Sanofi Device Innovation Challenge

Submitted August 30, 2025

HALŌ

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01

Discover

Patients requiring subcutaneous drug delivery (SDD) currently face many challenges.

Around the world, **hundreds of millions** of people are living with **chronic diseases** that require regular intravenous (IV) infusions, which are **burdensome**.

To alieve the struggles of these many people, **large volume on-body delivery systems** offer a compelling solution by delivering the medication subcutaneously so that people may **self-administer** and **regain** large portions of their life.

Drivers

First, we researched existing solutions so that we could deliver a design with truly helpful features that wouldn't be infringing on other devices.

Current on-body delivery systems for various medications include OnPro®, YpsoDose®, Libertas®, enFuse®, and Gx SensAir®. These products all succeed in delivering medication with a few key similarities. They possess **simple visual indicators**, **cartridge fill systems**, **hidden needles**, and an **adhesive pad**.

However, these systems generally **fail** to accommodate **large volumes** of medication, are **single-use**, and **require significant involvement of a healthcare provider**.

Signals

To learn about what our users care most about in an OBDS design, we adopted an interview and analysis procedure taught by an ex-IDEO professor*. We began with raw excerpts from interviews, turned those into trends, and turned them into actionable insights.

**Credit to George Aye at Greater Good Studio: www.greatergoodstudio.com*

Interviewees*

Personal Facts

01. Amanda

- Has run multiple half-marathons
- Works at a food bank

02. Brian

- Long Island native
- Owns a cat that made an interview appearance

03. Claire

- Athlete and college student
- Enjoys water activities

04. Dylan

- Is working in New York
- Spends weekends exploring NYC

05. Elizabeth

- Enjoys cooking
- Spends lunch walking on the riverfront

06. Fred

- Outdoor enthusiast
- Skis and mountain bikes

**Pseudonyms were used to protect interviewees' identities*

Interviewees*

Experience with Subcutaneous Drugs

01. Amanda

- Has used multiple migraine-treatment injectables
- Currently uses Aimovig®

02. Brian

- GLP-1 user
- Has used both Saxenda® and Wegovy®
- Daughter also uses Wegovy®

03. Claire

- Manages Type 1 diabetes with continuous glucose monitor and external pump

04. Dylan

- Has used Zepbound® for the past 6 months

05. Elizabeth

- Used a GLP-1 for two months

06. Fred

- Manages Type 1 diabetes with OmniPod and Dexcom G7 devices

**Pseudonyms were used to protect interviewees' identities*

Guiding Questions

**SDD = Subcutaneous Drug Delivery*

01 *What role does SDD* play in a patient's life?*

02 *How can the process of SDD require less healthcare professional intervention?*

03 *What is the relationship between patients and SDD devices?*

A trend we found:

Patients only want to think about the treatment, not the process.

Signals

Even though our interview questions focused on the drug injection systems the interviewees used, they spent a lot of time on the effects of the drugs themselves.

“The worst part is really when the pharmacy doesn’t have it stocked.”

–Amanda

“Yeah, I don’t have many complaints other than that I wish [the GLP-1 drug] wasn’t necessary.”

–Brian

“Honestly, the part that stresses me out the most is the needle … I don’t want to stab my eye out.”

–Dylan

A trend we found:

There is no right answer to how drug delivery should look, but there are wrong ones.

Signals

There are many different drug delivery systems in use today, with as many ways of using each one.

“I went through three sets of instructions as well as a video online to figuring things out.”

–Dylan

“I had to learn how to change my pump starting at age 7 from a training by a nurse.”

–Claire

“I learned by watching a video the drug company supplied once or twice.”

–Amanda

“The old one I used had a reusable body that held the drug, then I supplied and screwed on the needles myself. Now it’s all just in the pen, which is nice.”

–Brian

A trend we found:

The positive parts of the process are far more consistent than the negative parts.

Signals

While all users agreed that they have no major qualms with the drug injection process, they each mentioned different pain points.

“One time, I saw a little air bubble through the window and I freaked out.”

–Brian

“The whole process is relatively simple, and there are good results.”

–Dylan

“The deployment assistant and process makes it hard to mess up and relatively painless.”

–Fred

“I never even would’ve tried to use the thing if I hadn’t watched the video explaining it first.”

–Amanda

A trend we found:

The features patients care most about give the device a place in their lives, and have little to do with drug delivery.

Signals

Each user we spoke to had their own way of customizing their drug injection process, and when asked about their favorite design features, they consistently mentioned those customizable parts.

“I have to carry around lots of different parts in the event of a site change, it’s very hard to travel.”

–Claire

“I know some people pinch the skin of their stomach, or I think you can use your arm, too, but I pull the skin of my thigh apart, instead.”

–Amanda

“I like how everything comes together in one kind of set.”

–Dylan

“I use an old Tupperware to store the old needles. I would definitely be more worried about throwing stuff out if I had little kids, though.

–Brian

Futures & Solutions

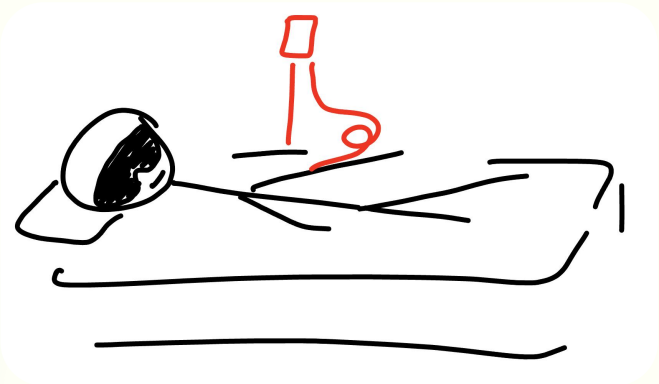
Before we started building practical solutions, we used the brainstorming method to clarify and distinguish what was **possible** and what was **needed** by patients and the challenge at hand.

Future 1: How might we take *"patients don't want to think about the process"* to the extreme?

- ➔ **Setting**: Patient's bedroom
- ➔ **Scenario**: Patients want to devote less thought and worry to the drug injection process.
- ➔ **Situation**: At the time of a user's bedtime routine, they've been wearing the (inactive) device ever since they remembered to put it on hours ago, and now they just hit one button and fall asleep.

Solution 1: Allow the SDD process to occur in the patient's sleep.

- ➔ **Stuff**: A wearable device that delivers drug volumes in such a way that doesn't disturb sleep.



Future 2: How might we use a *device tutorial* to increase the accessibility of the SDD process?

- ➔ **Setting**: Patient's kitchen
- ➔ **Scenario**: The knowledge of how to apply the device should be easily transferable and error-resistant by design.
- ➔ **Situation**: A patient is with family in the kitchen, with several loud kitchen processes occurring at the time. They have severe arthritis in their hands and need assistance with drug delivery. Their 16-year old grandchild offers to help the patient, but they don't yet know how to operate the device.

Solution 2: Integrate a verbal walk-through to allow patients' friends & family to help them through the injection process.

- ➔ **Stuff**: An OBDS device that gives consistent and easily-interpretable audiovisual feedback throughout a live tutorial of how to apply and use the device.

Future 3: How might we add to the existing *customizability* of self-injection devices?

- ➔ **Setting**: School
- ➔ **Scenario**: Patients will feel more comfortable with the drug injection experience if they can customize parts of it.
- ➔ **Situation**: A patient receives a new OBDS and is administering it around young children. The children don't like needles, so you replace the needle viewing window with an opaque shield.

Solution 3: Develop an OBDS that has assemble-your-own components for aesthetics + functionality.

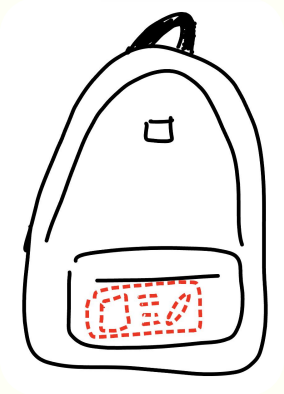
- ➔ **Stuff**: A device with interchangeable components to allow for repairability and customization, e.g. a viewing window cover, interchangeable audiovisual feedback modules, or an attachable strap for additional device stability.

Future 4: How might we allow the device to be easily usable in *unusual settings*?

- ➔ **Setting**: Airplane lavatory
- ➔ **Scenario**: Patients don't want to check an entire bag filled with medical supplies.
- ➔ **Situation**: A patient is on an international flight when they realize they need to replace their OBDS. They unzip their pocket-sized OBDS kit, complete with all injection components and waste disposal tools.

Solution 4: Peripheral accessories to the OBDS that make the device easier to use in out-of-home settings.

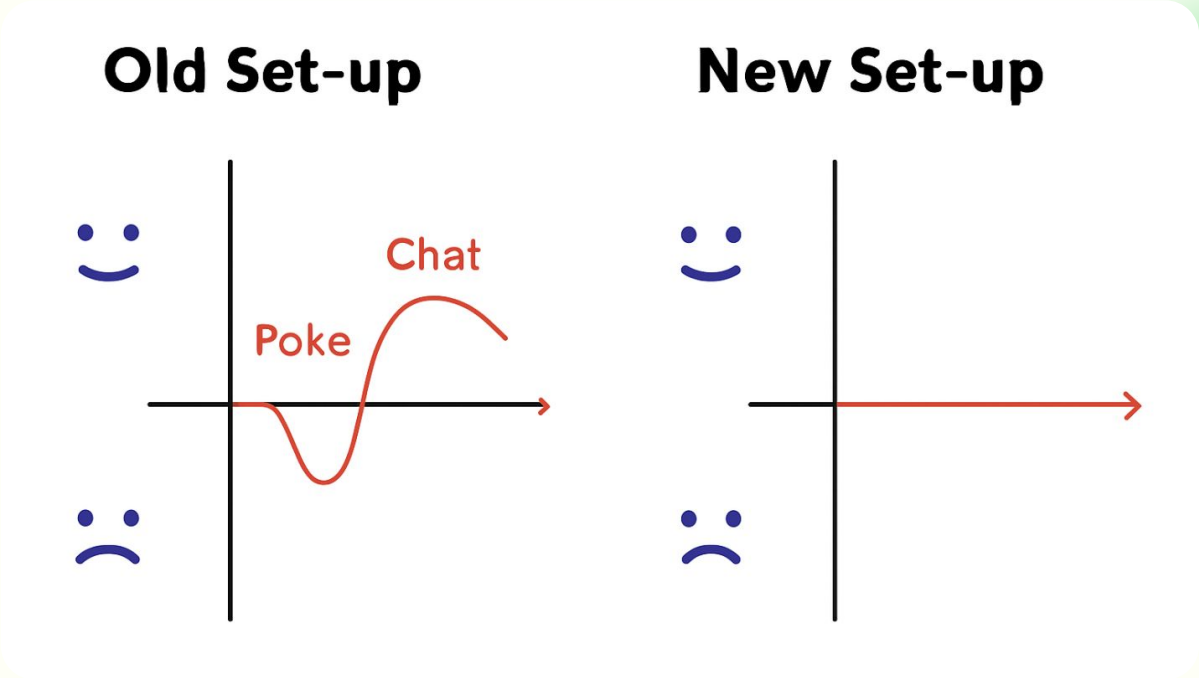
- ➔ **Stuff**: A sewing-kit sized pouch that includes an OBDS system, reloadable drug, spare batteries, an alcohol wipe, and a miniature sharps container to allow for the full replacement of a patient's wearable.



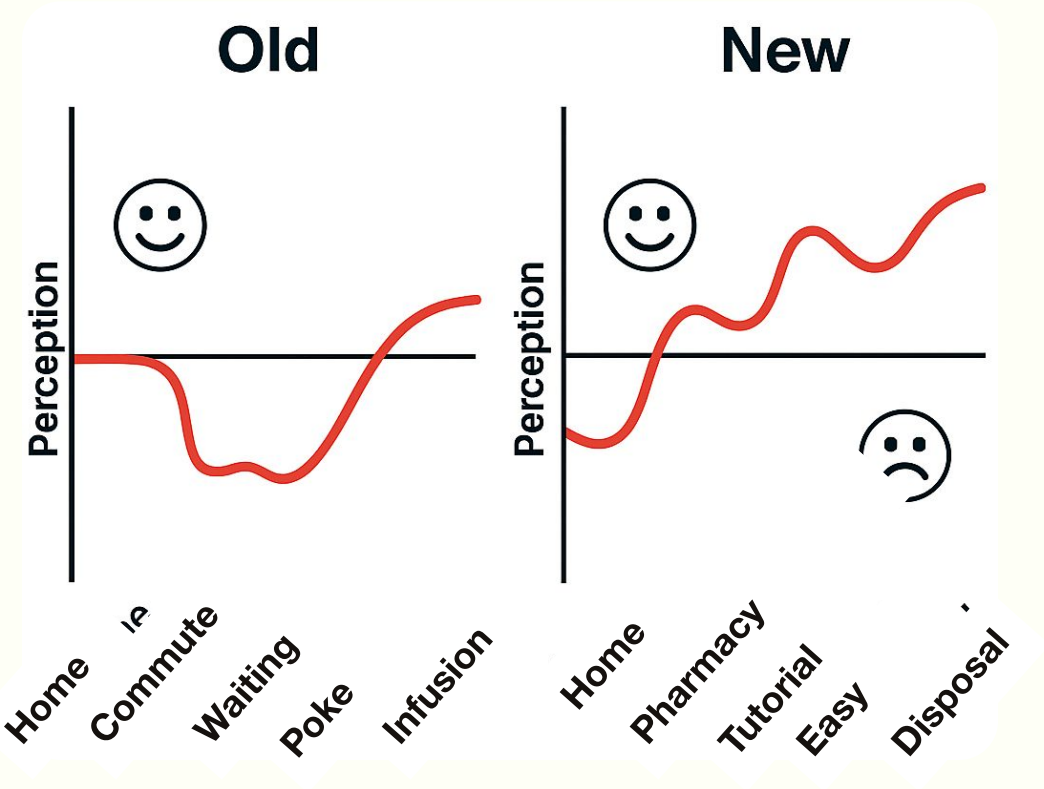
Stakeholder Journey Maps

We then developed two Stakeholder Journey Maps: one for **healthcare professionals** who would usually be involved in subcutaneous drug delivery, and one for the **patient** (our user).

Stakeholder Journey Map #1: Healthcare Professional



Stakeholder Journey Map #2: Patient



the Why?

Drivers:

- Patients with chronic diseases need to spend a lot of time regularly taking medication intravenously.
- Current on-body delivery systems lack many features required to allow for the self-administration of these medications.

Trends:

- Patients only want to think about the treatment, not the process.
- There is no right answer to how SDD should look, but there are wrong ones.
- The positive parts of the process are far more consistent than the negative parts.
- The features patients care most about give the device a place in their lives, and have little to do with drug delivery.

Futures:

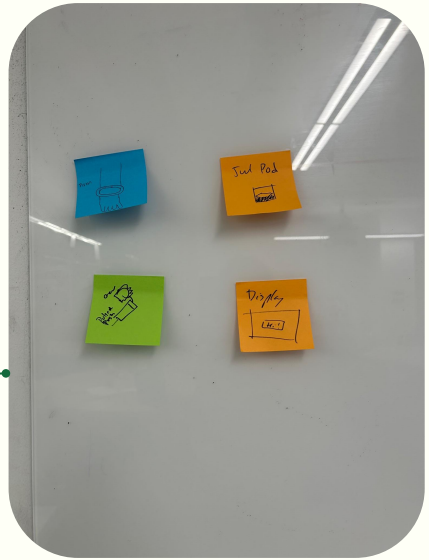
- **HMW** take *"patients don't want to think about the process"* to the extreme?
- **HMW** use a *device tutorial* to increase the accessibility of the SDD process?
- **HMW** add to the existing *customizability* of self-injection devices?
- **HMW** allow the device to be easily usable in *unusual settings*?

02

Design

First, we used the How Might We? framework to generate of lots of ideas.

Some about mechanisms, some about user experience, and some silly ones to keep us on our toes.



The winning ideas

Then, we developed some **proof-of-concept** prototypes to show off to our interviewees...

Prototyping Plan: Medicine Bubble

Sketch

Prototype

Key Assumptions

- Users are familiar with bubble-like fluid containers from the beverage industry
- The familiarity of mechanism will be both physically pleasing and confidence-inspiring for users

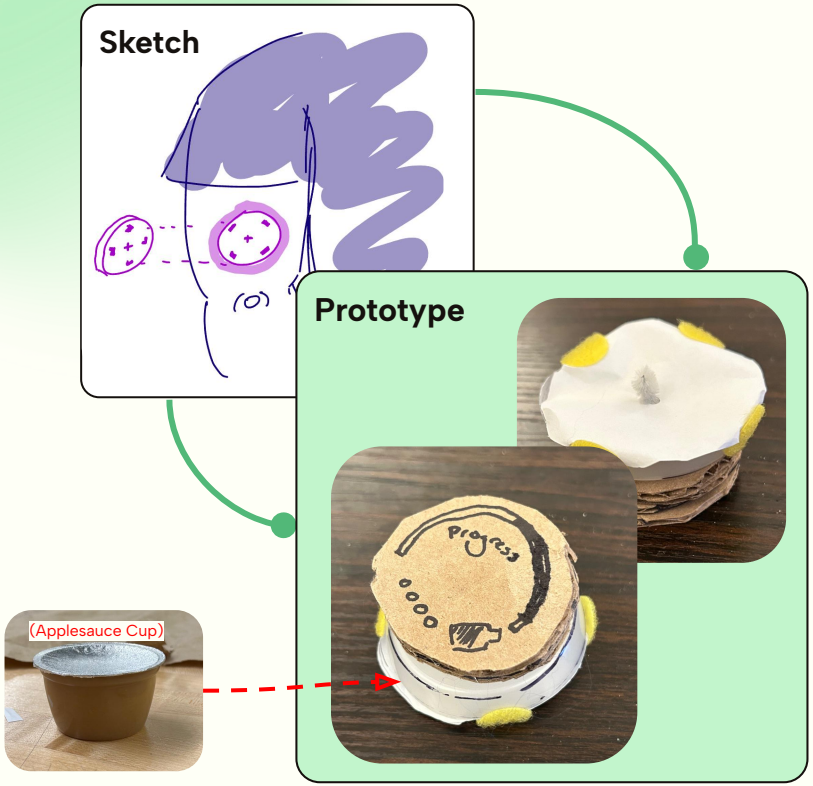
Test Points

- User familiarity with bubble mechanism
- Usability at unusual drug loading angles

Materials

Sculpting compound container, plastic straw, resealable bag, rubber band, hot glue

Prototyping Plan: Twist-On Mechanism



Key Assumptions

- A two-piece design will aid product sustainability
- Twisting mechanism will allow greater feeling of security in the OBDS

Test Points

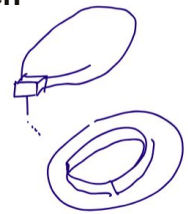
- UI/feedback features
- Available body locations for application
- Device-clothing interactions

Materials

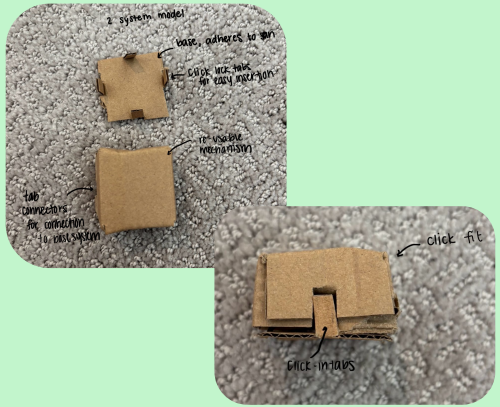
Applesauce cup, hot glue, permanent marker, velcro, cardboard, pipecleaner

Prototyping Plan: Two-system model

Sketch



Prototype



Key Assumptions

- Minimizing product waste supports sustainability efforts
- Electronics can be reused

Test Points

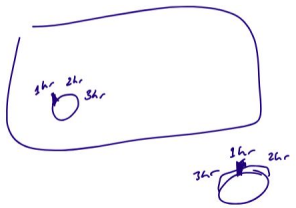
- Attachment of two systems
- Device performance with integrated two-part system

Materials

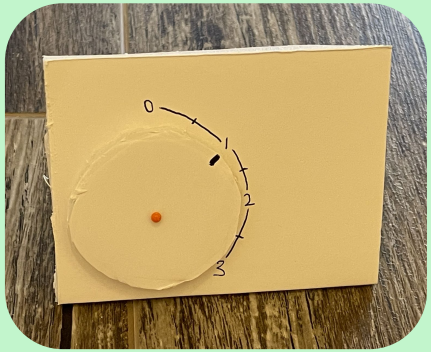
Cardboard

Prototyping Plan: Twist Timer

Sketch



Prototype



Key Assumptions

- Users want an easy method to know how much time is left
- Doctors want control over flow rate

Test Points

- The size of readability of the knob
- The location and positioning of the knob

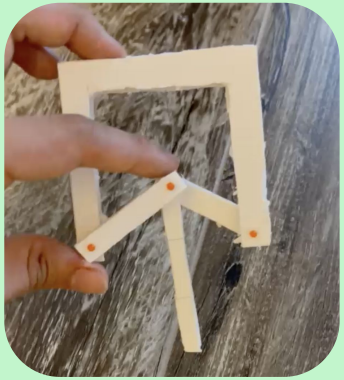
Materials

Foam Board, Pins

Prototyping Plan: Button Plunger

Sketch

Prototype



Key Assumptions

- Users want single step application
- Users want to be able to easily stop administration

Test Points

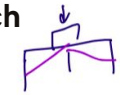
- Injector insertion and retraction speed
- Force required to deploy injector

Materials

Foam Board, Pins

Prototyping Plan: Button needle deployment

Sketch



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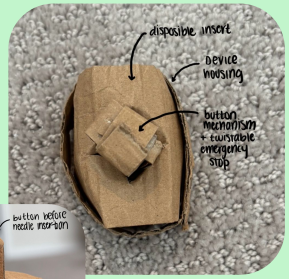


Key Assumptions

- A quick deploy/release needle support patient needs and reduces fear/risk

Test Points

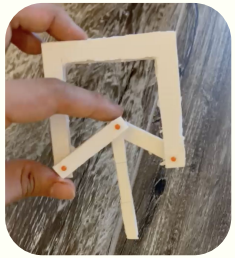
- Force required for deployment
- Ease of retraction and emergency stop

Materials

Cardboard

the What?

- ➔ **These prototypes were built as proofs-of-concept to share our thought process with our initial interview participants.**
- ➔ **We built prototypes that:**
  - ◆ Show the **size** of the OBDS we're planning to build
  - ◆ Interviewees can picture interacting with in **everyday settings**
  - ◆ Take engineering jargon out of the conversation of important device **mechanisms**
  - ◆ Began looking into key project requirements, including:



Needle
Injection/Retraction

Form Factor
For convenience and comfort

Usability
For patients of all backgrounds and ability levels

03

Refine

Next, we ran our ideas by our original interviewees, and listened to what they had to say.

Simplicity

The users we met described a strong desire for simpler solutions.

“Let the device handle the needle! It's better if we can do all that automatically.”

–Amanda

“The fewer pieces I need to worry about the better. If I can just pick it up and without mirrors or needles or anything use it, that would be ideal.”

–Dylan

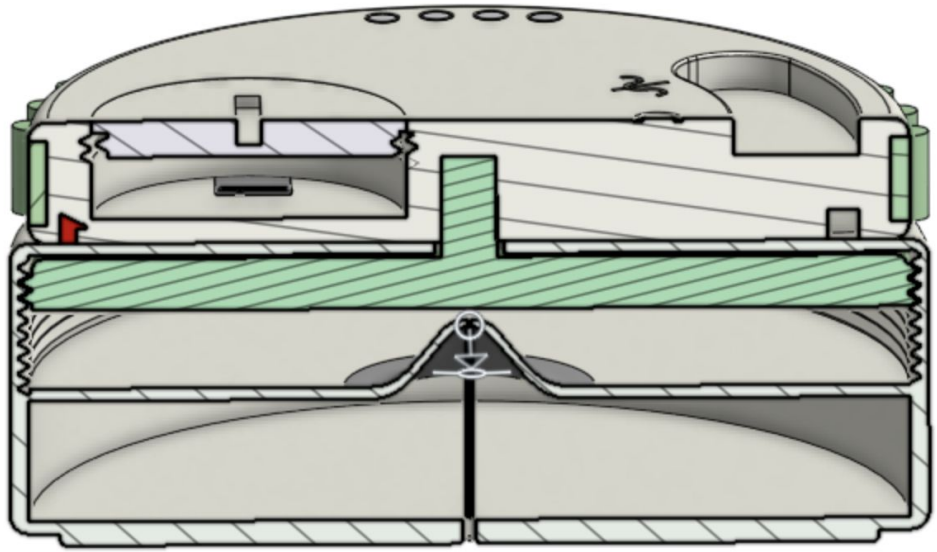
“Simpler controls are better. Especially as we get older built-in, simplified controls are easier.”

–Brian

Function

Users expressed a need for simplicity without complex moving parts.

The design features a streamlined mechanism that integrates progress monitoring, drug delivery, and automatic needle deployment



Device Feedback

Ideally, all of the complexity in the device can be simply communicated to the users for their use.

“Something that can tell me that everything is working properly.”

–Claire

“I like to change the location of injection so it being clear from multiple angles would definitely be helpful to me.”

–Brian

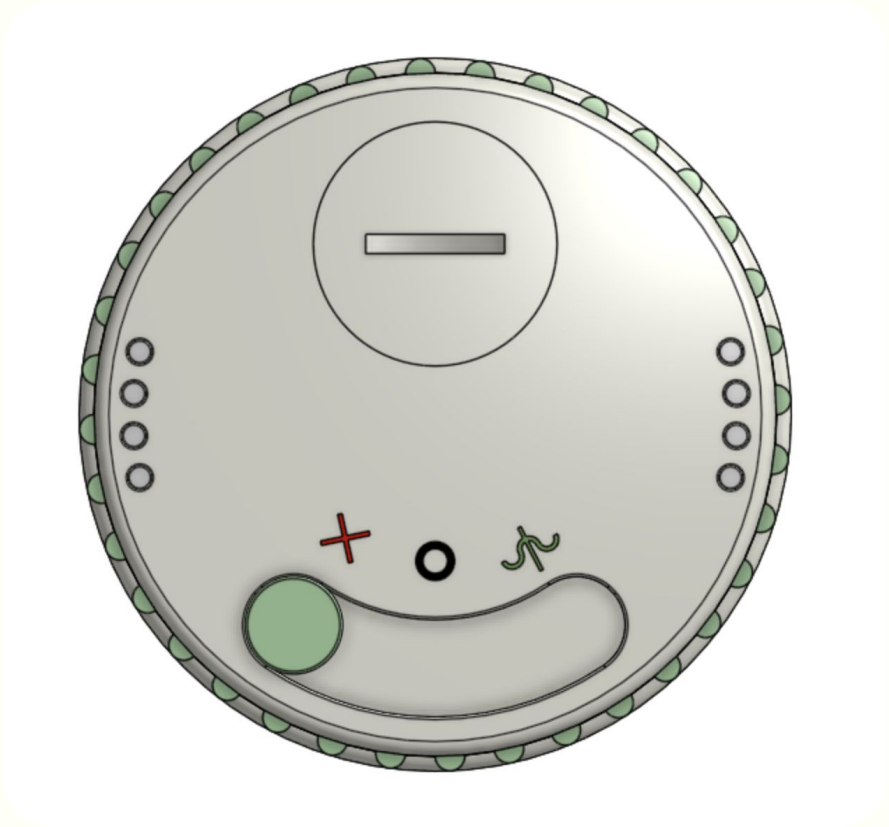
“I want to be able to see and hear that it is working. I don’t need to see the needle, but want to be reassured.”

–Elizabeth

Function

Feedback outlined a need for patients to be able to monitor treatment progress regardless of where the device is located.

The face of the device offers light indicators for treatment progression and needle deployment status.



Lifestyle Compatibility

The ease in which the device adapts and conforms to the user's lifestyle is essential to them.

"I don't mind if anyone sees it. I can explain it. I just want it to be discrete and in the background."

–Fred

"I'm always on the move, so keeping it out of my way is super important. And not just mine when my kids are around."

–Amanda

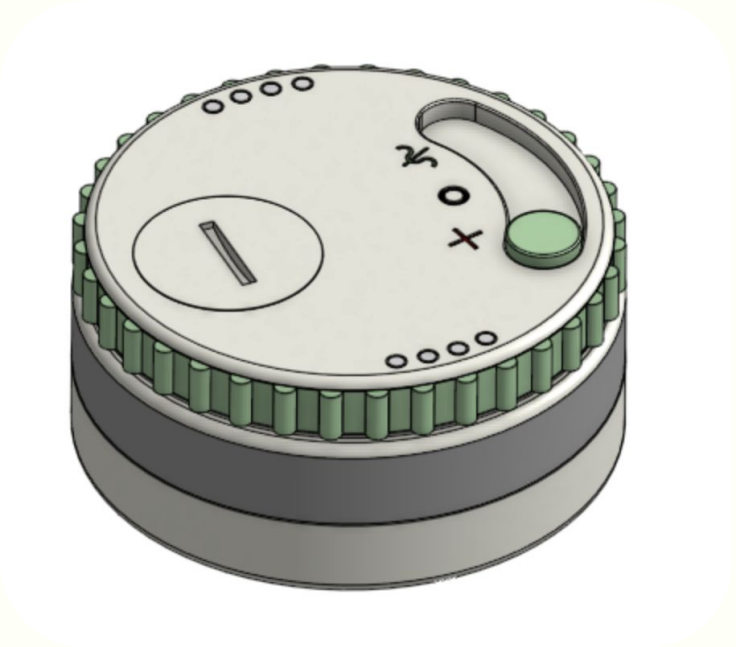
"I want to forget that it is even on me. No stinging or jostling before, during, or after."

–Dylan

Function

Feedback indicated that patients need to be able to perform everyday activities without interference from the device.

The low profile design of the device allows patients to maneuver without interference and easily make adjustments to their treatment regimen.



The Numbers

7 cm Diameter, 3.4 cm Height

The HALŌ's small footprint means breathability and minimal skin irritation for users, while its height allows it to be easily worn under loose-fitting clothing.

25 gauge, ⅝" Needle

One of the HALŌ's most important components, the needle complies with industry-standard geometry, meaning it's easily sourceable and safe for SDD.

650 mAh, CR2450 Battery

This easily consumer-replaceable battery strikes the balance of convenience (can be found in many grocery stores) with capacity.

the How?

- ➔ **The initial design combines user feedback with product functionality to best suit patient needs.**
- ➔ **Our design captures the critical needs outlined by users:**
  - ◆ Simplicity
  - ◆ Device Feedback
  - ◆ Lifestyle Compatibility
- ➔ **With design choices and materials to optimize performance:**
  - ◆ Automated needle deployment and retraction
  - ◆ Durable recycled plastic housing
  - ◆ Low-profile with long lasting adhesive

04

Next Steps

What do we have?

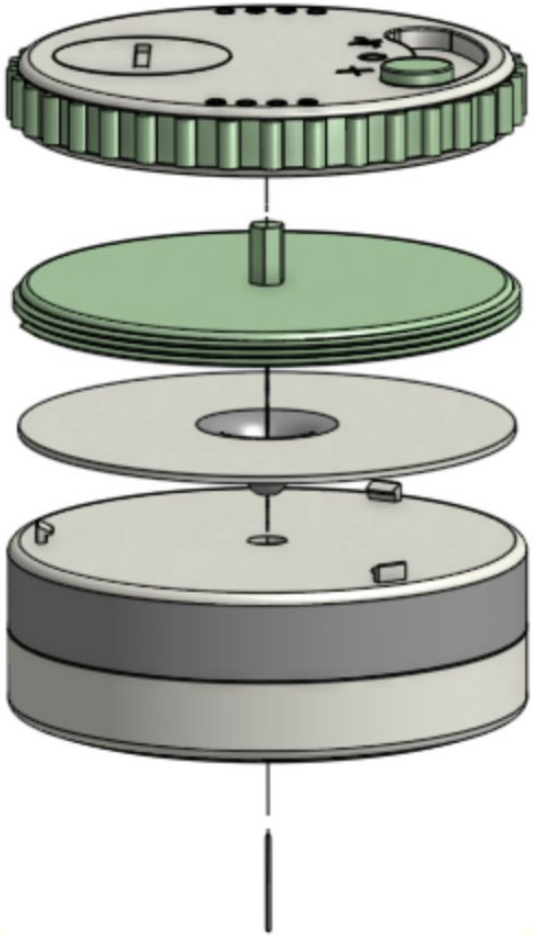
- Automatic and fast needle insertion and retraction
- Simple visual feedback on treatment progression
- A large reservoir in a small form factor
- Tight dose customizability and control

What do we need?

- Electronics design and layout for reusable casing
- Material selection for reusable reservoir
- Device weight and stability on the user

What do we need to test?

1. Reservoir materials
   - ➔ Part of the reservoir will need to flex and snap the needle forward and back.
   - ➔ Funding will be allocated to determine the physical and biological properties of different plastic materials
2. Manufacturing tolerance
   - ➔ The reservoir needs to have a tight seal to prevent contamination and allow for finer control
   - ➔ Funding will be used to find different manufacturers and investigate different development techniques
3. Electronics efficiency
   - ➔ To keep the device as light as possible while requiring the least set up and maintenance, the battery requirements must be investigated.
   - ➔ Time needs to be spent developing simple hardware and precise electrical controls.



05

Conclusion

the Why

Patients with chronic diseases do not have access to physical infrastructure that allows for greater independence through self-administration.

Further, they want to be able to focus on living their lives alongside their health condition(s), not the details involving the medication and treatment process.

the What

Our prototypes were proofs of concepts for a comfortable device that fits within the lifestyle of patients. The features we tested were simple and focused, increasing our chances for high-quality feedback from the subcutaneous drug users we interviewed.

the How

The HALŌ's simple design focuses on integrating with the patient's lifestyle in a discrete manner through features such as automatic needle deployment and retraction, a durable recycled plastic housing, and a low physical profile with built-in, long-lasting adhesion.

to our interviewees for sharing their thoughts and experiences, and to the people who helped us connect with them. *And to you, for reading this far!*

CREDITS: This presentation template was created by **Slidesgo**, and includes icons by **Flaticon** and infographics & images by **Freepik**

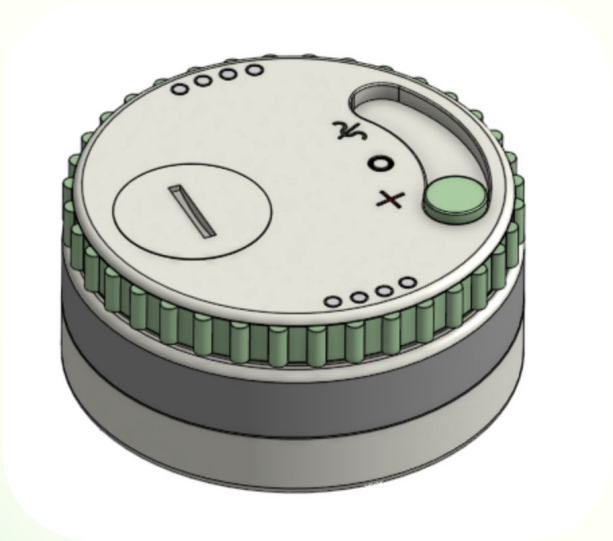
Thank you...

06

Appendix

What is the current design?

Product Design

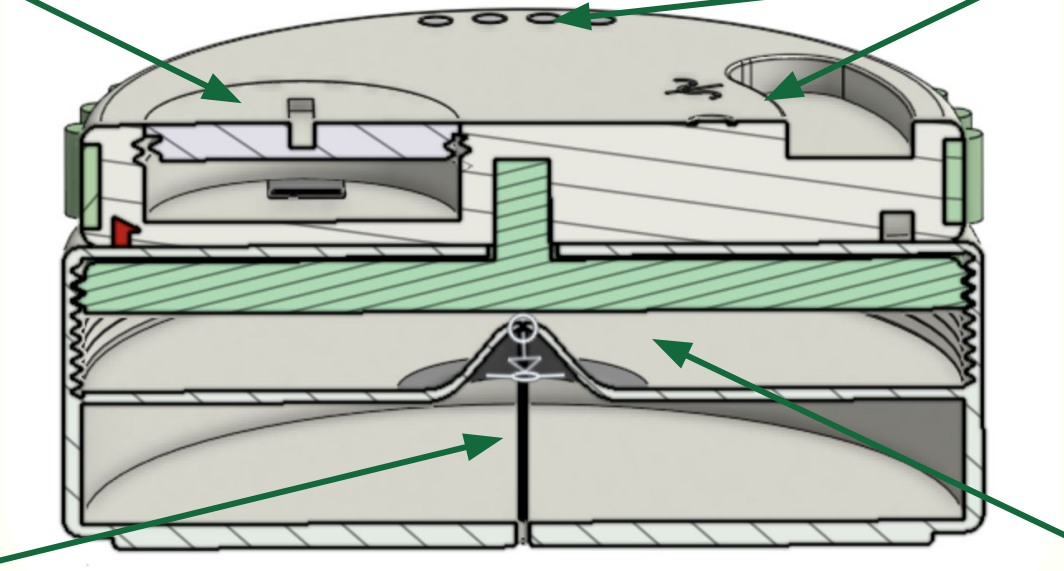


Features

- Two-part system with reusable electronics module and disposable needle/drug cartridge
- Integrated dial indicators and retraction mechanism provide intuitive user feedback
- Rechargeable battery supports long-term sustainability, with easily replaceable components to extend product life

Easily accessible battery housing for rechargeable button battery improving device sustainability

Indicator system for patients to monitor treatment progress, needle position, and flow rates

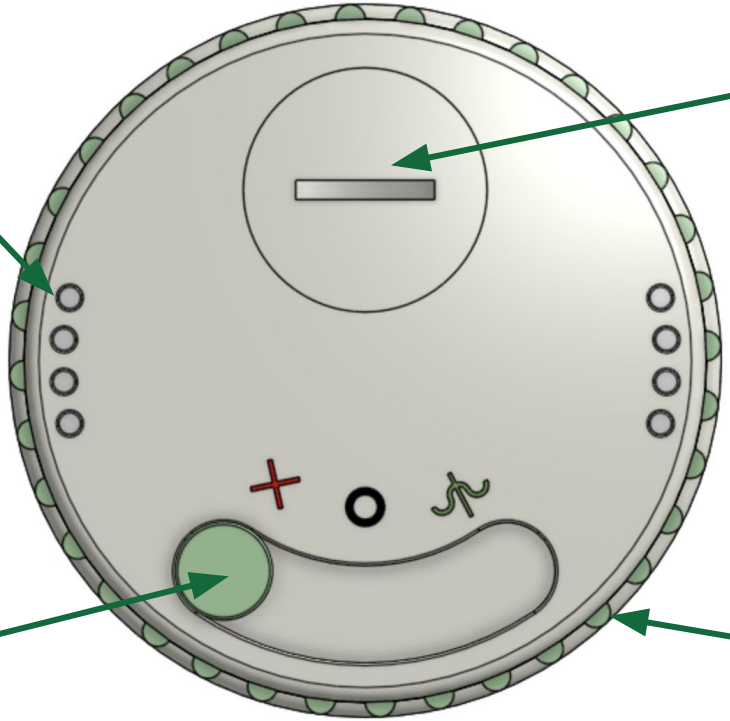


Needle housing mechanism with seamless deployment and retraction capabilities

Drug compartment for up to 25 mL of liquid and threaded plunger path for continuous drug delivery

Indicators for patient feedback of therapy progress

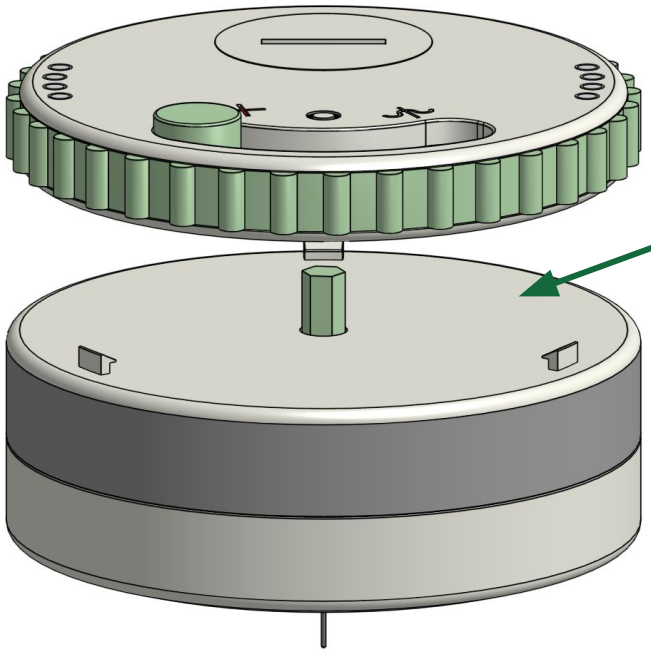
Standardized battery access for accessibility



Easy to operate knob with visual indicators for needle stage

Dial for flow rate adjustment and tactile user feedback

Reusable electronics system with easy attachment to disposable system



Click-in fit between electronic and reusable modules for reliable connection and replacement

Disposable system with needle system and drug compartment

What's it made of?

Housing

- Polycarbonate for durability and low-cost manufacturing
- Recycled manufacturing program to support sustainability efforts

Electronics

- Standard button battery for rechargeable capacity and easy replacement
- Custom circuit board and micro-pump

Reservoir

- Biocompatible synthetic polymer (ex. polyolefins) for drug compatibility and leeching preventative

Needle

- Steel medical grade insertion needle with rapid deployment and retraction

Adhesion

- Irritant free adhesion pad leveraging gecko-skin properties for long lasting adhesion and comfort

Thank you!