DOCTOR ON-DEMAND

DUO CASE 12

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Introduction

For this month-long project, we had the opportunity to develop an iOS app using the Swift programming language centred around the theme ‘Doctor on-demand’. This document serves as a comprehensive record of our journey toward the final product, including my personal contributions to the project.

Our project began with thorough online research and the execution of a user study including surveys. The valuable insights we gained from these efforts were used in creating the Figma prototype for our app. We developed our final code using Swift and Swift UI in Xcode, incorporating push notifications as our chosen hardware implementation.

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1. Project Overview:

Introduction:

In this project, I have teamed up with Ashanti. My responsibilities included managing documentation and facilitating file communication through GIT, as well as working with Ashanti on user studies, design, and coding tasks.

Our intended user base consists of individuals who have already received a medical diagnosis. This application aims to enable users to monitor their physical well-being (, with the data accessible to their healthcare providers). This proactive approach is designed to reduce the necessity for frequent hospital admissions among patients. In our case the users being long COVID patients.

Problem Statement:

Healthcare in developed countries suffers from rising costs and high demand for staff. A doctor on-demand, a virtual health-coach or a virtual expert system that determines diseases or gives solutions is the next thing to solve these problems. Hence, our aim is to build an app that assists users in finding answers to their medical questions without directly 'burdening' healthcare professionals, who already have significant workloads.

Objectives:

Goal

Increase the overall well-being and quality of daily life for long-term COVID patients through the development and implementation of a user-centric virtual health app.

Sub-goals

- Improve the ability of long-term COVID patients to manage their symptoms effectively.
- Enable users to have seamless and valuable interactions with health advisors or counsellors.
- Provide resources and support to improve the mental and emotional well-being of users.
- Foster a supportive and active user community for long-term COVID patients.

Research questions

1. *Improve Symptom Management:* How can we enhance symptom management for long-term COVID patients through the long-term COVID Virtual Health App (COVIDiary)?
    - Criteria: A 20% increase in user-reported satisfaction with symptom management tools within three months, as measured through user feedback and app ratings.

2. *Facilitate Health Advisor Interaction:* How can we optimize the interaction between long-term COVID patients and health advisors within the long-term COVID Virtual Health App (COVIDiary) to provide maximum value and support to users?

- Criteria: Achieve a 90% positive user feedback rating on the value and quality of interactions with health advisors within six months.

3. *Promote Mental and Emotional Well-being*: What strategies and resources can be implemented within the long-term COVID Virtual Health App (COVIDiary) to effectively promote the mental and emotional well-being of long-term COVID patients?
    - Criteria: A 25% decrease in self-reported feelings of anxiety or depression among users, as measured through regular mental health assessments, over the course of a year.

4. *Community Building*: How can we foster a strong and active user community within the long-term COVID Virtual Health App (COVIDiary) to provide valuable peer support for long-term COVID patients?
    - Criteria: Achieve a consistent weekly engagement rate of at least 40% among registered users in the community forum.

2. Research:

Online research:

Before starting this project, I initiated for us to gain a basic understanding of Virtual Health, including its current market with existing applications. We have already identified the pros and cons associated with the general use of virtual health apps, as well as conducted an analysis of the current competitors in the market.

"Virtual health simply refers to the healthcare provider and the patient meeting remotely with the help of mobile apps, software, and videoconferencing. More than diagnosis, this is aimed at checking in with and monitoring patients over a longer period."

The data presented in *'Table 1 Pros and Cons of Virtual Health'*, has been based from information sourced from both [Source 1] and [Source 2].

	Pros	**Con**
1	Providers can extract a huge amount of data using Big Data techniques and build relevant records for further research on healthcare.	Cannot get controlled substances from psychiatrist.
2	It can give doctors a clear picture of patient symptoms and infections.	Being charged for the appointment up on front.
3	Providers can remotely monitor the old and vulnerable on a 24-hour basis.	Can not reach providers in between appointments.
4	Wider access to healthcare. The ability to send expert providers to poorer parts of the world, where proper medical care is non-existent.	Virtual healthcare providers may store digital copies of data in an unsecured setting, making them vulnerable to hacking and identity theft.
5	Takes less time, money, and energy to look for a second opinion.	There are no set standards for the health market, and this lack of standardization can lead to a loss of confidence from customers due to security breaches or inappropriate care.
6	Reduces the need for continuous hospitalizations in case of chronic diseases.	Technology barriers, patients may face barriers due to lack of technology or digital literacy. Not everyone has a smart phone or reliable internet connection.
7	Virtual healthcare can be instrumental in reserving ER beds for serious injuries and not chronic illnesses, which went unchecked due to the communication gap between patient and provider.	Misdiagnosis or missed diagnoses.

Table 1 Pros and Cons of Virtual Health

Also, based on [Source 3] **"Longcovidpatiënten willen politieke partijen strikken voor een stembusakkoord"** from NOS nieuws mentions that "Ook al kunnen mensen nu wel terecht bij hun huisarts of een medisch specialist, uit ervaringen blijkt dat die op dit vlak niet altijd deskundig genoeg zijn. Het is niet ongewoon dat patiënten behandelingen krijgen die de long covid verergeren."

The article covers a Long Covid advocacy group that aims to secure political agreements for recognition, healthcare, and funding in the upcoming elections. They advocate for awareness,

improved care, and research. The objective is a national centre of expertise for chronic conditions.

User Research:

Survey

Goal: The goal of the survey was to identify the functionalities that users would like to see in our app. Given our strong user-centric approach, we aimed to gather insights and ideas from other individuals.

We created the survey in both English and Dutch to gather additional input from family and friends. The results from both surveys were used to ascertain the app's most essential features.

We gathered a total of 10 responses, with 5 from each survey. One of the critical questions was about the most valuable features for a long-term COVID patient app. The top two preferences, with 5 votes each, were 'symptom tracking' and 'health advisor recommendations.' As a result, we have reflected these preferences in our prototype designs by giving priority to these functions on the main screen. *See 'Figure 1 Home screen'.*

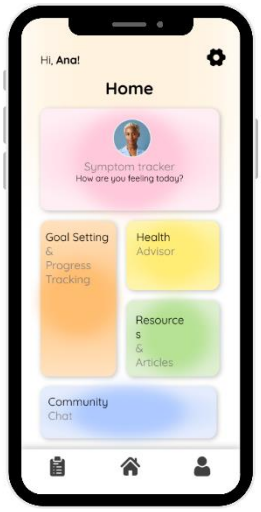

Figure 1 Home screen

Market Research:

Competitors research

Ashanti and I conducted online research by making a competitors research using [Source 4] to see the existing health/symptom tracker apps available on the market. *See 'Figure 2 Competitors research'.* Our goal was to identify the features that performed effectively while recognizing those that did not. We want to incorporate the successful ones into our consideration while avoiding the ineffective ones.

App	Pros	Cons
Doctor on Demand	- Has a host of licensed doctors, therapists, and psychiatrists. - Sign-up, appointment booking, and billing procedures are easy - Patients without insurance coverage are extended the same care and treatment.	- Without insurance, you might end up paying more for a half-hour teletherapy visit than you would pay for an hour of in-person therapy. - You may need to wait a few days for an appointment. - Depending on your location, you may only have a few therapists to choose from. - The service cannot treat mental health crises or severe mental health symptoms. They may recommend in-person treatment for manic episodes, schizophrenia, thoughts of suicide, or serious symptoms of psychosis.

		- You cannot get a prescription for stimulants or benzodiazepines.
Medici	- Has a slew of doctors and nurses. - One-to-one messaging and videoconferencing with the chosen healthcare provider. - Patients can choose from their range of remote treatment plans based on health requirements and budget.	- Membership costs $149 monthly
LiveHealth	- Has therapists, doctors, and lactation counsellors. - Personal dashboard to track appointments, symptoms, and treatment.	- **Cannot complete common medical forms:** You cannot complete disability requests, DMV forms, FMLA, insurance requests, or service dog requests on LiveHealth Online - **U.S. only:** You can only access LiveHealth Online in the United States - **Wait time:** You may wait up to 2 weeks to meet with a psychiatrist
AmWell	- Allows 24/7 appointments with registered practitioners. - Has a videoconferencing feature. - Doctors can access your history, answer your queries, conduct a proper diagnosis, treat accurately, and then prescribe medication.	- Psychiatry is only available for individuals 18-years and older. - No text-based therapy available. - Amwell providers will not prescribe controlled medications. - No medication delivery available. - No discount for participating in both therapy and psychiatry.
MySugr	- Has trained and certified diabetes educators for personalizing meals, medications, and exercise routines. - Tracks blood sugar and food intake, maintains a medication log and even provides an accurate HbA1c estimate	- your data must be manually entered unless you are using one of the Accu-Chek connected meters (Accu-Chek Guide meters in the United States) - currently only connects with Accu-Chek meters enabled with Bluetooth, rather than all brands of glucose fingerstick meters - not all features are included in basic free version, but require a subscription option - does not offer direct integration with continuous

		glucose monitors such as Dexcom or FreeStyle Libre - bolus calculator feature is not available in United States because it has not been cleared by the Food and Drug Administration since being submitted for review in spring 2021 -

Figure 2 Competitors research

3. Ideation:

Brainstorming and Ideas:

I brainstormed ideas for our project and concept, thinking about how we could make the app stand out and be a hit with a specific audience.

- Make the app for people with chronic illnesses or diseases. *What specific chronic illness/disease?*
- Make the app for elderly/seniors. Who may have chronic health issues and mobility limitations, making in-person doctor visits challenging.
- Make the app for families. Caregivers who need quick access to medical assistance for themselves and/or their children.
- Make the app for travellers/busy professionals. Who might require medical consultations while away from their regular healthcare providers.
- Make the app for rural or underserved areas. Individuals living in remote areas with limited access to healthcare facilities.
- Make the app for (long-term) COVID patients.

- Enable licensed healthcare professionals, such as doctors and nurses, to directly address users' needs. This service is particularly valuable for healthcare providers who cannot be physically present at their workplace due to personal circumstances, such as pregnancy or physical disabilities.

- Integrate with wearables (e.g. Apple Watch)

We chose to move forward with my idea of making our app to long-term COVID patients. We believe it was relevant, especially since Ashanti coincidentally came across an article [Source 3] where long-term patients expressed feeling unheard and emphasized the need for more attention to their challenges.

In addition, to address the concept of an 'on-demand doctor,' I had come across a TikTok video featuring a nurse who had been medically retired due to a physical disability but was still passionate and knowledgeable enough to assist patients and carry out her work.

MoSCoW table

Before conducting user research, I put together a MoSCoW table, *see 'Figure 3 MoSCoW table'*, based on my own imagination, envisioning what I thought might be possible for this app.

Must	Should	Could	Will not
Symptom tracking	Emotional support and community chat / community forum	Research and articles on long-term COVID	Too complicated UI
Medication and treatment reminders	Goal setting and progress tracking	Wellness and mental health resources	Privacy breach
Personal health records	Virtual consultations	Data analytics	
Health diary - Daily experiences - Symptoms	Emergency support	TeleRehabilitation, virtual rehabilitation exercises and physical therapy routines tailored to	

- Emotion state		the specific needs of long-term COVID patients.	
		Customizable care plans	
		Integration with wearables	

Figure 3 MoSCoW table

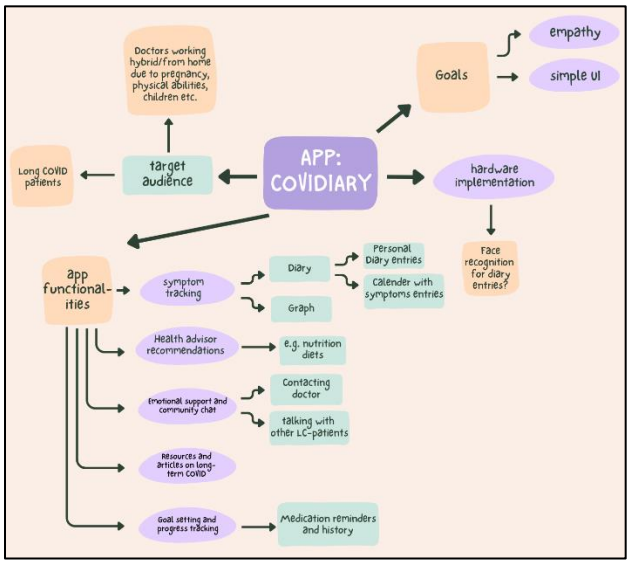

Figure 4 Mind map

Mind map:

To gain a better understanding of our progress and after the ideation phase of our app, we constructed a mind map that provides an overview of the app's features. *See 'Figure 4 Mind map.*

4. Design Process:

Moodboard:

At the beginning of our design concept process, Ashanti, and I each created individual mood boards. *See 'Figure 5 Moodboard;* . We then compared them to determine whether our creative visions matched and to identify the functionalities or design elements that we both found appealing for integration into our app.

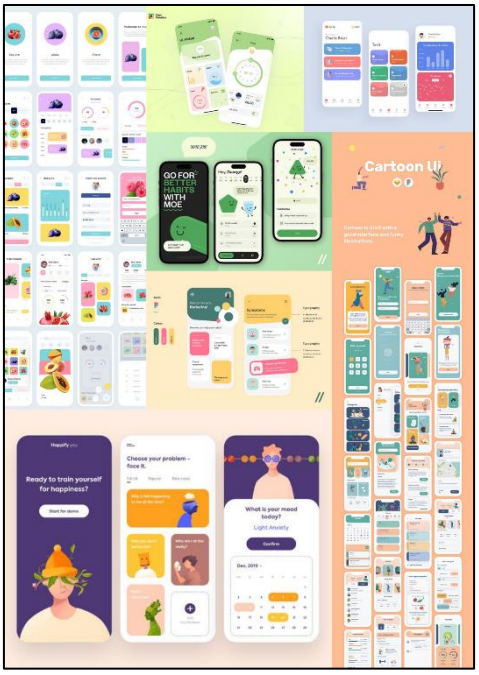

Figure 5 Moodboard

Prototyping:

After Ashanti and I prepared mood boards to visually represent our app ideas just before the vacation, we made the decision to work on our prototype during our holiday. Thankfully, our initial planning did not account for the vacation, which helped us avoid falling behind schedule because we did not manage to complete our prototype during that time off.

But during the break, I did decide to start building the prototype without going through the initial wireframe and basic design stages. My reasoning was to create a hig as we progressed. I wanted our app to be efficient, placing functionality above aesthetics, although visual appeal was still important. In this case, making sure things worked well was more important than making them look good right away.

I was created the designs for the pages for articles, goal setting, community, settings, and the mood/symptom tracker.

You can find a more detailed account of our app's progress in the [Source 5] 'Prototype and Testing Documentation'.

User Testing:

To evaluate the design aspects of our prototype, I created the objective for our qualitative usability testing.

Prototype testing goal: We want our prototype to be user-friendly, considering that the app is intended for a wide range of age groups, some of whom may not be adept at handling complex technology. Additionally, we seek to evaluate whether our design effectively directs the user's attention to the key elements we want them to focus on. For example, crucial functions should be made more prominent, while secondary or additional functions should be 'less emphasized.'
Tasks: We provided our user testers with no predefined tasks and allowed them to explore our app freely, collecting their feedback and thoughts as they navigated through our prototype.

We performed three rounds of user testing. I noted the feedback given by the users as they navigated our prototype. This documentation can be found in the 'prototype and testing documentation.' Additionally, I summarized the main points of feedback, which included:

- A spelling mistake in the title.

- Raising questions about the implementation of actual medical advice / medical professionals affiliated with this app (students, doctors on leave, or nurses).
- Suggesting the inclusion of more detailed information about the symptoms provided as options.
- Recommending the inclusion of a disclaimer regarding digiD and its government affiliation before engaging with it.
- Personal medical information should only be required if the app is linked with a doctor, as it may be unnecessary otherwise.
- Optional hardware function, the automatic addition of scanned medications to the user's medication list.
- Optional function, the connection of recommended articles and exercises with the user's input on symptoms, such as recommending back exercises for those selecting "back problems."
- Considering the implementation of notifications for users who forget to mark off their medication.

Iteration:

After receiving feedback from our prototype testing session, the biggest decision we made was to refine our system tracking methods, *see 'Figure 6 information log COVIDiary'*, drawing inspiration from the app's user flow, *see 'Figure 7 information log flow'*. This adjustment aims to provide users with symptom-tracking suggestions for a more user-friendly interface.

From:

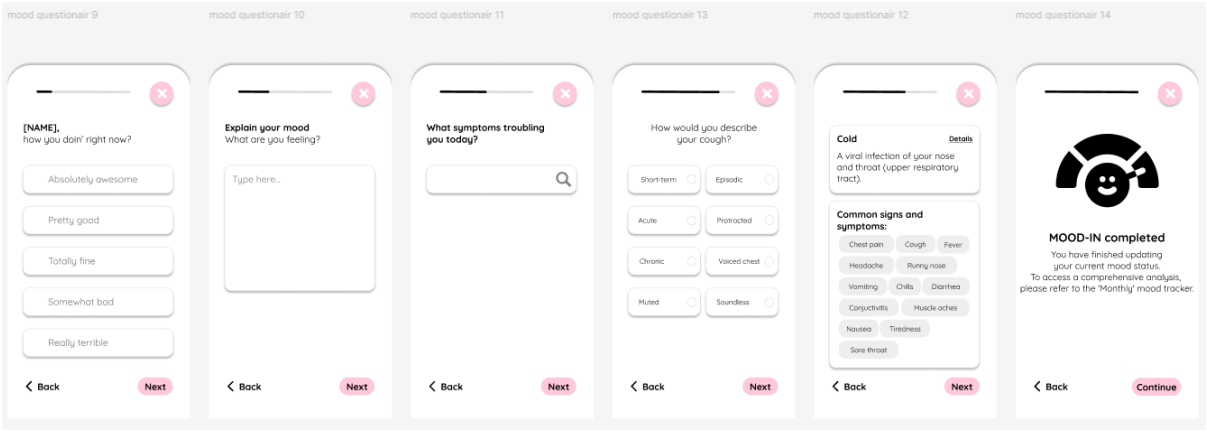

Figure 6 information log COVIDiary

Inspiration:

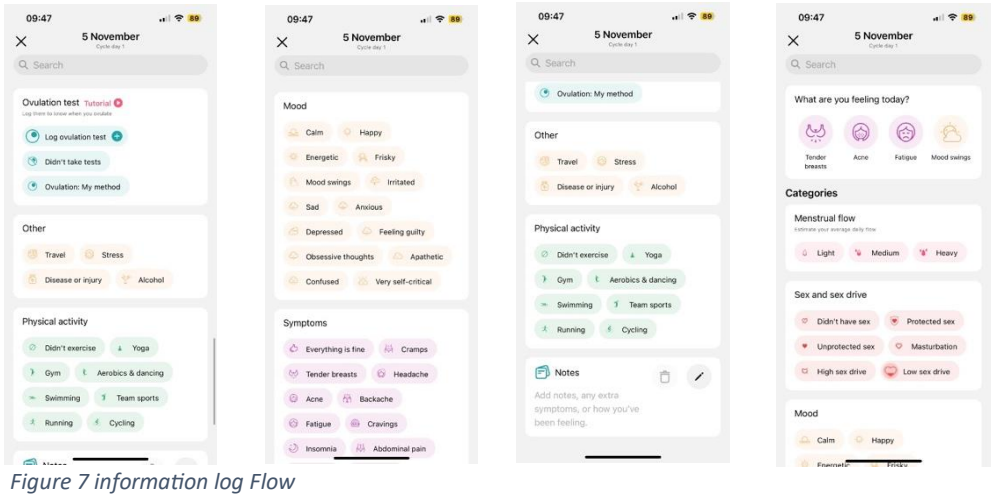

Figure 7 information log Flow

5. Final Solution:

Showcase the Final Design:

The primary function of the app is to track user symptoms, *see 'Figure 8 prototype final design'*, with the goal that health advice adapts based on the user's responses in the symptom tracker. The design is intentionally minimalistic, clear, and straightforward to cater to users of all age groups. To prevent the app from feeling too overwhelming.

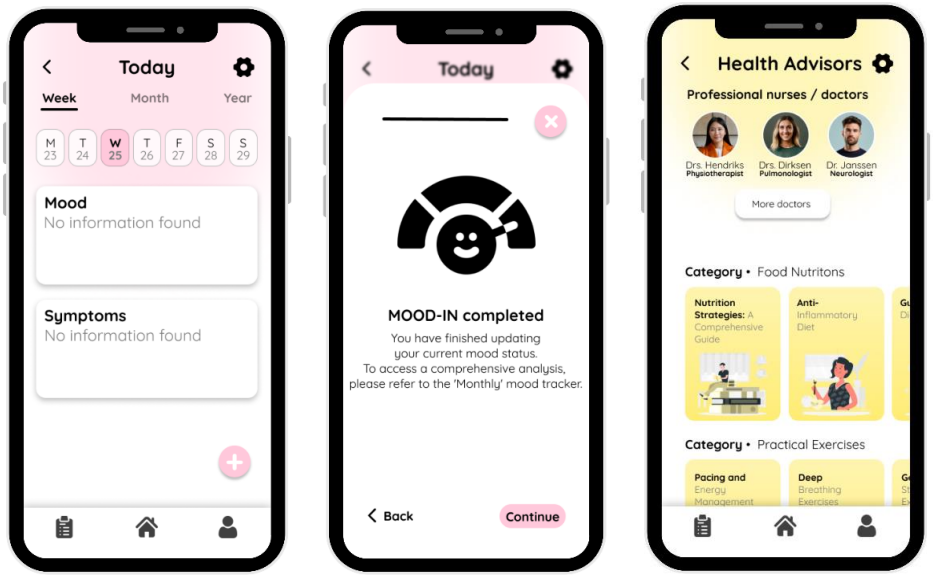

Figure 8 prototype final design

Before developing the prototype, we also designed a color palette, crafted an app icon, and created posters to essentially promote the app.

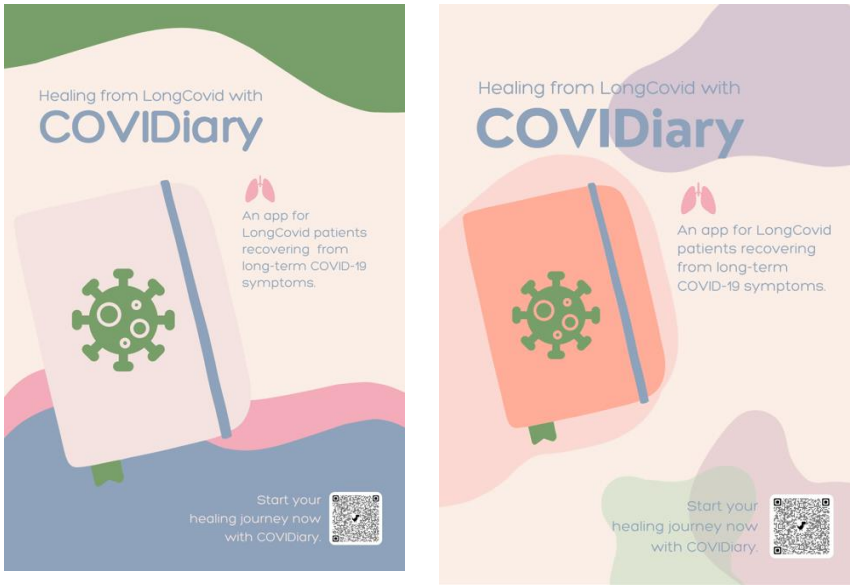

Figure 9 poster designs

Showcase the Final Code:

(File name 231104_diary on https://git.fhict.nl/I479015/sm4_s2_fuhua_ios.git)
I began by connecting the pages to screenshots from the prototype. From there, we proceeded to code and replace the screenshots with actual functionality.

For our hardware implementation, we have chosen to use push notifications into our mood and symptom tracking system, *see 'Figure 10 Xcode push notifications'*. The code is currently made to send daily reminders to users, that way encouraging them to record their mood and symptoms. On top of that, we are considering adding additional of push notifications when users indicate that they are experiencing distress or discomfort.

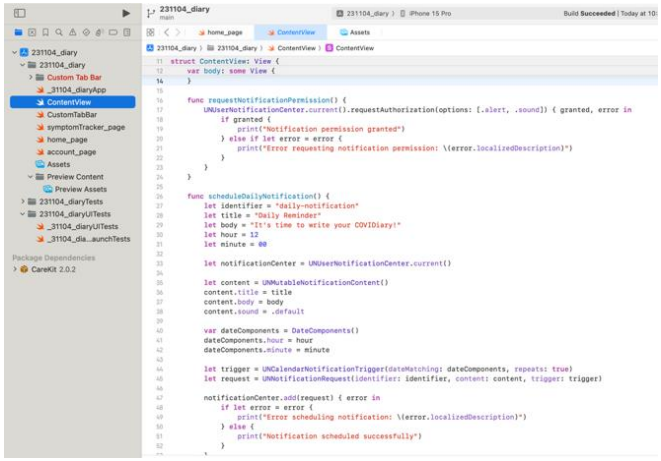

Figure 10 Xcode push notification

Features:

Our initial problem statement was, "How can a mobile solution address issues in the current healthcare system?" Focusing on healthcare, we chose long COVID patients as our specific target audience. Their challenge was feeling unheard and neglected. To address this, we developed an app aimed at meeting their needs by giving more attention to their struggles and offering solutions or additional information and resources.

6. Results:

Successes and Learnings:

We achieved more in this project compared to the last one by emphasizing coding and delivering tangible results, rather than getting stuck in the design phase. I was motivated to avoid wasting time, as we did in the previous project. Making decisive choices and maintaining a steady pace were key goals for me this time. However, I acknowledge that I still have room for improvement in the coding aspect. Reflecting on the action plan, I partially adhered to it but did not fully follow through with all the outlined steps.

Next Steps:

If our project advances, I think we would want to incorporate additional features into the app's functionality. Moreover, collecting user feedback on the project's status will be crucial for pinpointing areas of improvement and sustaining our current progress. Furthermore, our goal is to better understand our actual target audience and collect their insights about the current app, moving beyond individual opinions solely focused on the design.

7. Feedback sessions:

11/10/2023

We need to brainstorm to select a particular target audience for our app.

We've already conducted online research and performed a competitive analysis. Additionally, we have started the ideation process for the app's functionalities, and created a MoSCoW table that will be adjusted based on survey results. Also, we have begun thinking of the app's design concept, creating mood boards to align our ideas, and subsequently creating another mind map to gain a better perspective of our app's objectives.

We have also already created our first poster designs.

01/11/2023

- Good concepts, choose one for implementation.
- Users could find it motivating to track their progress and potentially identify patterns in their behaviour.
- The community appears to be a more accessible option compared to visiting a doctor, especially considering doctors' busy schedules with in-person appointments. Additionally, the 'Health Advisors' articles are more likely to be based on professional advice.
- Push notifications will be used for our hardware implementation through the symptom tracker. For instance, if users have been feeling unwell, an optional push notification could inquire, 'Are you feeling better?' along with daily reminders."

8. Technical case

(Video can be found in the GIT)
My technical task was ‘Tech Case 11: View navigation within your app.’ Despite facing challenges, such as misunderstanding the assignment and dealing with a forgotten password, I think I successfully understood and completed the task. From my understanding, the goal was to create a responsive navigation bar for various devices, ensuring compatibility with features like iPad Split View. So, I successfully implemented these aspects.

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   [3] Getting Data From API in Swift + iOS (Xcode 14 tutorial) - Beginners

   [4] Random dad joke

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