

Stakeholder-Centered Design of a Diabetes Self-Management App for Underserved Populations

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Background

Diabetes

- Estimates from 2018 report that 34.2 million people of all ages (~10.5% of the US population) had diabetes.¹
- In 2017, diabetes was the seventh leading cause of death in the United States.¹
- The total direct and indirect estimated costs of diagnosed diabetes in the United States in 2017 was \$327 billion.¹

- Mobile health (mHealth)** applications can provide a cost-effective solution to keep diabetic patients motivated to follow a healthy regimen and remind them when a certain behavior is needed.
- Low adoption rates and engagement** with these technologies over time is not well understood.
- Among the reasons for low adoption, especially within **underserved communities**, are low health literacy, lack of access to technology, and low technological understanding.
- There is a clear need for a **holistic understanding of the perspectives of multiple stakeholders** before designing a **diabetes self-management intervention**.

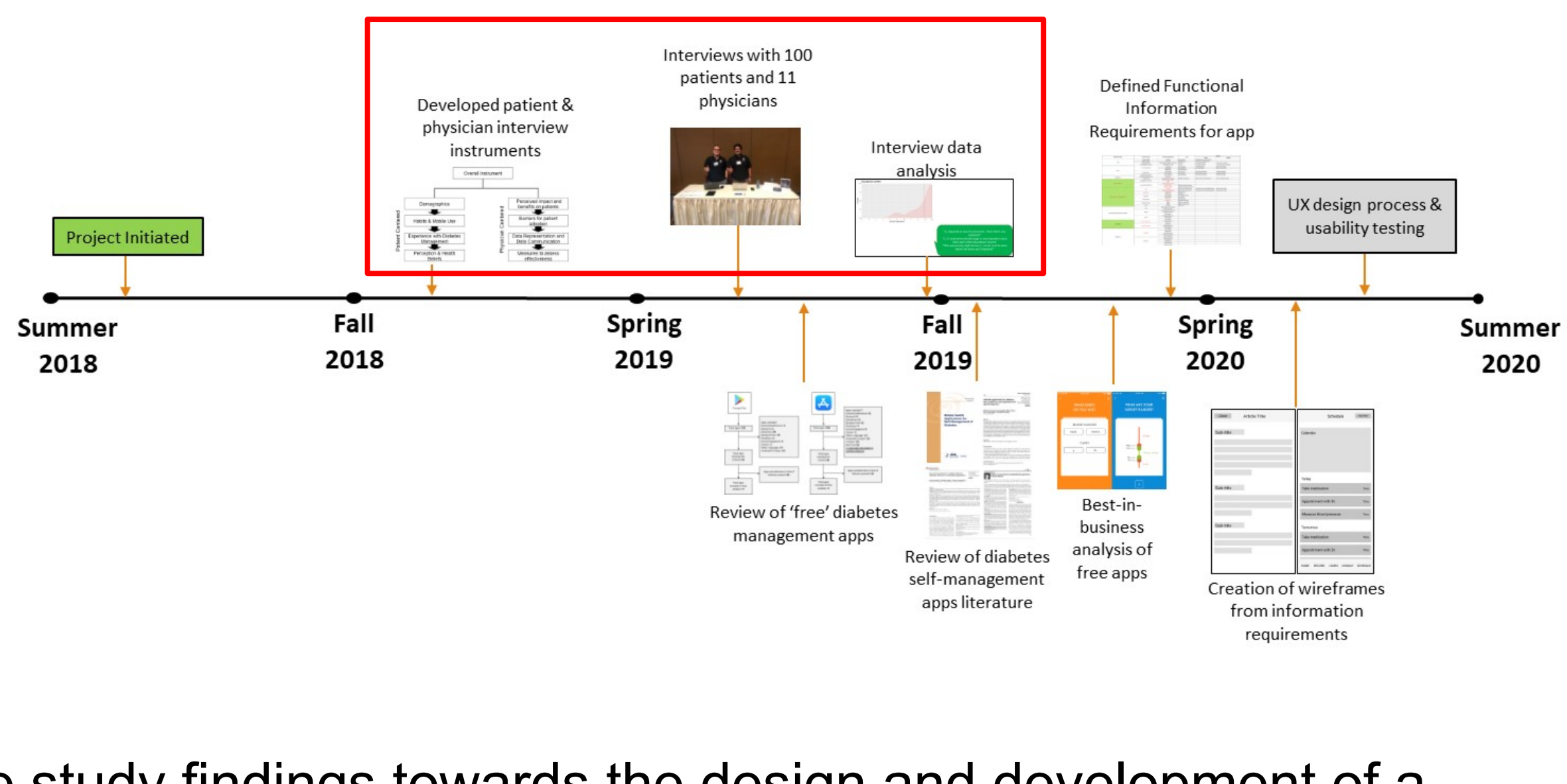
Objectives & Methods

Objectives

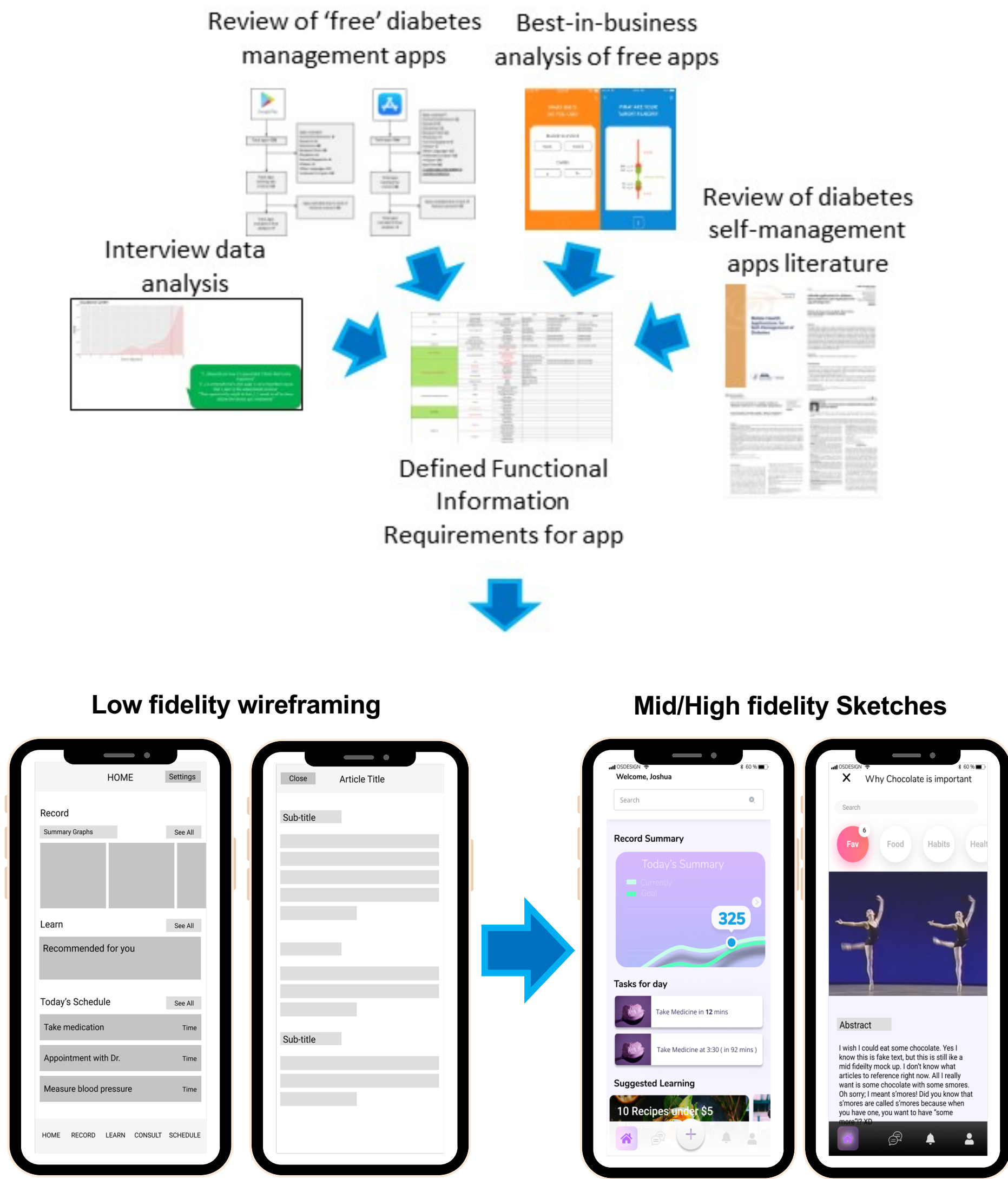
- Objective #1:** Elicit the perspectives of underserved patients and physicians about preferences for a device to help manage diabetes, and their beliefs regarding usage and utility of such a device.
- Objective #2:** Integrate the study findings towards the design and development of a diabetes self-management mobile app for underserved population.

Methods

- An **interview protocol** was developed to understand stakeholder perspectives on diabetes self-management. The interview was designed for an approximate duration of 30 minutes, including a mix of closed- and open-ended questions.
- The Texas A&M University Review Board reviewed and approved the protocol (IRB Protocol #IRB2017-0784D).
- Patients** from six medically underserved counties in South Texas were interviewed during diabetes education events and **physicians** serving medically underserved communities in South Texas were recruited and interviewed during a diabetes education conference.
- The interviews were **audio recorded** and **transcribed** and a **thematic analysis**² of the interviews was conducted by two coders using MAXQDA 12.



Current Work



Results

Demographic Information

Table 1: Demographic information of patients

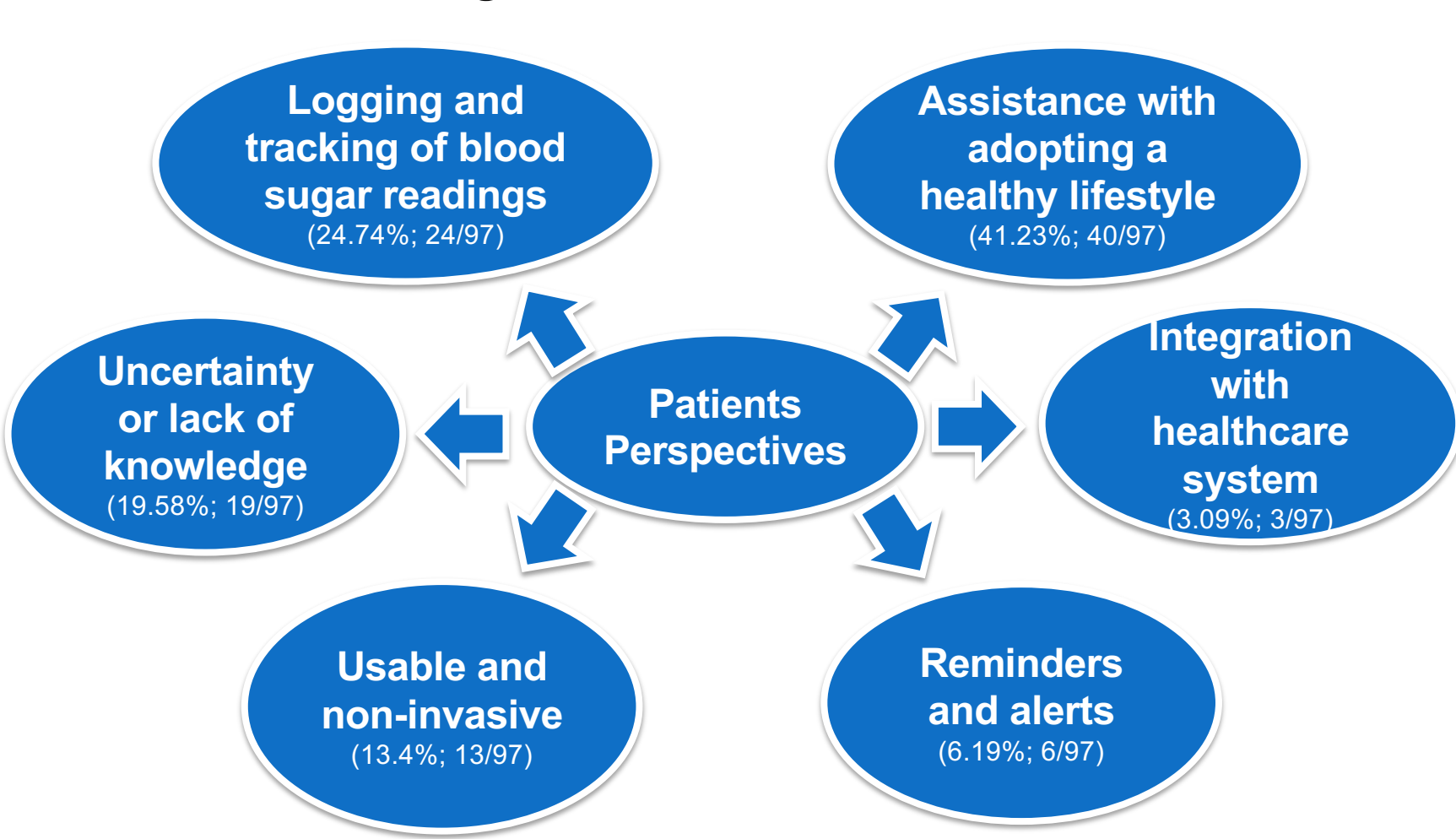
Stakeholder Type	Number of Respondents	Percentage
Gender (n=99)		
Female	73	73.74
Male	26	26.26
Race (n=99)		
White	7	7.07
Hispanic or Latino (white)	63	63.63
Hispanic or Latino (non-white)	26	26.26
American Indian or Native	2	2.02
Two or more races	1	1.01
Education (n=98)		
Less than high school diploma	16	16.33
High school diploma or GED	30	30.61
Some college, no degree	26	26.53
Associate's Degree	14	14.29
Bachelor's Degree	9	9.18
Graduate or Professional Degree	3	3.06

Table 2: Demographic information of physicians

Stakeholder Type	Number of Respondents	Percentage
Gender (n=11)		
Female	2	18.19
Male	9	81.81
Age (n=11)		
45-54 years	1	9.09
55-64 years	5	45.45
65-74 years	5	45.45
Race (n=11)		
White	9	81.81
Hispanic or Latino (non-white)	2	18.19
Nature of Experience (n=11)		
Family Medicine/Practice	9	81.81
General Medicine	1	9.09
Pediatric Nurse Practitioner	1	9.09

Patients

Patients were asked to specify features they desired in a mobile app, and the following themes emerged:



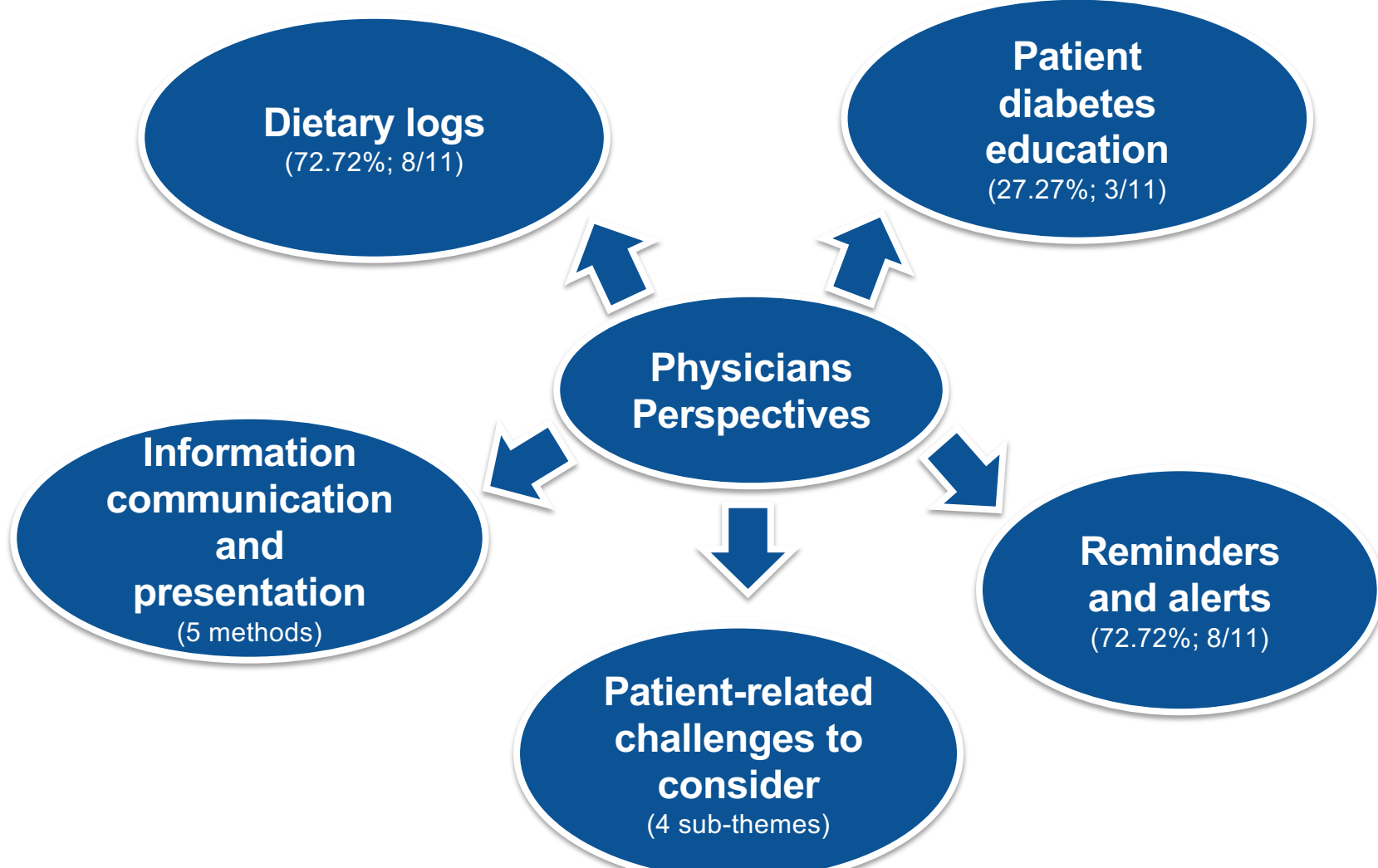
- Emphasized the need for **accessible and easy-to-understand educational content** about the condition.
- Highlighted the need for quick access to **tips on how to regulate blood sugar, types of foods to eat (and avoid)**, as well as **exercise and physical activity multimedia**.

"Like maybe like a diet plan, things to do or not to do you know that can lower your sugars if they're high."

"to measure if your sugar is high or low and to explain what things you can do to lower our sugar"

Physicians

Physicians were asked a series of questions about features they believed would benefit their patients.



- Consistent with patient responses, physicians indicated that **glucose monitoring, educational content, and graphical visualization of diabetes data** were among the top-rated app features.
- Cautioned researchers to bear in mind the **health literacy and numeracy of underserved populations** when providing educational material and developing data visualizations.
- Physicians, while encouraging the retention of the feature to encourage patient engagement, were skeptical that the **log information** feature could regulate patients' condition; physicians highlighted **patients' tendencies to be dishonest about food and medication logging**.

"Well, like I said, the people I'm going to use it on are usually older people and those people are, we didn't grow up with technology"

"So, I mean, if they want write it down, that's fine. Um, and if you're assuming perfect compliance and honesty. Um, but my experience is that most patients aren't completely honest with what they don't."

Conclusion

- The emergence of **patient education** as a desired feature suggests the need for designers to pay closer attention to patients' lingual abilities and health literacy levels.
- Both stakeholders also strongly desired the use of **appropriate visualizations of diabetes data**.
- We recommend further investigation into the **types of visualizations** that would facilitate easy interpretation of diabetes data.
- We recommend adopting a **community-based participatory research approach** to facilitate a grass root level education about the capabilities of the app being designed.

Acknowledgements / References

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[1] National Diabetes Statistics Report, 2020. (2020, February 11). Retrieved from <https://www.cdc.gov/diabetes/library/features/diabetes-stat-report.html>

[2] Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.

