts were used for the qualitative analysis. The transcripts were checked against the original tapes for accuracy by the focus group moderator and then deidentified for presentation of data analysis.

For the coding, the group used what Miller and Crabtree<sup>17</sup> define as an “editing” methodology, which involved three main steps: (1) an initial naïve approach toward the transcripts, with an emphasis on avoiding preconceptions and prejudgments; (2) a search for meaningful content or “units of text” considered important and relevant to the topic; and (3) a process of sorting and categorizing these units of text into codes, analytically applying the codes to the transcriptions, and reporting them in the results section.

The authors began the first step by reading the focus group transcripts and discussing what they viewed as key topics. After an initial reading, they found frequent discussions of the importance of the relationships participants had with their providers. Two investigators, one an expert in doctor–patient communication and qualitative research (SZ) and another in patient portal technology within the clinical encounter (GF), decided to focus on the research question: What impact might these therapeutic relationships have on participants’ interest in using the diabetes portal? After developing this focus, the two coders (SZ and GF) followed Miller and Crabtree’s second step and noted all meaningful units of text related to provider–patient communication. Within this step, each coder separately marked those passages involving provider–patient communication and its relationship to the portal. This process was then used in the calculation of intercoder reliability (see below).

During this stage the coders noted strikingly different patterns in how participants described the office nurses, receptionists, and staff personnel in comparison to the diabetes educators. The office staff was viewed as part of the medical provider’s team, whereas the diabetes educators were viewed as independent providers. For this reason, a coding decision was made to examine diabetes educators in a separate analysis.

**Codebook and Coding Definitions.** The coders next followed Miller and Crabtree’s third step where units of text were formed into codes, noting specific passages related to having satisfying or dissatisfying provider–patient relationships as well as having an interest or disinterest in using the portal. The focus of this final step in the qualitative analysis was at the level of the participant’s viewpoint. The coders read across the focus groups with the goal of understanding the views of each participant in terms of the satisfaction/dissatisfaction with their provider and the interest/disinterest in using the portal. Given our research focus on portal use in light of the provider–patient relationship, those participants who both expressed satisfaction/dissatisfaction with their provider relationship, as well as statements about their interest/disinterest in using the portal, became the chief textual data for our analysis.

In this step, the *provider–patient relationship* code was defined as involving discussions of satisfaction or dissatisfaction with the communication and information sharing they experienced with their medical provider. This included *direct* communication (including face-to-face, telephone, written communication, and e-mail) and *indirect* communication (through office staff and nurses working with the provider).

An operational definition was used of *provider* as the person who the participant described as their primary medical provider for their diabetes.

To help further refine the codebook, the coders turned to a definition of the codes *satisfaction* or *dissatisfaction* with the provider–patient relationship that was based upon the team’s previous qualitative work.<sup>9,18,19</sup> The presence of relationship satisfaction/dissatisfaction was operationally defined as a positive/negative judgment about the interaction with a provider charged with treating the participant’s diabetes. Consistent with theories of qualitative coding, examples would be counted regardless of where they occurred in the course of the focus group.<sup>20</sup> As the topic focused on the provider–patient relationship, the following descriptions were *excluded* from the *relationship* code: (1) communicative problems with pharmacists, diabetes educators, and others who were unrelated to the their provider or their offices; (2) financial problems unrelated to the relationship with the provider; and (3) difficulties with providers related to any other diseases outside of diabetes, unless it had some direct bearing on the care the participant received for that condition.

The coders defined the codes relating to *interest* and *disinterest* in using the portal as being specifically related to the UPMC HealthTrak. The *interested* code was used for statements involving the intent to use the system or some praise for the portal. Participants who expressed interest in the system, but who had difficulties in finding internet access or who were uninterested in paying for the service were still defined as interested. Intent to use only other electronic forms of communication not including the HealthTrak portal (such as other web sites or patient portals) were excluded from the interested code. The *disinterested* code was used when participants stated that they did not like the portal, were not interested in using it, or would not invest the effort to learn the program.

**Intercoder Reliability.** The second step (see above) of the Miller and Crabtree method was used for determining intercoder reliability. Here each coder separately marked segments of texts related to provider–patient relationship talk in the context of the patient portal. A kappa statistic was used to calculate the intercoder reliability between the two coders at this stage using the total number of lines in all focus group discussions as the total number. The computer software program ATLAS.ti 5.0 (Scientific Software, Berlin, Germany) was used to facilitate the marking of the textual passages related to provider–patient communication, the assignment of codes, the calculation of total lines of text marked, and the conversion of those totals into binary numbers for statistical calculation. The statistics were based on calculations of the following combinations for each line within the focus group transcripts: presence/presence of provider–patient relationship talk as judged by the two coders, presence/absence, absence/presence, and absence/absence. The kappa score was 0.89, or what Landis and Koch<sup>21</sup> describe as “almost perfect” agreement.

## RESULTS

### Participant Characteristics

Characteristics of the focus group participants are summarized in Table 1. Participants were mostly white (72%) with a

mean age of 54 years (SD 12). About one half of the samples were men (51% men), well educated, and with more than 80% having some secondary education. The average length of time living with diabetes was 10 years. Over three fourth of the sample owned a computer, with fewer than 20% stating that they had no access to the internet. The two different recruitment waves were similar except for the category of internet access (Table 1), with the postportal wave having a higher rate of access than the preportal wave. All participants came from practices with multidisciplinary teams. However, no survey questions asked about the extent to which they used allied health care members.

### Qualitative Analysis

The coded passages revealed two inversely related themes in our analysis: (1) interest in portal use appeared to be linked to dissatisfaction with the provider–patient relationship, whereas (2) disinterest in portal use appeared to be linked to satisfaction with the relationship.

- 1 Linkage between interest in portal use and dissatisfaction with the patient–provider relationship  
Those participants who had dissatisfying relationships with their providers saw the portal as a means of gaining knowledge or control over their diabetes. Several sub-themes emerged in our analysis that helped to explain this association.
  - 1.1 Communication and responsiveness of provider: Having problems interacting with the provider caused participants to appear more open to using the patient portal. One participant described himself as being dissatisfied: “But my own physician did not make any information available to me. She just said ‘You have diabetes. You need to do this. Take this’.... I had to look for the information, and the diabetes education, and all that on my own.” To provide further explanation, this participant noted that “when I start talking nutrition [with the provider]...it’s almost like I’m not saying anything or I’m just saying ‘blah, blah, blah.’ It’s like she’s not even listening at that point.”
  - 1.2 Access to information: The difficulty in obtaining needed medical information emerged as another issue that participants struggled with. In discussing the interest in using the patient portal, the above participant noted: “Actually, it seems great to me because the first-one of the first things on there is the lab results.” Another patient concurred: “It’s a hassle to get my blood results. It’s just a hassle to do everything and I would appreciate [the benefits of the patient portal system].” This woman later went on to describe the portal system as “absolutely great,” adding: “Do you know how difficult it is to get my lab results? It’s like signing a congressional amendment or something.” The concerns went beyond access to data, as some participants hoped for more detailed background information. Referring to the glycosylated hemoglobin, one patient hoped that the portal “will give you a better explanation there than maybe the doctor gave you. Because all my doctor said was ‘It’s a three month average of your glucose.’ And I’m like: how do they get a three-month average from one day’s test? You know, I didn’t understand. It baffled me.”

Table 1. Characterization of Focus Group Participants (n=39), All Participants, Preportal Wave 1, and Postportal Wave 2

	All participants (n = 39)	Preportal Wave 1 (n = 21)	Postportal Wave 2 (n = 18)	P value
Male sex (%)	20 (51)	10 (48)	10 (56)	0.6319
Mean age (SD)	54 (12)	53 (13)	55 (11)	0.7030
Nonwhite race (%)	11 (28)	7 (33)	4 (22)	0.4553
Highest level of education (%)				0.2240
High school graduate	7 (18)	6 (29)	1 (6)	
Some college	12 (31)	7 (33)	5 (28)	
College graduate	6 (15)	2 (10)	4 (22)	
Post graduate degree	14 (36)	6 (29)	8 (44)	
Mean years since diagnosis (SD)	10.2 (9)	9.7 (9)	10.8 (9)	0.7242
Newly diagnosed (< 5 years) (%)	17 (44)	11 (52)	6 (33)	0.2429
Own a computer (%)	30 (77)	13 (62)	17 (94)	0.3922
Source of Internet access (%)				0.0510
Home	13 (33)	6 (29)	7 (39)	
Work	2 (5)	1 (5)	1 (6)	
Both	15 (38)	6 (29)	9 (50)	
Other (e.g., library)	2 (5)	1 (5)	1 (6)	
Not applicable (no access)	7 (18)	7 (33)	0	
Mean months on HealthTrak (SD)			8.1 (8)	

P values indicate the significance of differences between preportal and postportal subjects using t tests for means or proportions of continuous variables (sex, age, nonwhite race, years since diagnosis, own a computer) and Fisher's exact test for categorical variables (education, source of internet access)

1.3 Logistical problems with office communication: Relationship problems occurred even indirectly when participants were unable to gain access because of problems with office staff. One woman stated: "I would rather use [the portal] than go through the office. And it's nothing personal against the ladies in the office. They have a tough job to do. But I've had more than one occasion of either messages not getting to [the provider] or not getting to him as quickly as I would have liked.... I've waited two and three days for things, which grates on my nerves." Another woman was enthusiastic about the patient portal, as she complained about the impenetrability of the provider's office: "I've thought about changing my physician because he's hard to get to." She explained: "I had to call the office

several times with problems and questions, but I get this nurse and that's as far as I go. She'll say 'I'll ask him.' And then she'll call back and say.... 'You don't need to come in.' Well, that's why I haven't been able to see him."

2 Linkage between disinterest in portal use and satisfaction with the patient-provider relationship  
Conversely, participants with a satisfying provider-patient relationship appeared less in need of the patient portal. Again, several themes emerged.

2.1 Communication and responsiveness of provider: One key reason for appearing less motivated to use the portal was the satisfaction participants expressed in their therapeutic relationship. One participant shared his enthusiasm



for his healthcare team: "I don't have a problem. I know [medical provider X is] in every Wednesday and I can give her a call and talk to her if I have to.... I keep a log of all of my blood sugars on my computer and I e-mail it to her every month or six weeks. And she normally responds with an e-mail saying 'you're doing well, and your numbers look good,' or whatever." Thus, the participant had few needs and therefore little desire for a new system. In discussing the features and costs of using the patient portal, this participant noted: "I already e-mail my own testing and I don't have any trouble getting lab results. I get my blood drawn routinely the first Monday of every month and the same afternoon my doctor calls me with the results."

- 2.2 Barriers to learning the system: The time required to learn the portal system appeared problematic to participants with a satisfactory provider relationship. One participant satisfied with the communication with her physician found the system too difficult to use. The woman said that she had the desk number for her provider and that "my doctor sends the results of my blood levels. He tells if my blood level is, if it's good or bad." When asked about her views on using the portal she described herself as "computer illiterate" and asked: "Hope you can still obtain things by phone call. Not to be outdated, folks...it's harder for me to learn stuff like that.... I prefer to do it the way I'm doing it now, if I can."
- 2.3 Fear of losing relationships: Some participants valued their choices of how to communicate, and were concerned that the portal might cause them to lose those choices. One woman responded to a question about the advantages of the portal, stating that she already had the benefits by being able to "pick up the phone, call my doctor." In elaborating, she added: "I think I feel that way though because I have a good communication with both my doctors and nurses, you know. So sometimes I like to talk to them. It's a change in my day. I'm not talking to the same people all the time, you know. I like the nurses. I like the doctors." Another participant worried about the impact of such technology on the core relationships that patients rely on in the health care environment: "So my fear is that the personal stuff, the ability to pick up the phone and talk to the nurse, starts to get in jeopardy as we are starting to find ways of communicating with health care to displace the person-to-person contact. So, you know, I have apprehension about using [the patient portal] that it at some point in time it will reduce my ability to have a more personal contact with the health care system."
- 2.4 Use of e-mail outside the portal: A subtext to many of the comments involved the participants and their attitudes toward e-mail. Whether described positively as enhancing communication or negatively as a fear of loss of this mode of communication, participants' e-mail contact with their provider was seen as a reason for not needing the new system. One woman stated her concern that using the designated e-mail function in the new portal—which did not offer direct e-mail contact with their physician, but rather a general medical advice category first routed to a nurse—might make her relationship with her provider worse: "[My provider and I] already communicate through e-mail and that works. Now if I'm getting

thrown into this HealthTrak thing with my e-mails, does that mean they're going to get put on a lower level or something? Because I know what I do now works." Because of the indirect routing of the e-mails, one participant raised concern about who in the office would be reading the e-mail messages sent over the portal. However, none of the participants mentioned the increased security of messages sent over the encrypted portal as an advantage over that of their regular e-mail system.

## DISCUSSION

With the widespread use of electronic e-mail communication, health care experts are increasingly interested in employing newer technology to improve and lower the costs associated with medical care.<sup>22,23</sup> Whereas our study of a patient portal is consistent with this trend,<sup>24</sup> our results also highlight the importance of the more traditional interactions that exist between providers and patients. A good relationship with providers and the ready availability of advice and feedback that it brings diminished the perceived utility of the patient portal.

Recent studies have found that patients have adapted to the introduction of technologies, such as telemedicine and e-mail.<sup>25,26</sup> Despite privacy concerns, e-mail messages are perceived as an attractive option to communicate with health care providers, as shown by a high percentage of patients in favor of using e-mail to interact with physicians in other studies.<sup>27,28</sup> Participants appeared more willing to branch out to alternative methods of computer-based communication, such as the patient portal, if they had a dissatisfying relationship with their provider.<sup>29</sup>

Importantly, some participants in our study were worried that the use of the portal would gradually erode their ability to communicate with their health care team. The suspicion of the portal supports the relative importance participants place on the traditional patient-provider relationship, as they continued to send messages to their providers directly rather than wanting to rely on a portal system, such as our HealthTrak, which processed e-mail messages without a specific provider "send to" designation.<sup>14</sup> Interestingly, study participants did not express concerns about confidentiality as either an advantage of the new portal or a disadvantage of the current e-mail system. It might be, as Moyer et al.<sup>22</sup> and Hassol et al.<sup>25</sup> suggest, that patients either do not understand the lack of privacy in traditional e-mail or they do not care. Either way, the promise of a more secure and encrypted form of communication appeared to add little in terms of motivating participants to use the new portal system.

This study is limited in that it provides the views of self-selected participants in focus group discussions conducted during two different waves (pre- and postportal) in the implementation of a patient portal. As is true with all focus groups, the information here was self-reported and is constrained by the conversations within which it occurred. Participants were also largely from an urban area. Studies demonstrate unique challenges for patients in rural environments. In this case, even a satisfactory provider relationship may not be a barrier to portal use.<sup>30,31</sup> Our sample was also younger and more highly educated than the population with

diabetes that was sampled in the national NHANES III trial, reflecting the bias of those interested in discussing computer technologies.<sup>32</sup> Our sample was heterogeneous in terms of their years living with diabetes.<sup>32</sup> We also did not capture the participants' use of multidisciplinary health care teams. In addition, for the postportal focus groups, we specifically recruited participants interested in discussing a computerized patient portal. Therefore, the sample may be skewed toward those interested in adopting new technologies. However, even within this wave, we found that participants with satisfactory clinical relations appeared less interested in using the patient portal. Thus, our sample may actually understate the affect that a satisfying provider relationship might have in terms of reducing portal use.

In conclusion, there are substantial societal interests in developing computer programs designed to facilitate contact between patients and their health care teams.<sup>33–35</sup> A patient portal with information, such as laboratory values and general advice, can function as a valuable resource for patients.<sup>36</sup> However, it cannot replace the provider–patient relationship, which can offer both personal interaction and individualized advice. Considering the costs associated with the implementation of patient portals and the current mixed results,<sup>37–40</sup> further studies are needed to determine their impact on the quality of care. As the provider–patient relationship can affect the use of the portal, studies should include detailed assessments of interactions at the different implementation phases. Future studies should also consider collecting information on attitudes providers have toward patients' use of portal technology. Few studies focus on provider attitudes toward patients' use, examining instead medical practitioners' practice patterns.<sup>41–43</sup> For those that have, the results have been mixed. Some studies have found a positive provider view,<sup>44–46</sup> whereas others have shown concerns about the uncompensated burdens of communicating with patients via e-mail.<sup>24,25,47</sup>

Developers of such systems should also take into account the needs of patients. Our study indicates that options such as direct provider e-mail may reduce patient reluctance to use the system. Others and we also found that patients have few concerns about the loss of privacy that can occur within traditional e-mail.<sup>22, 25, 48</sup> Further patient education about the importance of secure, encrypted e-mail may entice reticent individuals to increase their portal use. Finally, further work is needed to understand the impact of portal technology on issues involving a “digital divide.”<sup>49</sup> It is unclear whether the portal may empower those with limited resources and transportation difficulties to better control their disease, or whether the lack of access to the technology itself will instead widen racial and economic disparities. One can only hope that with increased services that all patients may reap the benefits that such bioinformatics technology can provide.

---

**Acknowledgements:** This research was sponsored with funding from the Veterans Administration Health Services Research and Development Merit Review Entry Program Career Development Award and the U.S. Air Force and administered by the U.S. Army Medical Research Acquisition Activity, Fort Detrick, Md (award number W81XWH-04-2-0030).

**Conflict of interest statement:** None disclosed.

**Corresponding Author:** Susan L. Zickmund, Ph.D.; Center for Health Equity Research and Promotion, VA Pittsburgh Healthcare System, 151C-U, University Drive C, Pittsburgh, PA 15240, USA (e-mail: Susan.Zickmund@med.va.gov).

## APPENDIX

### Discussion Topics for the Focus Groups

*(Italicized question denotes direct triggers of provider–patient communication discussion.)*

Major topics:

1. What is it like for you living with diabetes?
2. Because you have been diagnosed with diabetes, what positive changes if any have occurred in your life?
3. What's different about diabetes than other chronic diseases?
4. Tell me about your experiences with diabetes education groups.
5. What kinds of information do you want/need about diabetes?
6. How, if at all, has HealthTrak affected your management or control of your diabetes?
7. How would you describe your experiences in using HealthTrak?
8. *What is it like for you to communicate with your physician or other health care providers using HealthTrak to communicate with your physician?*
9. How would you compare HealthTrak with other ways that you have tried to get information about diabetes?
10. If you were going to grade the HealthTrak what kind of grade would you give it and why?
11. How do you feel about participating in the HealthTrak?
12. We are trying to understand the value of HealthTrak to its users. There are different components that you may find more or less valuable. If you had to provide a monthly dollar amount for how much you value a particular component of the HealthTrak system, how much would you say (1) for having access to your laboratory results; (2) for having access to messaging with your physician; and (3) for the tools that help you track and manage your blood sugars, weight, and exercise? Is it worth it to you? If the choice was not having the service or paying for messaging, is it worth it to continue? What is too high?
13. If the hospital requires physicians to subscribe to HealthTrak in order for their patients to use it, would it be worth it for your doctor to purchase it? If your doctor's office found it to be expensive and some of the costs were to be passed on to you, what do you think would be a reasonable amount to pay on a monthly subscription basis? What if a “basic plan” with information links and the ability to review labs were available for free, but access to scheduling and messaging services (e.g., to your physician, the office, or the diabetes educator) had a charge?
14. Overall, would you recommend HealthTrak to a friend?
15. Is there anything you would like to add that was not discussed?

## REFERENCES

1. **Shireman C, Sweat GT, Jebson LR.** 'Tablet' makes for good medicine. Case study: tablet-style computers can enhance physician satisfaction, revenue stream. *MGMA Connex.* 2005;5(10):45-8, 1.
2. **Green CJ, Fortin P, Maclure M, Macgregor A, Robinson S.** Information system support as a critical success factor for chronic disease management: necessary but not sufficient. *Int J Med Inform.* 2006;75(12):818-28.
3. **Audet AM, Doty MM, Peugh J, Shamasdin J, Zapert K, Schoenbaum S.** Information technologies: when will they make it into physicians' black bags? *MedGenMed.* 2004;6(4):2.
4. **Sciamanna CN, Gifford DR, Smith RJ.** Design and acceptability of patient-oriented computerized diabetes care reminders for use at the point of care. *Med Inform Internet Med.* 2004;29(2):157-68.
5. **United States Renal Data System.** Diabetes statistics in the United States. 99-3892. USA: NIDDK; 1999
6. **Smith NL, Maynard C.** The burden of diabetes-associated cardiovascular hospitalizations in Veterans Administration (VA) and non-VA medical facilities. *Diabetes Care.* 2004;27(suppl 2):B27-32.
7. **Mayfield JA, Reiber GE, Maynard C, Czerniecki J, Sangeorzan B.** The epidemiology of lower-extremity disease in veterans with diabetes. *Diabetes Care.* 2004;27(suppl 2):B39-44.
8. **Ormandy P, Vlamincck H, Harrington M, Forest M, Visser R.** A new internet resource for chronic kidney disease patients. *EDTNA/ERCA J.* 2006;32(1):63-6.
9. **Hess R, Bryce CL, McTigue K, et al.** The diabetes patient portal: patient perspectives on structure and delivery. *Diabetes Spectr.* 2006;92(2):106-10.
10. **Jaffery JB, Becker BN.** Evaluation of eHealth web sites for patients with chronic kidney disease. *Am J Kidney Dis.* 2004;44(1):71-6.
11. **Calderon JL, Zadshir A, Norris K.** A survey of kidney disease and risk-factor information on the World Wide Web. *MedGenMed.* 2004;6(4):3.
12. **Liederman EM, Morefield CS.** Web messaging: a new tool for patient-physician communication. *J Am Med Inform Assoc.* 2003;10(3):260-70.
13. **Baur C.** Limiting factors on the transformative powers of e-mail in patient-physician relationships: a critical analysis. *Health Commun.* 2000;12(3):239-59.
14. **Goodyear-Smith F, Wearn A, Everts H, Huggard P, Halliwell J.** Pandora's electronic box: GPs reflect upon email communication with their patients. *Inform Prim Care.* 2005;13(3):195-202.
15. **Bergmo TS, Wangberg SC.** Patients' willingness to pay for electronic communication with their general practitioner. *Eur J Health Econ.* 2006.
16. **Andreassen HK, Trondsen M, Kummervold PE, Gammon D, Hjortdahl P.** Patients who use e-mediated communication with their doctor: new constructions of trust in the patient-doctor relationship. *Qual Health Res.* 2006;16(2):238-48.
17. **Miller W, Crabtree BF.** Primary care research: a multi typology and qualitative road map. In: **Crabtree BF, Miller WL, eds.** *Doing Qualitative Research.* London: Sage Press; 1992.
18. **Zickmund S, Hillis SL, Barnett MJ, Ippolito L, LaBrecque DR.** Hepatitis C virus-infected patients report communication problems with physicians. *Hepatology.* 2004;39(4):999-1007.
19. **Zickmund SL, Blasiole JA, Brase V, Arnold RM.** Congestive heart failure patients report conflict with their physicians. *J Card Fail.* 2006;12(7):546-53.
20. **Dey I.** *Qualitative Data Analysis: a User-friendly Guide for Social Scientists.* London: Routledge; 2003.
21. **Landis JR, Koch GG.** The measurement of observer agreement for categorical data. *Biometrics.* 1977;33(1):159-74.
22. **Moyer CA, Stern DT, Dobias KS, Cox DT, Katz SJ.** Bridging the electronic divide: patient and provider perspectives on e-mail communication in primary care. *Am J Manag Care.* 2002;8(5):427-33.
23. **Liederman EM, Lee JC, Baquero VH, Seites PG.** The impact of patient-physician Web messaging on provider productivity. *J Healthc Inf Manag.* 2005;19(2):81-6.
24. **Katz SJ, Nissan N, Moyer CA.** Crossing the digital divide: evaluating online communication between patients and their providers. *Am J Manag Care.* 2004;10(9):593-8.
25. **Hassol A, Walker JM, Kidder D, et al.** Patient experiences and attitudes about access to a patient electronic health care record and linked web messaging. *J Am Med Inform Assoc.* 2004;11(6):505-13.
26. **Goldman RD, Macpherson A.** Internet health information use and e-mail access by parents attending a paediatric emergency department. *Emerg Med J.* 2006;23(5):345-8.
27. **Liederman EM, Lee JC, Baquero VH, Seites PG.** Patient-physician web messaging. The impact on message volume and satisfaction. *J Gen Intern Med.* 2005;20(1):52-7.
28. **Bergmo TS, Kummervold PE, Gammon D, Dahl LB.** Electronic patient-provider communication: will it offset office visits and telephone consultations in primary care? *Int J Med Inform.* 2005;74(9):705-10.
29. **Grazi GL.** Web relationships between physicians and individuals seeking information on hepatopancreatobiliary diseases. *Arch Surg.* 2006;141(12):1176-82.
30. **Pathman DE, Ricketts TC, III, Konrad TR.** How adults' access to outpatient physician services relates to the local supply of primary care physicians in the rural southeast. *Health Serv Res.* 2006;41(1):79-102.
31. **Iezzoni LI, Killeen MB, O'Day BL.** Rural residents with disabilities confront substantial barriers to obtaining primary care. *Health Serv Res.* 2006;41(4 Pt 1):1258-75.
32. **Saydah SH, Fradkin J, Cowie CC.** Poor control of risk factors for vascular disease among adults with previously diagnosed diabetes. *JAMA.* 2004;291(3):335-42.
33. **Graschew G, Roelofs TA, Rakowsky S, et al.** New trends in the virtualization of hospitals—tools for global e-Health. *Stud Health Technol Inform.* 2006;121:168-75.
34. **Bell H.** Going interactive. Once the laggards of interactivity, hospitals are beginning to build Web sites consumers can use. *Healthc Inform.* 2000;17(4):85-2.
35. **Navarro FH, Wilkins ST.** A new perspective on consumer health Web use: "valuegraphic" profiles of health information seekers. *Manag Care Q.* 2001;9(2):35-43.
36. **Farrell SP, Mahone IH, Guilbaud P.** Web technology for persons with serious mental illness. *Arch Psychiatr Nurs.* 2004;18(4):121-5.
37. **Ross SE, Moore LA, Earnest MA, Wittevrongel L, Lin CT.** Providing a web-based online medical record with electronic communication capabilities to patients with congestive heart failure: randomized trial. *J Med Internet Res.* 2004;6(2):e12.
38. **Subramanian U, Fihn SD, Weinberger M, et al.** A controlled trial of including symptom data in computer-based care suggestions for managing patients with chronic heart failure. *Am J Med.* 2004;116(6):375-84.
39. **Oenema A, Brug J, Lechner L.** Web-based tailored nutrition education: results of a randomized controlled trial. *Health Educ Res.* 2001;16(6):647-60.
40. **Cintron A, Phillips R, Hamel MB.** The effect of a web-based, patient-directed intervention on knowledge, discussion, and completion of a health care proxy. *J Palliat Med.* 2006;9(6):1320-8.
41. **Simon SR, Kaushal R, Cleary PD, et al.** Physicians and electronic health records: a statewide survey. *Arch Intern Med.* 2007;167(5):507-12.
42. **Menachemi N, Ettl DL, Brooks RG, Simpson L.** Charting the use of electronic health records and other information technologies among child health providers. *BMC Pediatr.* 2006;6:21.
43. **Menachemi N, Matthews MC, Ford EW, Brooks RG.** The influence of payer mix on electronic health record adoption by physicians. *Health Care Manage Rev.* 2007;32(2):111-8.
44. **Kittler AF, Carlson GL, Harris C, et al.** Primary care physician attitudes towards using a secure web-based portal designed to facilitate electronic communication with patients. *Inform Prim Care.* 2004;12(3):129-38.
45. **Gaster B, Knight CL, DeWitt DE, Sheffield JV, Assefi NP, Buchwald D.** Physicians' use of and attitudes toward electronic mail for patient communication. *J Gen Intern Med.* 2003;18(5):385-9.
46. **Ralston J, Carrell D.** Use and satisfaction of a patient Web portal with a shared medical record between patients and providers. *AMIA Annu Symp Proc.* 2006;1070.
47. **Hussain N, Agyeman A, Das CM.** Access, attitudes, and concerns of physicians and patients toward e-mail use in health-related communication. *Tex Med.* 2004;100(3):50-7.
48. **Hou N, Chui MA, Eckert GJ, Oldridge NB, Murray MD, Bennett SJ.** Relationship of age and sex to health-related quality of life in patients with heart failure. *Am J Crit Care.* 2004;13(2):153-61.
49. **Masucci MM, Homko C, Santamore WP, et al.** Cardiovascular disease prevention for underserved patients using the internet: bridging the digital divide. *Telemed J E Health.* 2006;12(1):58-65.