

Achieving and Maintaining Euglycemia During Pregnancy for Type 2 Diabetes Through Technology and Coaching: Usability Study

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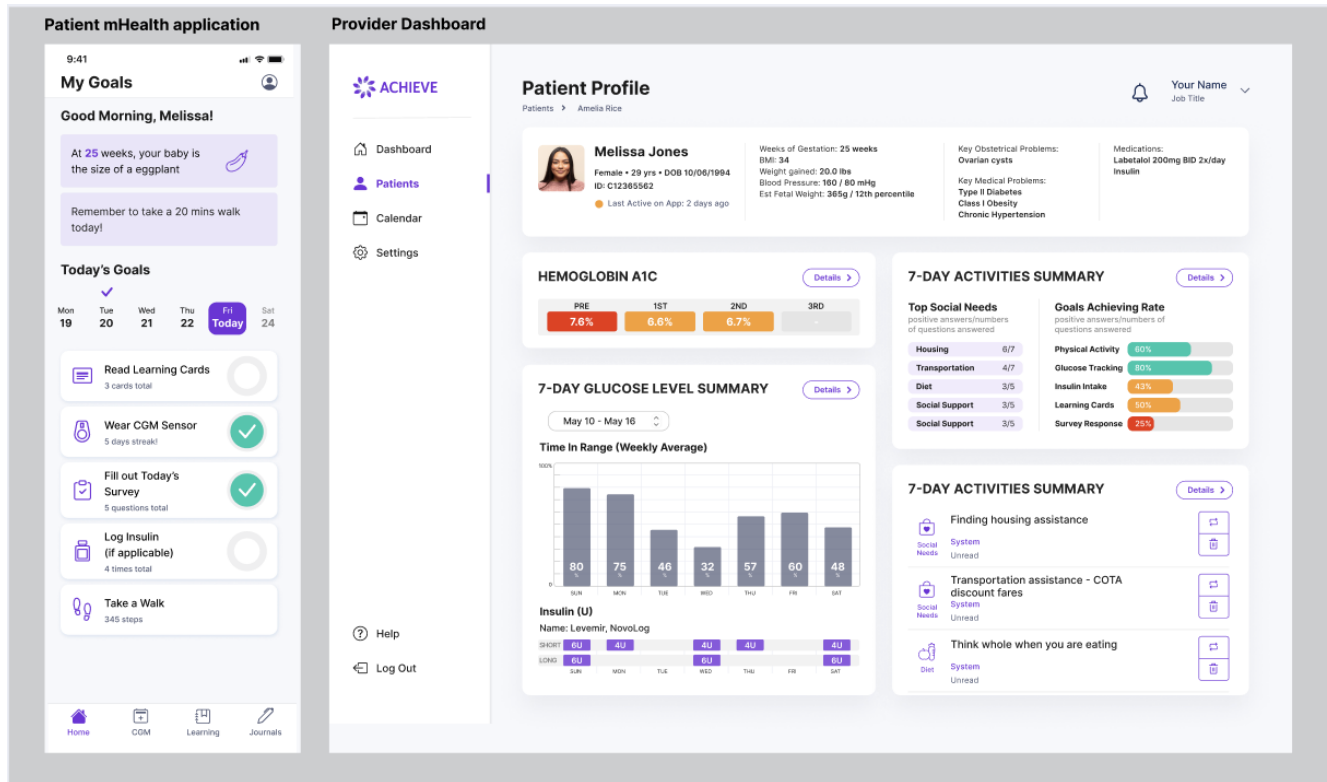


Figure 1: The prototype of the mobile health (mHealth) application (left) and provider dashboard (right).

ABSTRACT

We conducted usability testing with five patients and eight care team members on a mobile Health application (care team and patients) and dashboard (care team). These digital tools are designed to support Medicaid-insured pregnant individuals who have type 2 diabetes (T2D) to better manage health-related social needs, T2D, and pregnancy. We built prototypes and collected feedback and future recommendations on functionality and user experience. These suggestions will guide future improvements of the digital tools.

Index terms: pregnancy, diabetes management, user-centered design.

1 INTRODUCTION

Effective type 2 diabetes (T2D) management is critical for pregnant individuals as high hemoglobin A1c values have been linked to negative maternal and infant outcomes¹. Health-related social needs (HRSNs) such as transportation, income, housing can further complicate T2D management, increasing risk of adverse pregnancy outcomes¹. Digital tools such as mobile health (mHealth) applications have been widely used in managing T2D². However, there has not been a mHealth application that addresses T2D management, pregnancy, and HRSNs. This usability study aimed to address this gap by gathering user feedback to improve the mHealth application and dashboard prototypes. These prototypes are part of the ACHIEVE intervention, created to help manage T2D among Medicaid-insured pregnant individuals.

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2 METHODS

Participants from our Academic Medical Center (AMC) were recruited via convenience sampling by our research study staff. Patients had to be at least 18 years old, diagnosed with T2D, pregnant, and covered by Medicaid insurance. We conducted interviews with five patients and eight care team members (maternal fetal medicine physicians, diabetes educators, nurses, and social workers). Interviews focused on how patients and care team members felt about using mHealth applications and providing patient-generated health data (PGHD) to manage their health. We also discussed how mHealth applications may be used to improve health management for obstetric patients living with T2D during and after pregnancy. The first part of these sessions discussed personal opinions of the personas the research team created. The second part of the sessions consisted of “Think Aloud” sessions of the participants’ opinions on using the prototypes in Figma. Lastly, we conducted an empathy map activity to gain deeper insight into the needs and motivation of care team members and patients. Participants filled out the maps based on the persona and experience using the prototype. Interviews lasted approximately 60 minutes. Interviews were audio-recorded and transcribed verbatim using Zoom. We used affinity diagramming to analyze the interview data and develop clusters of desired features from patients and care team perspectives regarding the mHealth application (patients and care team) and dashboard (care team). We organized feedback into positive and negative categories for specific functions of the dashboard and mHealth application using Miro boards. We also counted the frequency of specific preferences for features. We prioritized features that were of importance and technically feasible using the IBM prioritization matrix. We used quotes from the interviews to abductively build personas based on feedback and our study’s conceptual framework, which was grounded in Social Cognitive Theory (SCT)³.

3 RESULTS

Figure 1 displays the ACHIEVE prototypes that participants interacted with during the usability sessions. During the empathy mapping activity, participants shared insights on what a patient would say, think, do, and feel using the mHealth application. In addition, facilitators and barriers were also a part of this discussion. Care team members expressed concerns that patients might not take time to engage with the mHealth application. Care team members also feared that patients may want to receive rewards for completing tasks or goals. One care team member shared that patients would feel better knowing they have an application that helps them manage HRSNs, T2D, and pregnancy. Several care team members indicated that the ACHIEVE tools could be used to support patients with making connections between their T2D, their pregnancy, and their overall health. This was confirmed during interviews with patients. Patients liked the idea of goals in the prototypes. They also felt that the mHealth application was easy to manage. Some patients felt that the checklist features on the mHealth application provided talking points to discuss with their care team members. The resources provided on learning cards were generally found to be helpful, especially for someone who needs support in addressing HRSNs. A patient noted that descriptions that were concise would aid with reading and long-term engagement. Many patients shared that notifications within the mHealth application would be beneficial if not too frequent. Based on this feedback, the research team created personas that describe three types of users: 1) patients who may not be engaged in managing their health, 2) patients who are somewhat engaged in managing

their health, and 3) patients who are very engaged in managing their health. These personas were subsequently used to design different ways in which the mHealth application engaged with a participant (i.e., content and functional personalization). We prioritized feedback on both ACHIEVE applications to ascertain end-user value and feasibility of these features the IT team.

4 DISCUSSION AND CONCLUSION

It is important to consider how our defined personas will use the mHealth application and how the dashboard can best support these personas. Some user specifications from the interviews like goals and resources were incorporated in the dashboards. Features like notifications or reward systems were not part of the initial prototypes. Based on our results, additional user specifications were suggested to improve the relevance and usability of the prototypes. Developing a digital intervention for an interventional trial in the clinical setting requires active and early input from end-users to ensure early and sustained engagement from them during and after the trial. During the system demonstration, we will expand on our findings from the empathy mapping activity and IBM prioritization matrix, and present formative findings from our early experiences from our active trial, which started in July 2024.

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