Teladoc HEALTH

Future Interactions – Smart Assistants for Managing Health

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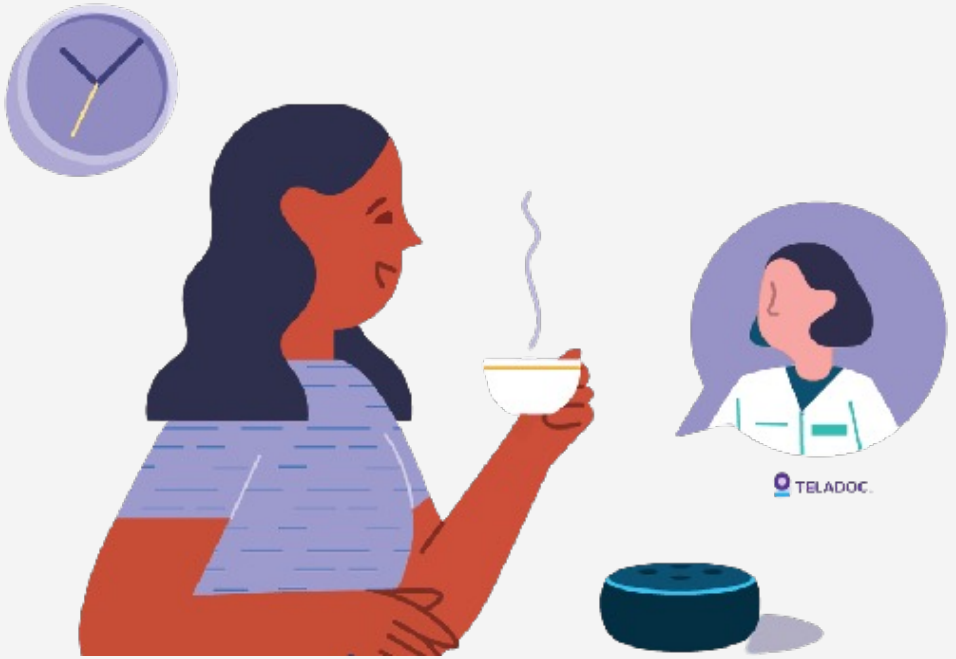
Initial efforts focused on examining Teladoc on Alexa Video Experiences but quickly evolved into understanding how people currently use smart assistants for health and wellness.



Background

What is the people problem?

Managing chronic conditions is a multi faceted problem that requires:

- a heavy lift in lifestyle & behavioral change,
- personalized health care plans, and
- ongoing support.

Coupled with Teladoc services and platforms, artificially intelligent **smart assistants** may provide **highly scalable solutions** in providing **targeted interventions.**

Background

What is a smart assistant?

Software that may live on your desktop/laptop computer, mobile-phone, smart-watch, or smart-speakers

Software that helps you:

- **connect to other devices**
- **access information**
- **help you complete task**

“Trying to manipulate. Diabetes and hypothyroidism. High blood pressure. High cholesterol. Accident prone. Trying to manipulate everything can be quite depressing.” - P3.

Why is this an important problem to solve?

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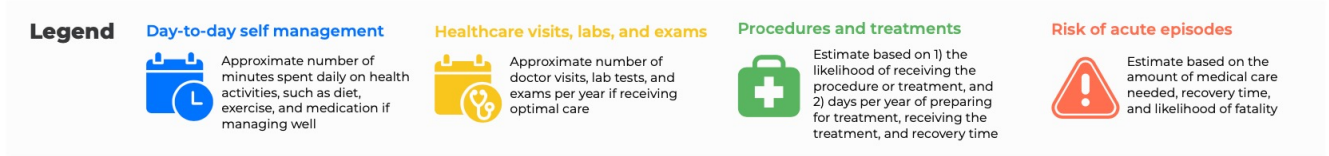
Background

1. Providing ongoing support can be **costly**
2. For chronic conditions such as Diabetes, CKD, and Heart Failure
    a. **day-to-day self-monitoring** and lifestyle management takes over your life.
    b. **minimal feedback** on the progression until you see your doctor, which is infrequent
    c. managing risk of hospitalization requires **daily self-monitoring** to check if you're **safe right now.**

*Huber, M., (n.d.), The effort of managing chronic conditions.

3. Potential to provide targeted interventions at **scale** and keep people alive longer. Teladoc can align its services to these needs in an innovative manner.

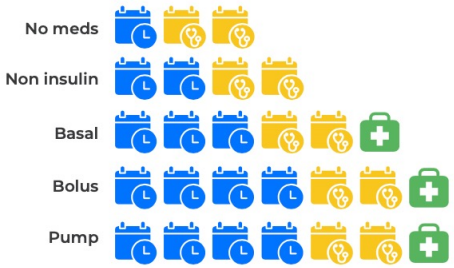
Background



Hypertension

Hypertension is low maintenance but is a **gateway to other chronic conditions**.

Diabetes



Once diagnosed, day-to-day self-monitoring and lifestyle management takes over your life.

Insulin dosing is particularly high maintenance. There's no luxury of getting off track.

Chronic Kidney Disease

There's **minimal feedback** on the progression until you see your doctor, which is infrequent. Only a **small percentage actually receives optimal care** shown here. For many, their **journey tends to start with dialysis.**

Managing CKD takes **minimal day-to-day effort until you hit ESRD, when it suddenly becomes your entire life** but treatment is more predictable.

Heart Failure

Hospitalization and surgical procedures are a common experience. Because acute episodes are unpredictable and disruptive, assessing the **risk is mentally consuming.** Life can feel normal until the next hospitalization.

Managing risk of hospitalization requires daily self-monitoring to check if you're safe right now.

"AI-based conversational agents provide suitable, personalized, and affordable digital solutions to react to these challenges and slow down individual disease deterioration to delay premature death" (Schachner et. al., 2020).

*Schachner, T., Keller, R., & Wangenheim, F., V. (2020). Artificial Intelligence-Based Conversational Agents for Chronic Conditions: Systematic Literature Review. *Journal of Medical Internet Research*, 22(9), e20701. https://doi.org/10.2196/20701

Study Overview

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Study Overview

Research Goals

This research sought to understand how people currently situate smart assistants in their day-to-day lives to manage their chronic conditions and general health.

Further, our goal was to discover what features and functions of smart assistants are most valuable for people when managing their health.

1. **Understand**
how people manage their chronic conditions and general health with SA's.

2. **Discover**
what features and functions of smart assistants are most valuable for people when managing their health.

3. **Build Empathy**
Understand the perspectives of those living with chronic conditions and connect to their stories.

Methods

Semi-structured interviews

The remote interviews were divided in two parts:

1. **Semi-structured interview:** focused on building empathy with participants and understanding current SA use.
2. **Q**: Can you describe a time in the past month when you used a smart assistant for health-related activities?

Modified Participatory Design Activities

1. Activities aimed at understanding people's **challengers** and **promoters** to maintain health goals.

2. Storyboard creation to *elicit a set of ideas and terms that describe **features** and **functions** of SA's.*

Study Overview

9 Participants From Across The US

Participants criteria based on activity:

6 **IDENTIFIED HAVING A MENTAL HEALTH ISSUE**

2 **IDENTIFIED HAVING DIABETS**

1 **IDENTIFIED NO CHRONIC ILLNESS**

Some demographics:

GENDER:	7 Female
	1 Non-Binary
	1 Male
RACE:	7 Black or African American
	2 Hispanic/ LatinX
AGES:	28-59

"Indeed, we found that African Americans feel othered when using technology powered by ASR—errors surface thoughts about identity, namely about race—leaving users feeling that the technology was not made for them."

*Mengesha, Z., Heldreth, C., Lahav, M., Sublewski, J., & Tuennerman, E. (2021). "I don't Think These Devices are Very Culturally Sensitive."-Impact of Automated Speech Recognition Errors on African Americans. *Frontiers in Artificial Intelligence*, *4*, 725911. https://doi.org/10.3389/frai.2021.725911

Motivations & Behaviors

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Insight

Informal and Formal Health Networks are the pillars on which managing chronic conditions are upheld.

- Participants heavily rely, indirectly and directly, with their informal and formal health support networks to manage their chronic conditions.
- Informal health networks = **friends, family, and digital communities.**
- Formal health networks = **doctors, specialist, and other health professionals.**
- Multiple participants from this study reported not only having chronic conditions but also taking care of loved ones who also exhibit chronic conditions.

"So, I want to find people who have ulcerative colitis…it's nice to hear other people talk about what they have to go through." – P9

“It explicitly recognizes the changing roles and relationships and information exchanges which take place, including those between the formal and informal support networks, and highlights that these relationships can be separated by distance (and indeed by time)” (Elers et. Al., 2018).

“Chronic diseases often heavily affect the immediate and wider social context of the affected patient [61]. Future interventions could consider additional human involvement in order to better recognize the social effect of chronic diseases. This could further maximize treatment adherence and health outcomes, two important treatment goals [68]" (Schachner et. al., 2020).

"we see the biggest potential of conversational agents in their ability to help patients effectively navigate health services, connect to health resources, and engage in ongoing conversations about health and well-being" (Dingler et.al., 2021).

Recommendation

Building experiences with Informal & Formal Support Networks in mind.

- Mechanisms that enable health data collecting and sharing with doctors or specialist.
- Ability to connect to communities who share similar chronic conditions.
- *Lightweight social connection in the form of "pings" or reminders.

*Liu, F., Esparza, M., Pavlovskaia, M., Kaufman, G., Dabbish, L., & Monroy-Hernández, A. (2019). Animo: Sharing Biosignals on a Smartwatch for Lightweight Social Connection. *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.*, *3*(1), 1–19. https://doi.org/10.1145/3314405

(Hunter et. al., 2021) Figure 1 Structural Model of Actors

Insight

People use SA's to collect health data both directly and tangentially via apps.

Participants indicate that they collect and log health data such as:

- Heart rate
- Blood pressure
- Diabetic readings
- Mood
- Sleep statistics
- Menstrual cycles
- Exercise

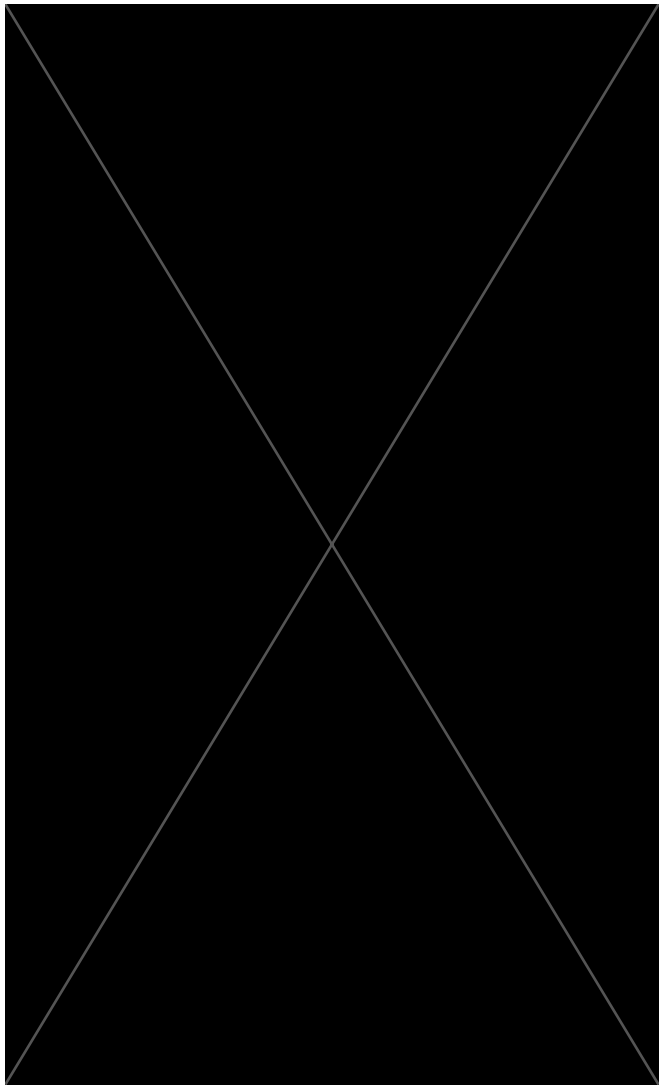
The SA' is used either directly, in conjunction with, or through apps such as Alexa, Siri, Google Nest, Facebook Portal, MyFitness Pal, Omron Health, Nike Run, or Apple Health.

"And that was basically helping me keep up with my steps, my calories , my water intake , my sleep patterns , even my period tracker. I had like a full scope of what was going on with my body." - P2

Recommendation

Provide a simple dashboard to allow people to manage their health data in one place.

- Participants expressed using a multitude of smart devices and applications to keep track of their health data
- Inability to switch modalities with all of health data in one place
- Interoperability across various devices and modalities should be considered for scalable and changing requirements when designing for individual health and wellness impact.
- [redacted]



Insight

Context determines which smart assistants are used.

Participants indicate that they use the following SA's interchangeably:

- Amazon Alexa,
- Apple Siri
- Google Assistant
- Samsung Bixby
- Meta Portal

The SA' is used according to where the participants are. **Home** vs **In transit** vs **While exercising.**

The primary context of use is in the home, but different SA may even be used according to where in the home the participant is at (shared space vs personal space)

"Alexa is on the first floor so if I am on the second floor, I use my cell phone [Siri] to set the alarm." - P5

Recommendation

Allow the ability to set profiles on the SA and give appropriate feedback according to context.

- Participants conceptualize the home as where the smart assistant **“lives”**/ its base camp i.e. in the form of a smart home device (Alexa, Meta Portal, Google Nest). Mobile and wearables is where the SA **“follows”** the participant.

- Smart home SA should have the ability to enable profiles so that family members can utilize the same smart assistant in shared spaces in more personalized manners.

- For family health managers this is especially important when documenting important health readings for different family members.

Recommendation

What if a video enabled SA could serve as a trusted concierge of health data for the whole family?

Modalities that "live" at the home, like video enabled smart speakers, can consolidate and display relevant health data according to profiles for all family members within the household. Family care managers can view this data, collected from various sources and family members (smart watches, mobile phones, smart home devices), in one place and act on data by leveraging Teladoc services.

What if a SA that "lives" with you could serve as a trusted concierge of health data for the whole family?

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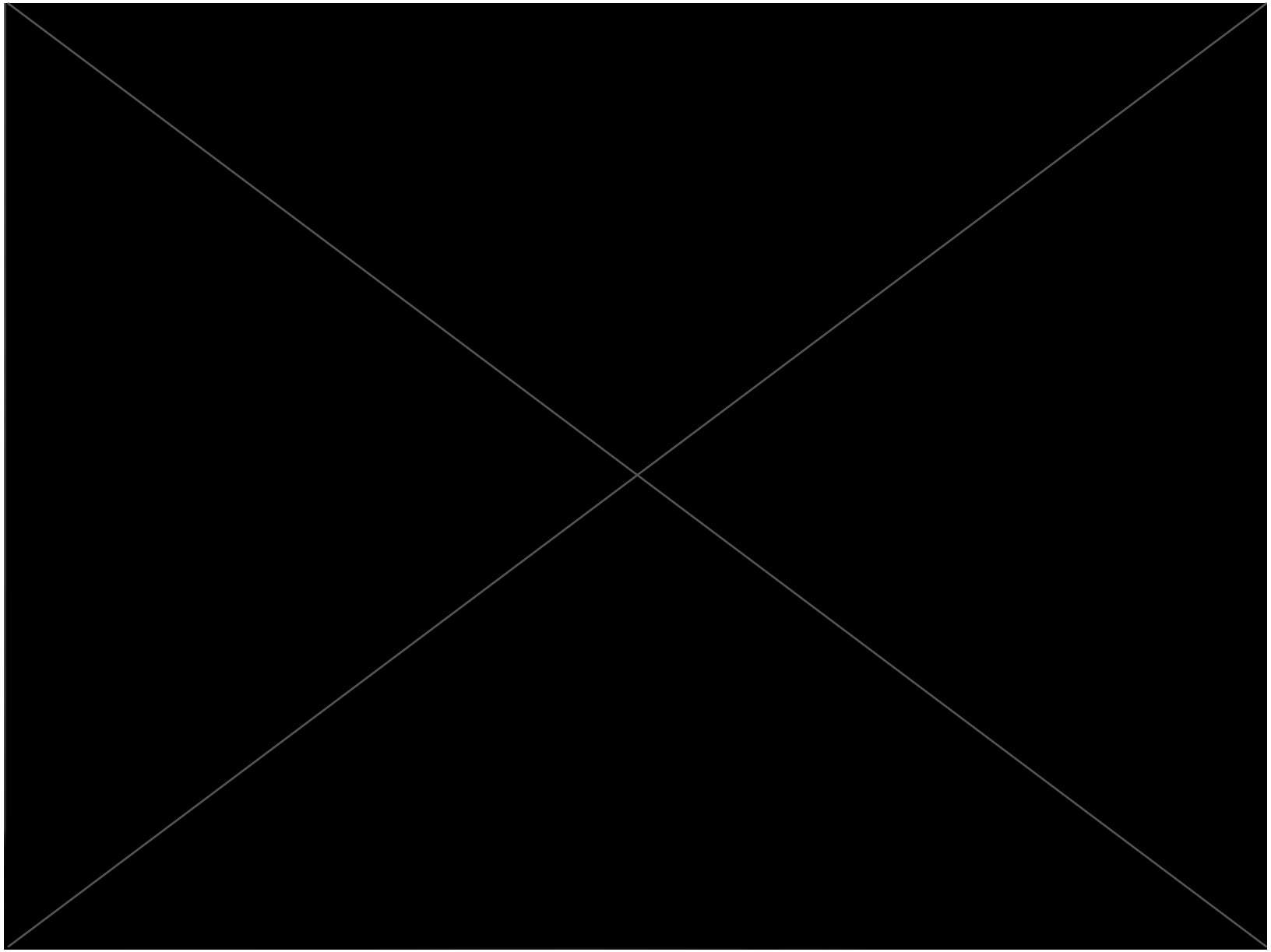
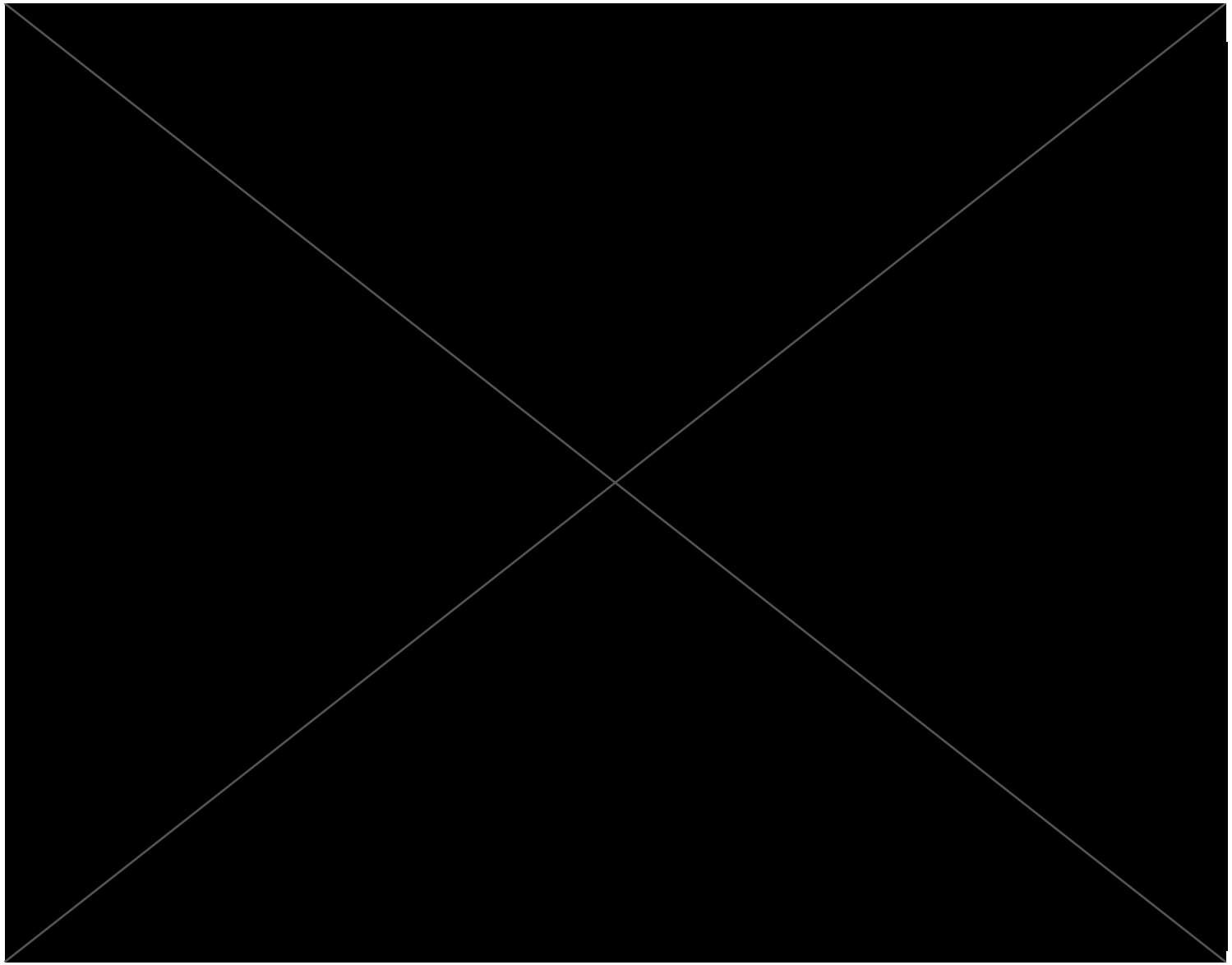
On managing the health of other family members.



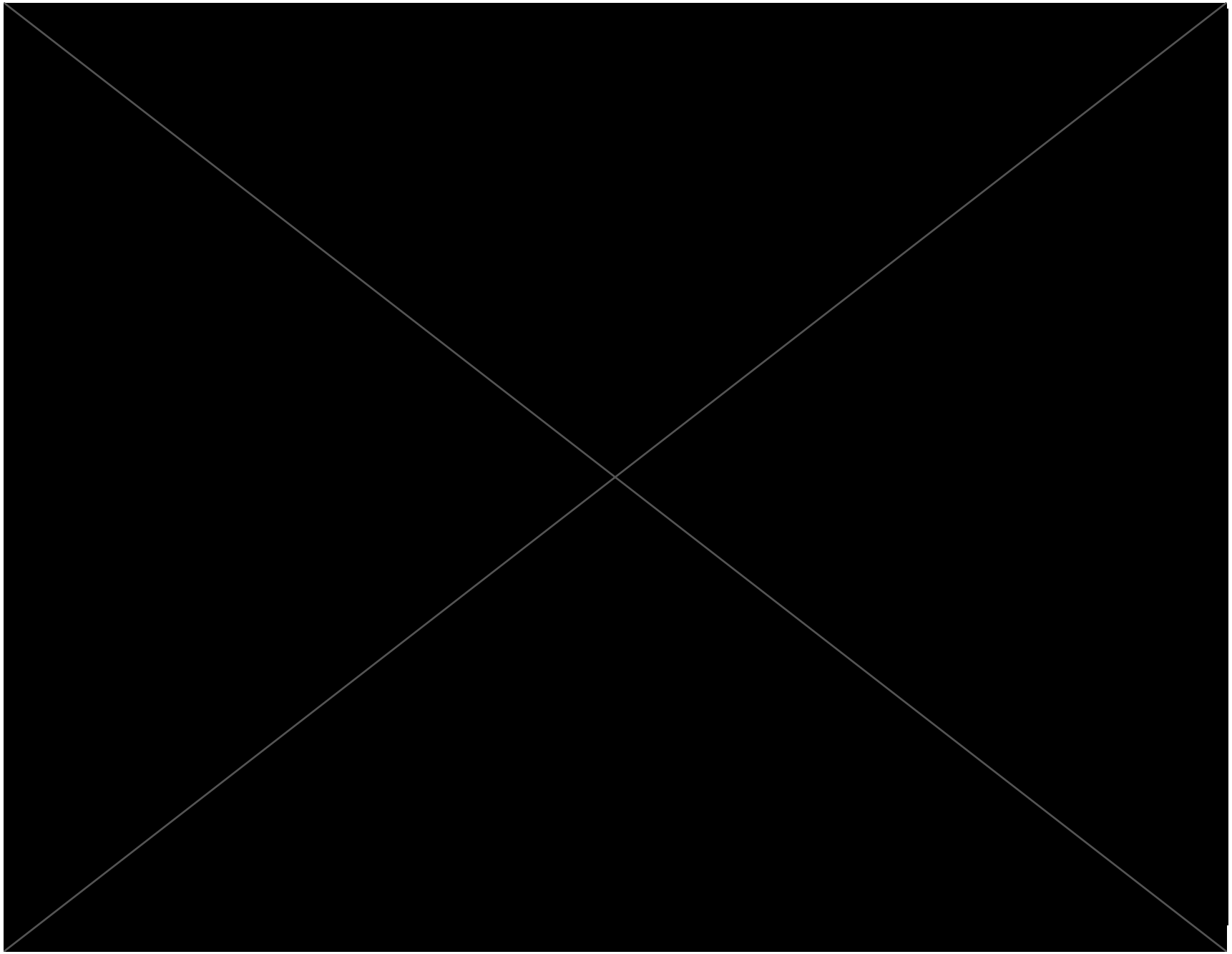
On managing the health of other family members from a distance.



What if a SA that "follows" you could help you collect health data, set goals & reminders, and connect you to a health coach on the go?

Modalities that "follow" you, like mobile and smart watch devices, can collect relevant health data such as heart rate, mood, menstrual, sleep, exercise, and others, either ambiently and actively. This data can be leveraged to help set goals and provide relevant "snapshots" of your health or suggest changes. This collected information can be used to connect participants to relevant health coaches while on the move.

On setting goals with a smart watch.



Insight

People mainly use their smart assistant for longitudinal outcomes on home or mobile devices.

- Most participants indicated that they use their SA to **schedule medication** and **appointment reminders**.
- Family health mangers use smart assistants to manage complex schedules for **multiple people** including parents, spouse, children, and in one case for extended family.
- Two participants indicated using **Telemedicine services** for therapy and diabetic care.
- 1 Participant indicated that they use the video device for educational purposes. i.e to record themselves administering insulin shots for a family member for later use.

“So, in order for me to , like , manage everybody's prescriptions and keep up with when administer medicine for them and stuff like that , I would set reminders , their routines on my Facebook portal or my Amazon Echo show.”

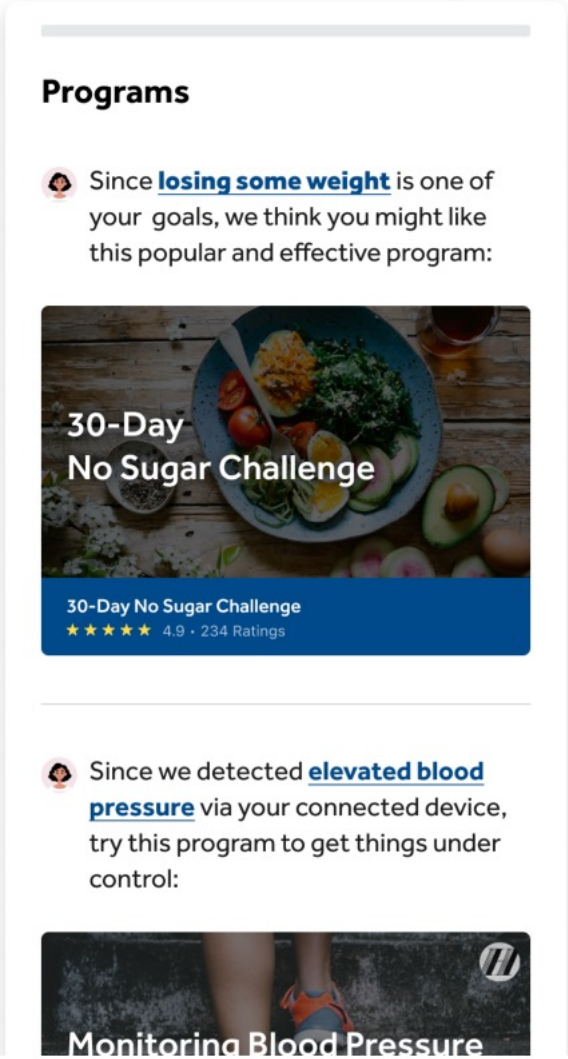
Allow users to set reminders according to family profiles

- Be able to send those reminders automatically to the family member, via text messages, at the time of the reminder.
- Present details like day, hour, and name of the medication to take.
- “I also need the alarm for my husband because he has high blood pressure and so he needs to take his medications.”
- "Health will be a continuous conversation between patients, caretakers, and their data, facilitated by conversational agents. (Dingler, et. Al., 2021)

Recommendation

Provide educational content specific to the patient's condition on video enabled devices.

- Participants expressed using the video enabled devices specifically for educational purposes.
- They access Youtube, record videos, search blogs, and ask their SA questions about episodic symptoms.
- Teladoc branded videos and content can **greatly address the educational concerns** of participants. This can be especially true for those who have to self administer medications like insulin.
- Educational videos/ library can be repurposed elsewhere and serve as a marketing tool.
- Support and learning through personalized content [OneApp Concept Testing - June 2021 Report]



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Thank you