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Enhancing HIV Patient Support Through Telehealth: Exploring Design Solutions

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Abstract. In recent years, telemedicine has advanced significantly, offering new possibilities for improving healthcare and patient outcomes. This paper presents a telemedicine app for HIV patients, developed using a human-centered design approach. Designed to meet the diverse and specific needs of Pre-Exposure Prophylaxis (PrEP) users and Late Presenters (LP), the app is part of the COMTRAC-HIV Project at the University Hospital Frankfurt. Through interviews with HIV experts and healthcare professionals, initial design solutions were derived. The paper explores the app's design process, core functionalities, and future directions, aiming to provide comprehensive support for individuals living with HIV.

Keywords. HIV, AIDS, telemedicine, digital health

1. Introduction

In recent years, the field of telemedicine has witnessed remarkable advancements, leveraging technology to improve healthcare delivery and enhance patient outcomes. One area that has gained considerable attention is the support and management of HIV patients. Telemedicine applications have the potential to provide convenient, accessible, and personalized care to individuals living with HIV, addressing various aspects of their healthcare needs [1]. However, a study conducted by Raeesi et al. found that existing HIV apps frequently fall short in meeting the diverse and specific needs of users [2].

This paper focuses on a telemedicine app designed to support HIV patients. The development process employed a human-centered design approach, involving both healthcare providers and the target user group to bridge the gap identified by Raeesi et al. The target user group comprises two categories: Pre-Exposure Prophylaxis (PrEP) users and Late Presenters (LP). PrEP refers to a preventative medication regimen for

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individuals at high risk of contracting HIV, while Late Presenters represent individuals who have been diagnosed with HIV at a later stage.

The result of this paper presents the initial design solutions for the telemedicine app after an iterative interview process with HIV experts. The design solutions aim to cater to a diverse range of patient profiles. The development of this app is being carried out as part of the COMTRAC-HIV (Communication and Tracing App HIV) project at the University Hospital Frankfurt, underscoring the commitment to advancing HIV care and support through innovative technological solutions. COMTRAC-HIV is funded by the Hessian Ministry for Digital Strategy and Development.

2. Methods

The design process involves several stages according to the ISO 9241-210:2019 "Human-centered design for interactive systems", including requirement gathering, design solutions, and iterative testing and refinement [3]. Requirement gathering is only roughly described in this methodology, as the focus of this publication is on the initial design solutions. Iterative testing and refinement will be the subject of future work.

2.1. Requirements

To identify the core functionalities of the app, expert interviews were conducted. In accordance with sample size recommendations for requirement and usability studies, eight potential study participants meeting specific inclusion criteria (i.e., working in an inpatient or outpatient setting for HIV/AIDS patients in Germany, holding a medical degree, and possessing specialist qualification in internal medicine) were invited [4].

These interviews provided valuable insights into the challenges faced by HIV patients and the potential areas where a telemedicine app could offer support. The input from the interviews guided the development team in defining the usage context and the key functionalities to be included in the app. The expert interviews were conducted and reported following the Standards for Reporting Qualitative Research (COREQ) [5].

2.2. Design solutions

Based on the gathered requirements and expert feedback, initial design solutions of the telemedicine app were developed. The development team consisted of medical informaticians, AV, RN, and JS, who collaborated with HIV specialists JC and CS and general practitioners SK and AM. These design solutions encompassed the identified core functionalities and aimed to provide a visual representation of the app's interface, navigation, and user interactions. Design solutions were created using *Figma* prototyping software. The design process incorporated design guidelines according to ISO 9241-110 such as heuristics (rules of thumb), design patterns or style guides [6]. Of note is the use of the Nielsen heuristics to ensure that interfaces adhere to the principles of usability and user-friendliness. Nielsen defines 10 principles, such as system visibility, match between system and reality, user control and freedom, consistency and standards, recognition over recall, and aesthetic and minimalist design. *Natural mapping* aligns interface elements with corresponding actions in an intuitive and logical manner [6].

The designs presented in the results section were created for the user side of the patients. The interface for the clinician side deviates from these designs.

3. Results

The result of the expert interviews and the requirements derived from them are the following four core functionalities of the app and the associated design solutions. The five figures illustrate the user interface of each function and show arrows to indicate the navigation structure. The functions are interconnected through a home screen.

3.1. Symptom diary

The app should have a feature that allows users to record (Fig. 1) and track symptoms (Fig. 2), enabling them to share this information with their healthcare providers.

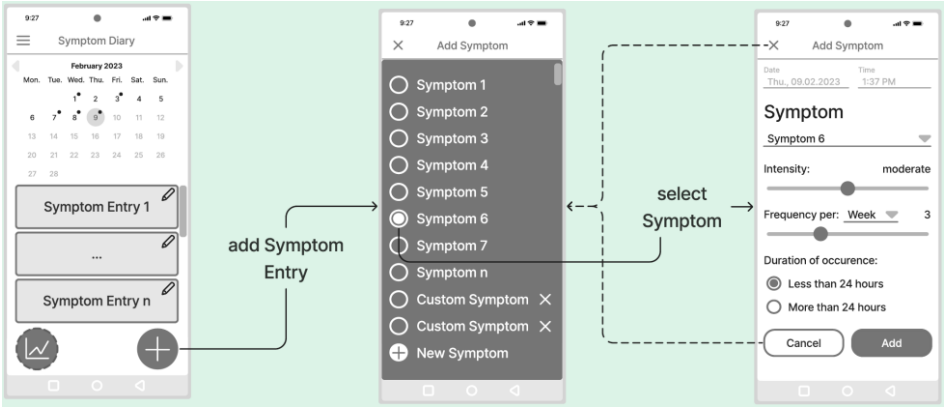

Figure 1. Recording of symptoms with e.g. intensity and frequency in the symptom diary

The symptom diary should be user-friendly, providing an overview of entered symptoms for both users and clinicians. A calendar view can be used to identify days and calendar weeks (CW) on which symptoms have been recorded. Bar graphs are used to visualize the symptomatology, with the intention of adding color in later versions of the app. There is a weekly view of all symptoms as well as an individual symptom view.

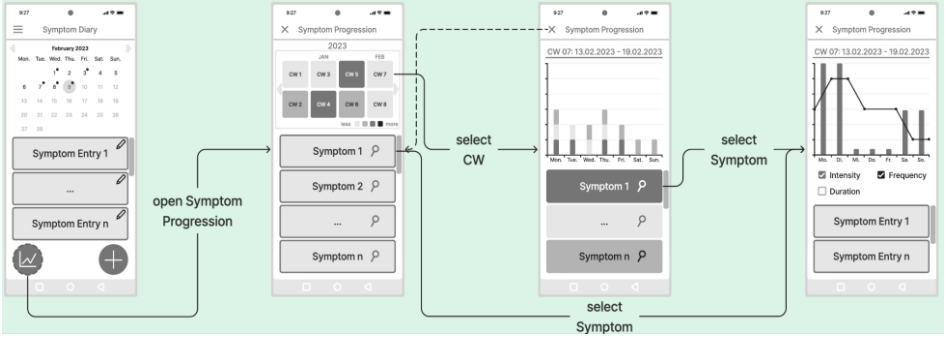

Figure 2. Tracking of symptoms with e.g. insight into calendar weeks (CW) and graphical representation

3.2. Medication plan

The app should include a functionality for users to manage their medications and set reminders for taking them. The feature should be capable of handling complex medication regimens (dosage, type, etc.) and provide customized reminders (Fig. 3).

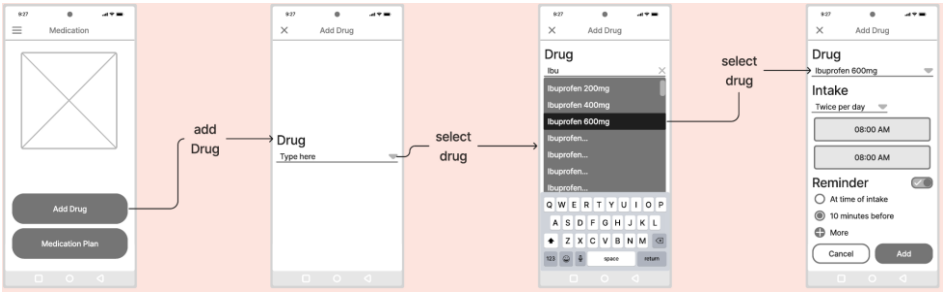

Figure 3. Entry of medication with dose setting, time indication and reminder function

3.3. Chat

The app should have a chat function that allows users to communicate with their healthcare providers for tasks such as ordering prescriptions, managing appointments, and addressing inquiries (Fig. 4). The chat function should be easy to use and ensure quick response times.

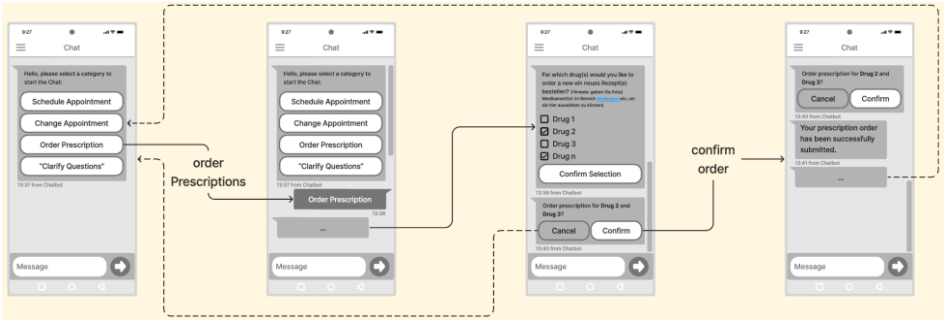

Figure 4. Chat function with various functionalities, here as an example the ordering of prescriptions

3.4. Video telephony

The app should enable users to communicate with their healthcare providers through video calls (Fig. 5). The video telephony feature should function with high quality and minimal interruptions to ensure effective communication.

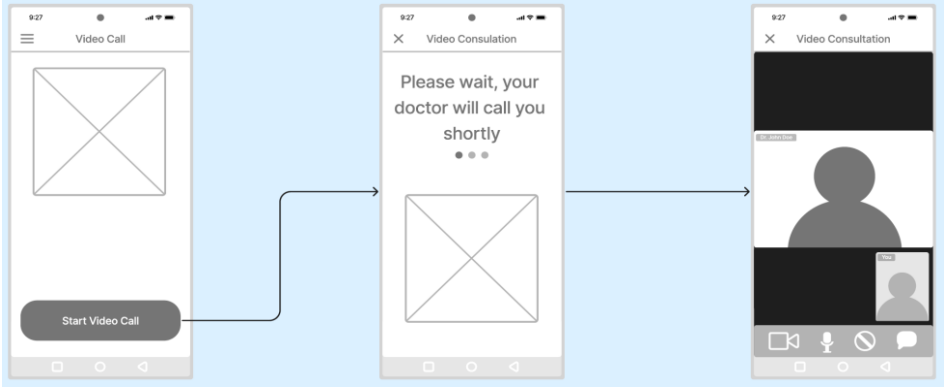

Figure 5. Video call to exchange information with the practitioner

4. Discussion

The initial design solutions presented in this paper aim to provide HIV patients with a comprehensive telehealth solution to support their symptom management, medication adherence and communication with healthcare providers.

Similar telemedicine apps designed to support HIV patients have emerged in recent years, reflecting the growing recognition of the potential benefits that technology can offer in healthcare. Some notable international examples include: *MyLife+* (Australia) and *Care4Today Connect Med Remind* (USA). German examples include *Prepared* (only for PrEP users), *MyTherapy* (no communication between clinician and patient), *Life4me+* (no symptom diary), and *Lifetime* (no symptom diary). As indicated in brackets and described in Raeesi et al. [2], many apps do not cover the full range of user needs.

The multilingualism of such an application will be important because, according to the experts interviewed, many risk groups and affected persons in German practices do not come from German-speaking countries. The app should be designed with accessibility in mind, ensuring ease of use for individuals with disabilities [6].

However, functionality, acceptance and usability of the app are insufficient if clinicians do not use it in patient care, so certification as a digital health app is crucial.

5. Conclusion

In summary, a human-centered design involving the active engagement of healthcare professionals led to design solutions that address the needs of HIV patients.

As the telemedicine app progresses beyond the scope of this paper, several future directions can be envisioned. Firstly, the design solutions will be subject to further iterations and enhancements based on the findings from usability evaluations and ongoing user participation, which includes both the PrEP and LP target groups.

Additionally, integrating advanced features, such as machine learning algorithms for personalized treatment recommendations or real-time data monitoring, could be explored to further enhance the app's capabilities. Finally, wider implementation and evaluation of the app in a clinical setting will be conducted to assess its impact on patient outcomes, healthcare provider workflows, and overall healthcare delivery.

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