

Usability of a Patient Portal in Patients with Digital Support Needs: A Think Aloud Study

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Abstract. Patient portals are increasingly used in healthcare as they provide access to health information and support self-management. However, their usability largely depends on patient's digital health literacy. This study assesses patient portal usability among participants with low-digital literacy, by performing concurrent in-situ think-aloud sessions. Furthermore, this study aims to provide insight into how these patients might be best assisted. Participants struggled most with visibility of system status. Participants who received oral instructions experienced less usability problems than those who received paper or no instructions. Embedding such support in practice might improve health care accessibility.

Keywords. User-centered design, usability, think aloud, digital literacy, patient support

1. Introduction

Healthcare systems increasingly rely on digital technologies such as electronic health records and patient portals to facilitate communication, provide access to health information, and support self-management [1]. Patient portals are seen as key enablers of patient engagement and empowerment [2]. However, their actual use is considerably influenced by personal factors and health care delivery factors, such as age, health literacy and patient portal usability [3].

Furthermore, many patients encounter barriers when using patient portals. These barriers include: limited digital literacy, usability issues, and insufficient tailoring of design to diverse end-user needs [4,5]. These challenges are unequally distributed,

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affecting older adults, people with lower educational levels, or those less familiar with technology [6].

To address these challenges, several hospitals in the Netherlands have established helpdesks, so-called Digipoints, where patients can receive direct, personalized support with the patient portal [7,8]. These desks are specifically designed to guide patients through the complexities of the patient portal, such as account creation, login procedures, or locating medical results. By offering step-by-step explanations and hands-on assistance, Digipoints aim to lower the threshold for digital participation in healthcare.

This study examines the usability of a patient portal from the perspective of patients recruited at a Digipoint. By focusing on this group, we aim to uncover usability challenges that may differ from those reported by digitally skilled populations, and to provide insight into how these patients might be best assisted in using a patient portal.

2. Methods

2.1. Study design

An observational usability study was conducted at the Digipoint of the Amsterdam University Medical Center in the Netherlands. The study consisted of a single concurrent think-aloud session including pre-study demographics with participants visiting the Digipoint. Think-aloud is a qualitative method used to evaluate usability, where users verbalize their thoughts, feelings, and actions while performing predefined tasks with the product [9]. This approach provides insight into user's cognitive processes, revealing usability issues, misunderstandings, or points of confusion during interaction with a tool or product [10].

A purposive sampling strategy was used to recruit a representative sample comprising four patients per instruction format [11]. Participants were eligible for inclusion if they: 1) visited the Digipoint for a question regarding the patient portal of Amsterdam UMC, 2) were 18 years or older, 3) used a smartphone.

2.2. Study procedure

One of the researchers (AR, SR, SO) explained the think-aloud session to consenting participants, provided study information, and addressed any questions. The think-aloud sessions were audio and video recorded and moderated by a trained usability expert (AR, SR, SO). Participants were familiarized with the think-aloud procedure through example tasks provided by the moderator. During the session, which took place at Amsterdam UMC, participants completed eight tasks centered around the core purpose: entering home measurements in the patient portal. These tasks included signing into the system; finding 'add your own measurements' via the menu; finding the blue 'add measurements' button; entering the date, glucose and insulin values; saving these values; and signing out. All tasks were based on fictitious data in the test environment and developed with a health-IT expert (RK). All participants completed the same tasks but were randomly assigned to one of three instruction formats: no instruction, instruction on paper, or oral instruction. Participants were randomly provided with either an iPhone or Android. Participants' socio-demographic characteristics assessed included age group, gender, educational level, self-reported health (1=poor, 5=excellent), health literacy (1=poor, 5=excellent), and self-perceived digital skills (1=below average, 5=above average).

2.3. Ethical consent

The Medical Ethics Committee of Amsterdam UMC declared this study as not subject to the human subject act (non-WMO) (METC 2024.0383). Each participant in the think-aloud session received a €10 gift card and a parking voucher.

2.4. Data analysis

All audio recordings were transcribed, and video recordings were analyzed by one researcher (AR); 10% were cross-checked by another researcher (SR) to complement the transcribed audio data. Data was analyzed by both researchers (AR, SR) independently on usability outcomes comprising 1) task performance, and 2) task completion (whether task was successfully completed). During two consensus meetings, identified usability problems were discussed (AR, SR, LP), and classified according to Nielsen heuristics [12].

3. Results

3.1. Socio-demographic characteristics

The study included 12 participants divided into three groups: instruction on paper (n=4), oral instruction (n=4), and no instruction (n=4). The age distribution was predominantly between 60-80 years (n=9), with a smaller representation of ages 40-60 years (n=1) and 80+ years (n=2). The sex distribution was seven males and five females. The majority completed secondary education (n=5). Overall health was self-reported as good (n=5) or reasonable (n=3). Self-reported smartphone literacy was average (n=7) and computer literacy also average (n=8). Tests were performed on either Android or iPhone (both n=6/6). The year of inclusion was 2024 for seven participants and 2025 for five participants.

3.2. Usability problems

Most participants experienced difficulty with visibility of system status, meaning the system did not clearly indicate action outcomes or appropriate next steps. For example, participants were uncertain where to enter their glucose or insulin data, often mistakenly inputting these values into the time allocation boxes instead of the designated value boxes. (1; Table 1). Consequently, the system expected a time format (e.g., 06:00) rather than a glucose value (e.g. 6.0) and would therefore change the value to fit the expected format (5; Table 1). Participants frequently failed to notice these automatic adjustments (6; Table 1).

Participants also experienced difficulty locating the correct buttons due to the excessive amount of information displayed on the screen. This often led to distraction from the primary task and expression of frustration or a desire to abandon the task (8; Table 1)

Furthermore, a quarter of participants were confused by wording they thought was similar to their tasks. When prompted to locate the button 'enter your own

measurements', participants often mistakenly clicked on options such as 'results' or 'sharing your medical history', due to perceived similarity in phrasing (2; Table 1).

3.3. Instruction format comparison

Participants with the instruction format 'no instruction' experienced in total more usability issues than those with 'instruction on paper' (46 vs. 37 encounters), and participants with 'oral instruction' encountered the least amount of issues (34 encounters). The corresponding Nielsen's principles of these issues are shown in Table 1. The number of issues were slightly higher for iPhone users in comparison to Android users (66 versus 51 encounters).

Table 1. Total amount of violations per Nielsen's principle, analyzed by instruction format

Nielsen's heuristics		No instruction	Instruction on paper	Oral instruction
1.	Visibility of system status	22	17	12
2.	Match between the system and the real world	3	7	4
3.	User control and freedom	0	0	0
4.	Consistency and standards	4	2	4
5.	Error prevention	1	0	0
6.	Recognition rather than recall	5	4	1
7.	Flexibility and efficiency of use	6	8	3
8.	Aesthetic and minimalist design	13	14	8
9.	Help users recognize, diagnose and recover from errors	2	2	6
10.	Help and documentation	1	2	1

4. Discussion

Consistent with literature, participants with limited smartphone and computer literacy appeared to experience more challenges in navigating the app and completing the tasks [13]. Organization and presentation of information on the screen highly influenced how participants experienced finding buttons and where to enter data. If tasks took too long, they voiced feelings of frustration and a desire to give up. Task performance was higher among participants who received oral instructions, but they were less successful in recovering from errors, suggesting that a combination of instruction methods may be preferable [14].

4.1. Limitations

A limitation of this study is that five out of twelve tests were conducted in 2024 and the remaining in 2025, resulting in variations in the testing environment. For instance, some usability issues identified in 2024 had been resolved by the provider in 2025.

Moreover, the participants were not the intended end-users, as they were not diabetes patients. This occasionally caused confusion when entering glucose or insulin values, particularly when encountering medical terminology such as *insulin correction* or *mmol/L*.

4.2. Future research

Most participants reported increased confidence in entering values into the system after completing the think-aloud, indicating a degree of learnability. Future research could examine whether, or how, users improve and maintain confidence in using patient portals over time.

5. Conclusions

Patients with limited digital health literacy face distinct usability challenges when interacting with patient portals, particularly when excessive information is presented, or task instructions lack clarity. Structured support via in-person guidance could improve usability outcomes. Embedding such support in routine care, for instance, through case managers or dedicated helpdesks, may reduce digital inequalities and foster more inclusive digital health implementation.

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