

Sophie Montgomery

DDR

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Deploy Research |
Data Collection and
review | Finalise draft +
Initial Concept

06

Data Collection and
Review | Finalise draft
+ Initial Concept

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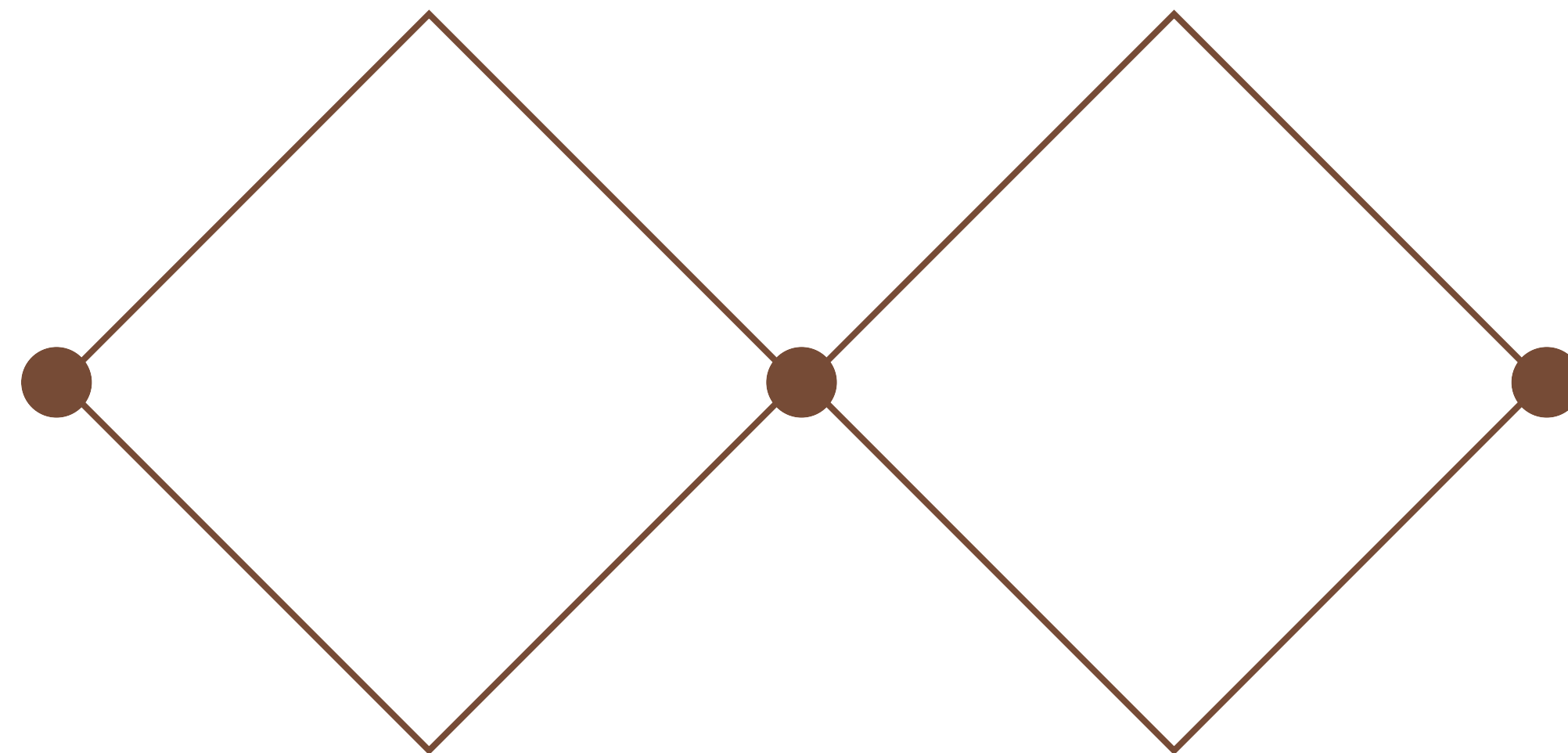
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Initial Concept Dev | A1
Part 1

Initial Concept Dev | A1
Part 2 | Concept
Features Technical

Initial Concept Dev | A1
Part 2 | Concept
Features Technical



Prototyping Stages

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- Prototyping
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- Technical

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- User Experience
- User testing
- Ergonomics
- Technical

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- User Experience
- Interface Validation
- User Testing

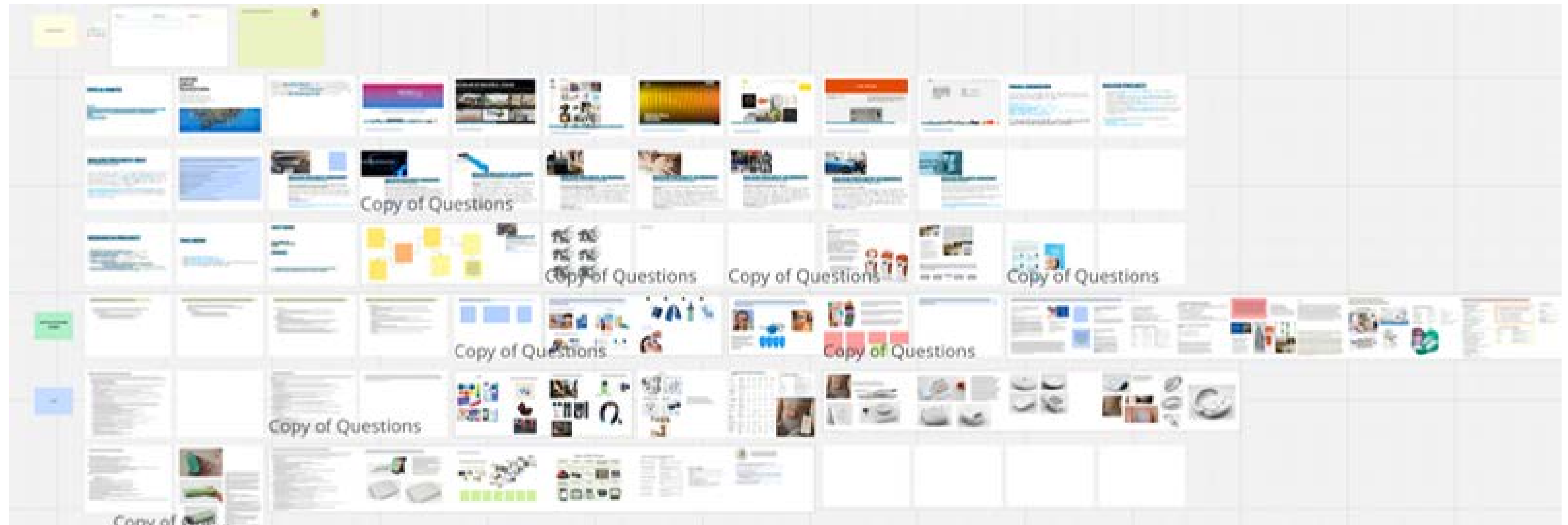
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Review details and A02 Due

01 week

Week Overview



Tutor Feedback

Things to do | 4

Re-view lecture and write notes

Research automotive vehicle topic and email Dan and Raf for questions

Research mood board and what I am interested in

Research medical, environmental, social justice and physically impaired issues that need industrial design development

Questions to Ask | 3

What is automotive vehicle topic about and what information will be provided and what scope will I be researching

Is the eye/ optometry industry a popular topic?

is medical adherence an interesting topic?

Other Notes | 2

Contact Anika about kids with high-functioning autism and what communication devices do they have issues and challenges with

Use Vizcom to ideate ideas for Tens machine

+ Tutor Discussion feedback



- explore the automotive vehicle topic
- Look into the 'halo' project for the internal mapping signage to signify where the user was, is and will go on their train journey
- the industry topic 'department of transport and main roads' has four years worth of research
- there is a CAD document that has pre-existing automotive vehicle
- there is a gap in the transportation market for designing for physically impaired users - such as blind, low vision, wheelchair users and deaf users

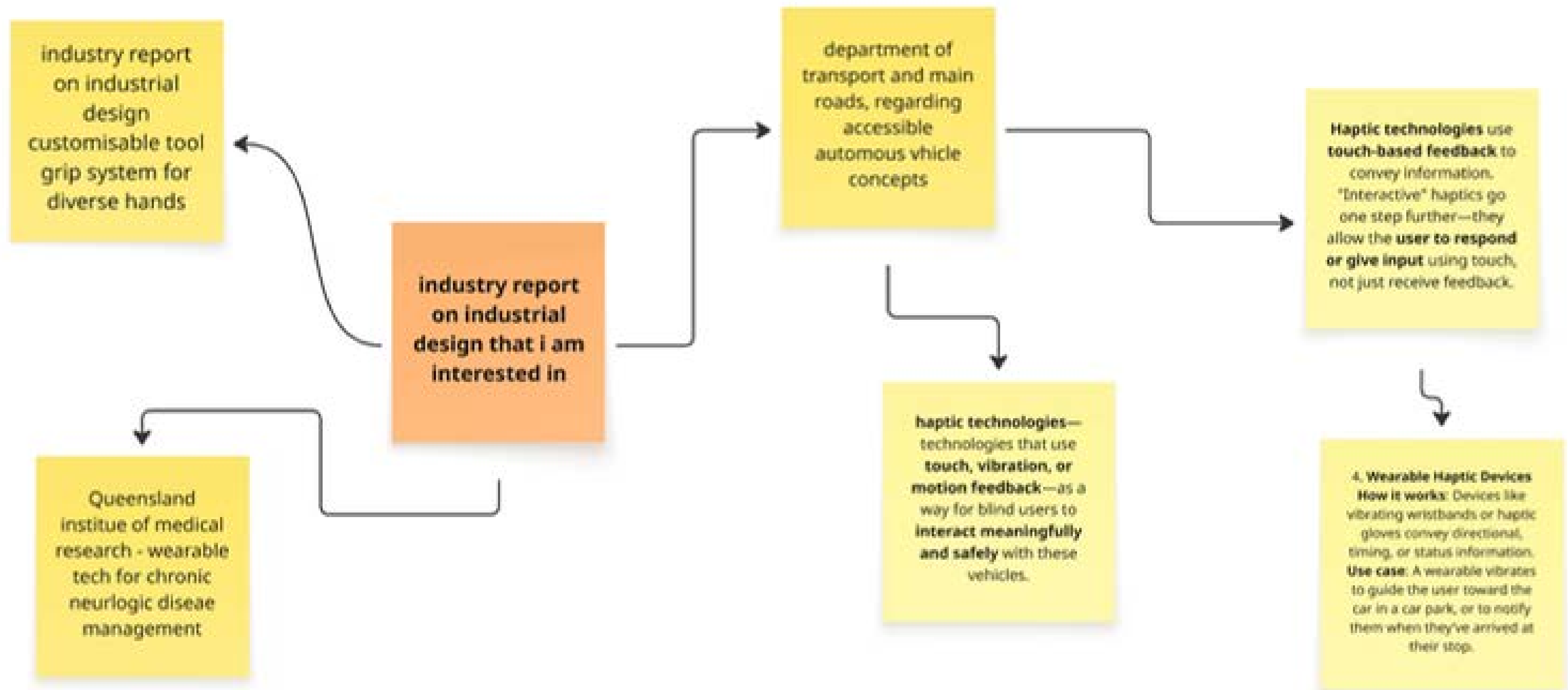


- the topic of optometry is interesting
- the glaucoma topic has the most innovation for products to explore and research
- keep going



- Working with kids in the high autism context is really difficult and hard to get permission for - getting kids feedback is impossible
- being able to get first hand feedback about how kids interact with communication devices is difficult, however you can video their sessions with OT if they have parental consent

Research - Industry Project Exploration



Research - Problems in Optometry Industry



eye patient care issues

blind/ low
vision users - AI
route mapping
glasses /
hearing aid

Eye patch for kids with one
less developed eye and need
to cover
- to reduce social stigma /
sensory issues

kid friendly, adult
and elderly
patient who
shake - help with
eye drops

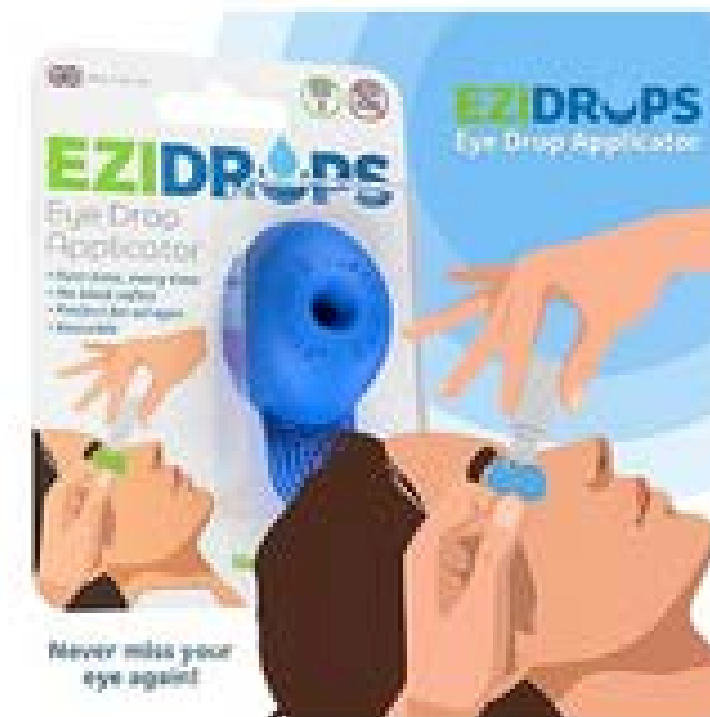
Research - Problem 1 in Optometry

Kid friendly, adult and elderly patient who shake - help with eye drops

Opticare Eye Drop Dispenser



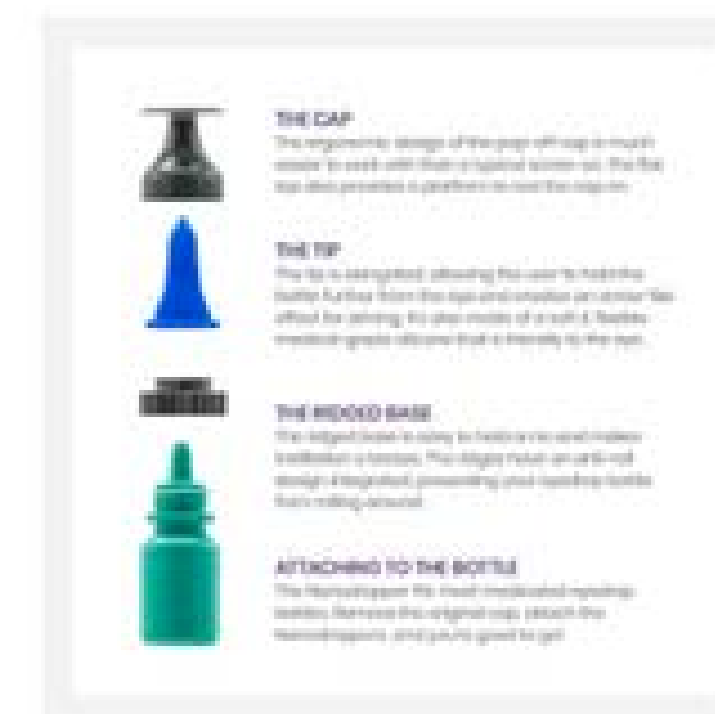
ezi drops



auto speeze eye drop aid



Nano drop



Research - Problem 1 in Optometry



gentle drop



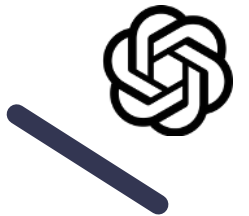
Research - Problem 2 in Optometry

Eye patch for kids with one less developed eye and need to cover



negative social stigma with product – looks uncool





Research - Problem 2 in Optometry



Core issue: Occlusion therapy intentionally blocks the stronger eye to force the weaker one to work harder.

Result: This **reduces the child's overall visual function**—depth perception, peripheral vision, hand-eye coordination.

Impact: Kids may struggle with **schoolwork, sports, reading, and even basic movement**, leading to frustration or disengagement.

Discomfort and Skin Irritation
Physical limitations: Eye patches often use adhesives or straps that can cause:

Skin irritation or rashes
Sweating, itching, or pain

Social Stigma and Self-Consciousness
Social experience: Many kids feel embarrassed or isolated when wearing a patch, especially in school or public settings.

Bullying risk: Eye patches are highly visible and may draw unwanted attention or teasing from peers.
Impact: Children might refuse to wear the patch or feel shame, affecting emotional wellbeing and compliance.

Cognitive and Behavioral Resistance
Age-specific frustration: Young children often don't understand the reason for patching and may remove or damage it.
Boredom: With one eye covered, kids often lose interest in tasks or play, especially screen-based or fine-motor activities.

Reduced Interaction with Digital Interfaces
Tech limitation: Many modern toys, tablets, and games are visually complex, requiring full binocular vision.
Problem: Patching the dominant eye makes it difficult to:
Read small text
Play video games
Interact with touchscreen apps

Lack of Feedback or Engagement
Therapy is passive: Simply wearing a patch does not actively engage the weaker eye in structured vision tasks.
Impact: Kids often don't see the "point" of wearing it unless combined with engaging vision therapy exercises or gamified systems.

Poor Personalization or Inclusivity
Most patches are one-size-fits-all, lacking child-specific design, aesthetics, or preferences.
Limited consideration for neurodivergent children or those with tactile sensitivities (e.g., children with autism or sensory processing issues).

a child-centered smart patch that transforms boring or frustrating occlusion therapy into a customizable, interactive experience that kids enjoy.
It empowers children, supports parents, and improves treatment outcomes through positive UX design, sensory comfort, and playful engagement.

Research - Problem 3 in Optometry

improving treatment of glaucoma devices - dosing aids and adherence devices

Programs to optimize adherence in glaucoma

Denise Kowling¹, Dawn Messer, Scott Siegle, Ryan Webb, N-PGAD Study Group

Collaborators, Affiliations: 4 sources
PMID: 20630372 DOI: 10.1016/j.oph.2009.08.021

Abstract

Purpose: This study was designed to raise awareness of the materials, devices, and Internet resources available to improve adherence to use of medications for the treatment of glaucoma and to review new devices under development.

Methods: A review of current indexed literature and Internet resources was conducted.

Results: A variety of educational brochures, pamphlets, and fact sheets promoting adherence to ocular hypotensive medications are available through multiple organizations and are easily accessed and ordered on the Internet. Video and Web-based patient educational tools have been designed to support patient adherence to glaucoma management plans and promote open dialogue between patients and providers. Reminder and recall systems that integrate with office software can be sent to cell phones as well as e-mails and personal digital assistant (PDAs), alerting patients to upcoming appointments and reminding them to instill their drops. Bottle devices with dosing support (timers with audible and visual signals and dispensing aids) and electronic monitoring have been shown to promote adherence. New products currently under development to improve the delivery of medications include nanoparticles, punctal plugs, and contact lenses that release glaucoma medications.

Conclusions: Many educational materials, services, Internet resources, and devices are available to optometrists to encourage patient adherence to glaucoma treatment and management.

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Programs to optimize adherence in glaucoma - PubMed

Many educational materials, services, Internet resources, and devices are available to optometrists to encourage patient adherence to glaucoma treatment and management.

- dosing aids
adherence
devices for
glaucoma
therapy

Developments in dosing aids and adherence devices for glaucoma therapy: current and future perspectives

Scott Y. Kurbani¹

Affiliations: 4 sources
PMID: 17568236 DOI: 10.1055/s74244404.2.207

Abstract

Glaucoma is a leading cause of blindness worldwide. Currently, topical drops are the mainstay of treatment for patients who suffer from this chronic disease. Adherence to topical therapy is known to be affected by forgetfulness, frequent dosing requirements and physical limitations. Dosing and adherence aids are designed to help patients adhere to their prescribed therapeutic regimens. This review discusses commonly used dosing and adherence aids, and offers opinions on how future devices may improve on currently available technology.

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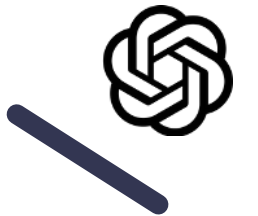
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tools need to be designed
to support patient
adherence to glaucoma
management plans and
promote open dialogue
between patients and
providers

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Research - Problem 3 in Optometry



🔍 What Are Eye Dosing Aids?

Eye dosing aids are devices designed to:

- Improve accuracy in administering eye drops
- Reduce physical barriers (e.g. tremors, poor hand strength)
- Promote adherence by reminding or guiding users
- Support communication between patients and providers about medication use

🔍 Gaps & Opportunities in Current Products

Challenge	Current Limitations	Opportunity
Forgetfulness	Basic devices don't remind or notify	Smart reminders (vibration, calendar sync, mobile alerts)
Fear or discomfort	No feedback, no desensitization	Haptic feedback, gamification, gradual exposure tools
Poor communication	Data isn't shared with provider	Bluetooth sync + clinician dashboards or QR summaries
Dexterity issues	Aids don't fully stabilize hands	Ergonomic, wearable drop guides with stabilizers
Low engagement	Devices look clinical, hard to use	Emotionally-designed, discreet tools (e.g. pen-style or wrist wearable timer)

💡 Industrial Design Opportunity Example

Concept: "OptiFlow" — a smart cap and ergonomic dispenser sleeve for eye drop bottles, with:

- Built-in light & sound feedback for correct dose
- Gentle haptic cue to guide breathing during use
- Logs usage, sends daily summary to app
- App includes interactive calendar and "ask your doctor" button
- Can be branded playfully or professionally depending on audience (seniors vs young adults)

Review of glaucoma medication adherence monitoring in the digital health era

Alaa Erbas^{1,2}, Rita Shabirini^{1,2}, Robert H. Weinstock¹, Sally L. Barber^{1,2}

• Author information • Article notes • Copyright and License Information

PMCID: PMC8317037 NIHMSID: NIHMS1724902 PMID: 33658817

The publisher's version of this article is available at [Br J Ophthalmol](#) 10

Abstract

Current glaucoma treatments aim to lower intraocular pressure, often with topical ocular hypotensive medications. Unfortunately, the effectiveness of these medications depends on sustained patient adherence to regimens which may involve instilling multiple medications several times daily. Patient adherence to glaucoma medications is often low. Recent innovations in digital sensor technologies have been leveraged to confirm eyedrop medication usage in real-time and relay this information back to providers. Some sensors have also been designed to deliver medication reminders and notifications as well as assist with correct eyedrop administration technique. Here, we review recent innovations targeted at improving glaucoma medication adherence and discuss their limitations.

Research - Problem 3 in Optometry

Non-adherence to glaucoma medication is multifactorial. Robin and Muir grouped non-adherence to topical glaucoma medication into five dimensions: patient-related, social and economic, health-care system, therapy-related, and condition-related dimensions.¹

Digital sensor technologies for glaucoma medication adherence monitoring

Abstract

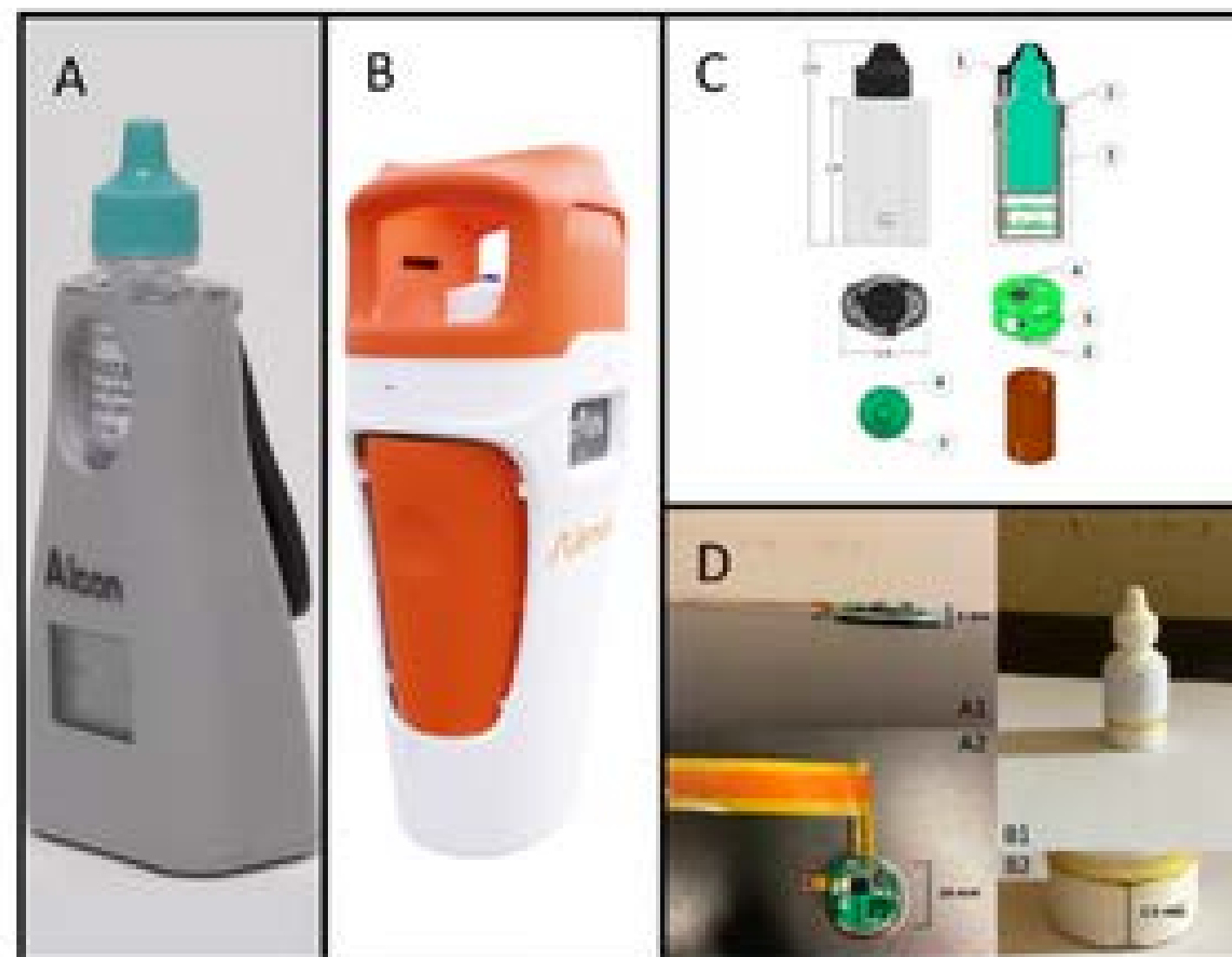
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Review of glaucoma medication adherence monitoring in the digital health era

Current glaucoma treatments aim to lower intraocular pressure, often with topical ocular hypotensive medications. Unfortunately, the effectiveness of these medications depends on sustained patient adherence to regimens which may involve instilling ...



Digital sensor technologies for glaucoma medication adherence monitoring. (A) The Travatan Dosing Aid. Reprinted from Friedman *et al.*¹⁰⁸, Copyright (2007), with permission from Elsevier. (B) The e-Novelia Smart add-on for ophthalmic droppers. Available from: <https://www.nemera.net/smart-ophthalmic-add-on-e-novelias/>. (C) An intelligent sleeve with embedded sensors to quantify adherence and fluid level for glaucoma medication. Bar magnets (1) are placed in the cap, reed switches (2) in the sleeve sense cap removal, the two-part capacitive sensor (3) has two copper sheets (a) and (b) surrounding the bottle, electronics are embedded in an nRF51422 system-on-a-chip (4), Bluetooth low energy (5) is used for data transfer, and the system is powered with a single rechargeable coin cell battery (6). Reproduced with permission from Payne *et al.*⁶⁸ (D) A smart drop sensor system comprised a thin conductive pressure-sensitive electronic sensor, for bottle squeezing detection and an electronic circuit (<2 mm thick) for signal processing and wireless transmission, in lateral view (A1) and top view (A2). The flexible sensor is contained underneath the label (B1), with electronics at the base (B2). Reproduced with permission from Aguilar-Rivera *et al.*⁶⁹

Research - Problem 3 in Optometry



in-market device - blood glucose meter/ reminder/ kit

Free of Worry
User-friendly design makes it perfect for the elderly



Large Screen Display Smart Voice Self-Checking Card

Sinocare



Caring for love

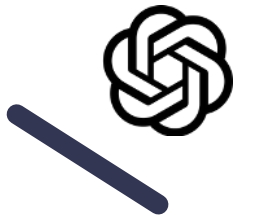


★ **Summary: Product Types**

Category	Example Products	Best For
Automated Dispensers	Hero, MedMinder	Complex regimens, seniors
Smart Packaging	AdhereTech, Popit	Monitoring adherence
Low-tech Reminders	TimerCap, e-pill	Simplicity, low cost
Voice/Audio Alerts	Reminder Rosie, Alexa	Users with dementia or visual impairments
Mobile App Integration	PillDrill, Hero	Connected caregivers, tracking



Research - Problem 3 in Optometry



non-adherence to glaucoma treatment includes

🧠 Psychological + Behavioral Barriers

1. Glaucoma is largely symptomless at first

- People don't feel anything going wrong.
- Without pain or vision changes early on, there's no internal urgency to take medication.
- "If I don't feel sick, why medicate?" is a common thought.

2. Treatment fatigue

- Daily or multiple-times-per-day drops become tedious.
- Especially if someone takes other meds, eye drops feel "low priority"

3. Forgetfulness or low habit strength

- Especially for older adults or people with cognitive impairments.
- Drops often don't fit easily into morning/night routines.

💧 Physical + Design-Related Barriers

4. Poor dexterity or tremors

- Conditions like arthritis, Parkinson's, or stroke aftermath make it hard to aim or squeeze bottles.

5. Fear or discomfort

- People avoid drops because they fear poking their eye or feeling the sting.
- No emotional support or desensitization tools exist for drop aversion.

6. Complex or non-intuitive bottle design

- Bottles are hard to hold, require strength, or have unclear tip orientation.
- No visual or tactile guidance for proper administration.

🗣️ Communication + Systemic Barriers

7. Lack of education and follow-up

- Patients may not understand how glaucoma works, or what happens without treatment.
- Providers may not have time or resources to reinforce this over time.

8. No real-time tracking or feedback

- Doctors rely on self-reports or occasional eye pressure readings.
- No built-in accountability or data visibility for patients.

9. Cost & accessibility

- Eye drops can be expensive or run out unexpectedly.
- Refilling prescriptions may involve trips to a GP or pharmacy — a burden for some.

🔍 Real-World Quote from Patients (from studies):

"I just forget. I don't even remember missing the dose until the next day."
— Elderly patient, US glaucoma adherence study (2017)

"My fingers don't let me hold the bottle steady."
— Parkinson's patient, UK study on assistive devices

"I hate the way they feel. Every time I blink, it burns."
— Young adult, open-angle glaucoma patient, Australia

💡 Where Industrial Design Could Intervene

Problem	Possible Design Intervention
No symptom = no motivation	Feedback mechanism (LED light turns red when dose missed)
Forgetfulness	Haptic reminder band or wall-mounted visual cue
Fear of drops	Soothing audio cue or VR desensitization training
Poor grip	Ergonomic dispensing sleeve or palm-stabilized applicator
No tracking	Bluetooth-enabled cap with in-clinic sync
No dialogue	Simple app that logs usage & lets patients message questions

🌱 Why So Many Patients Don't Adhere

1. Forgetfulness & Complex Schedules

- Around 40% miss doses by using drops less than 70% of the time (source).
- Multiple daily doses disrupt routines and increase cognitive burden.

2. Physical Difficulties

- Issues with holding drops correctly are common in tremors, arthritis, and aging and increasing difficulty (source).

3. Perceived Inefficacy or No Symptoms

- Since early glaucoma is asymptomatic, many patients don't perceive the benefit of medication, leading to stopped doses (source).

4. Side Effects & Discomfort

- Local irritation, stinging, or burning discourages continued use (source).

5. Cost & Access Barriers

- High medication costs and early refill delays (especially in insurance systems) reduce adherence (source).
- In low-income settings, affordability is often the primary obstacle.

Research - Problem 3 in Optometry



Nemera

e-Novelia, the smart add-on for preservative-free multidose eye dropper

Based on user test feedback, we have developed a new technology to make patients' life easier.

e-Novelia offers enhanced ergonomics and user friendliness.

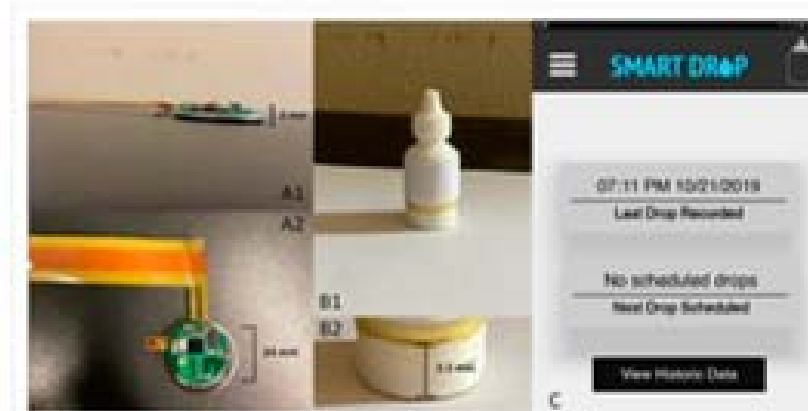
It provides several features: treatment information (dosage, drop detection, remaining volume indication, tutorials for use), patient assistance (dose history, reminders, next intake notification), alerts (time to take dose, low battery, when medication is running low), localization (device lost/find my device feature).

This breakthrough technology is a concrete innovation that brings benefits not only to patients but to all stakeholders involved: healthcare practitioners, researchers, pharmaceutical companies, payers.

- Treatment information (reminders, treatment history)
 - Enhanced instructions for use (video, drug replacement alerts)
 - Usage feedback (localization tracking, right usage)
 - Electronic guidance (inclination light, drop detection)
-
- Improved patient adherence to treatment
 - Patient friendly (ergonomic eye cup, large lever actuation)
 - Increased patient awareness with connectivity
 - Re-usable and rechargeable



Research - Problem 3 in Optometry



www.mdpi.com

Smart Electronic Eyedrop Bottle for Unobtrusive Monitoring of Glaucoma Medication Adherence

Glaucoma, the leading cause of irreversible blindness, affects >70 million people worldwide. Lowering intraocular pressure via topical administration of eye drops is the most common first-line therapy for glaucoma. This treatment paradigm has notoriousl...

Figure 1. (A1) Lateral view of electronics underlying the smart drop system, comprising a thin conductive pressure-sensitive electronic sensor, for bottle squeezing detection and an electronic circuit (<2 mm thick) for signal processing and wireless transmission. (A2) Top view of electronic sensor and electronics placed beneath the bottle. The circuit diameter and battery are approximately 14 mm in diameter. (B1) An eyedrop bottle containing the flexible sensor underneath the label, and electronics at the base of the bottle. (B2) Plastic case (height 3.5 mm) underneath an eyedrop bottle that covers the battery and the circular electronic circuit. (C) Smart phone application that communicates via Bluetooth Low Energy (BLE) with the instrumented eyedrop bottle to track eyedrop adherence. The application can update patient adherence information to a database (Google) where individuals (e.g., physicians, care providers, family members) can track how the patient adheres. The database also allows for real-time updating of reminder specifications on the smart phone app, so that programed reminders for patients can be modified remotely.

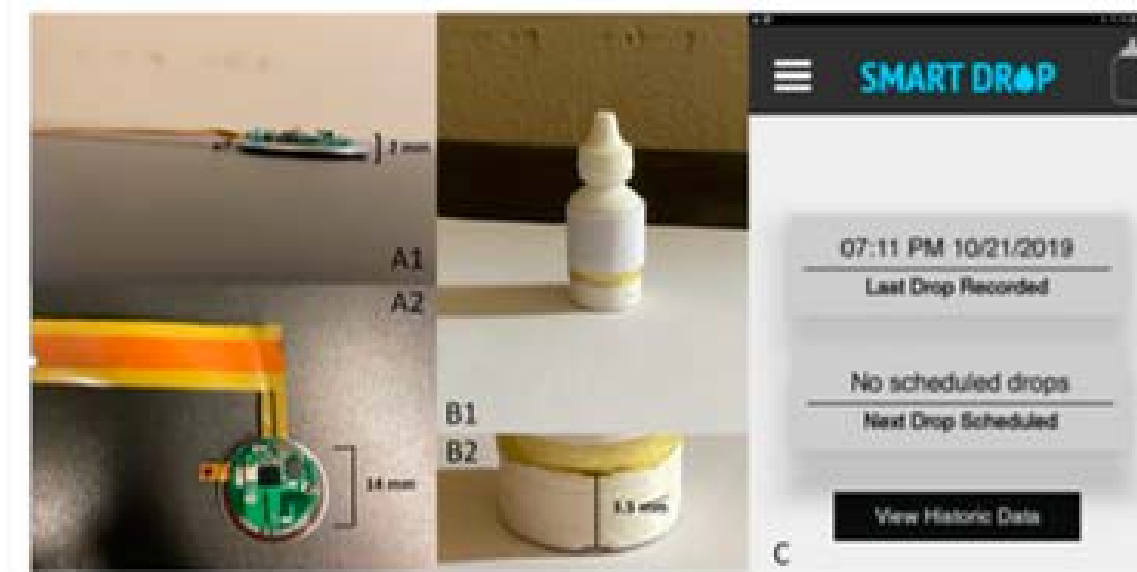
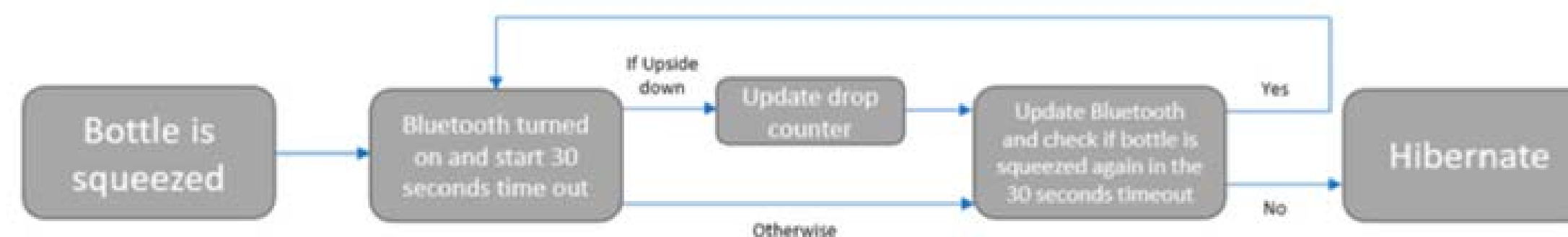
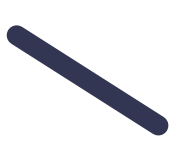


Figure 2. Scheme depicting normal behavior of the eyedrop bottle system. When upside-down bottle is squeezed, the system broadcast such the time stamp information of when the bottle was squeezed.



Research - Problem 3 in Optometry

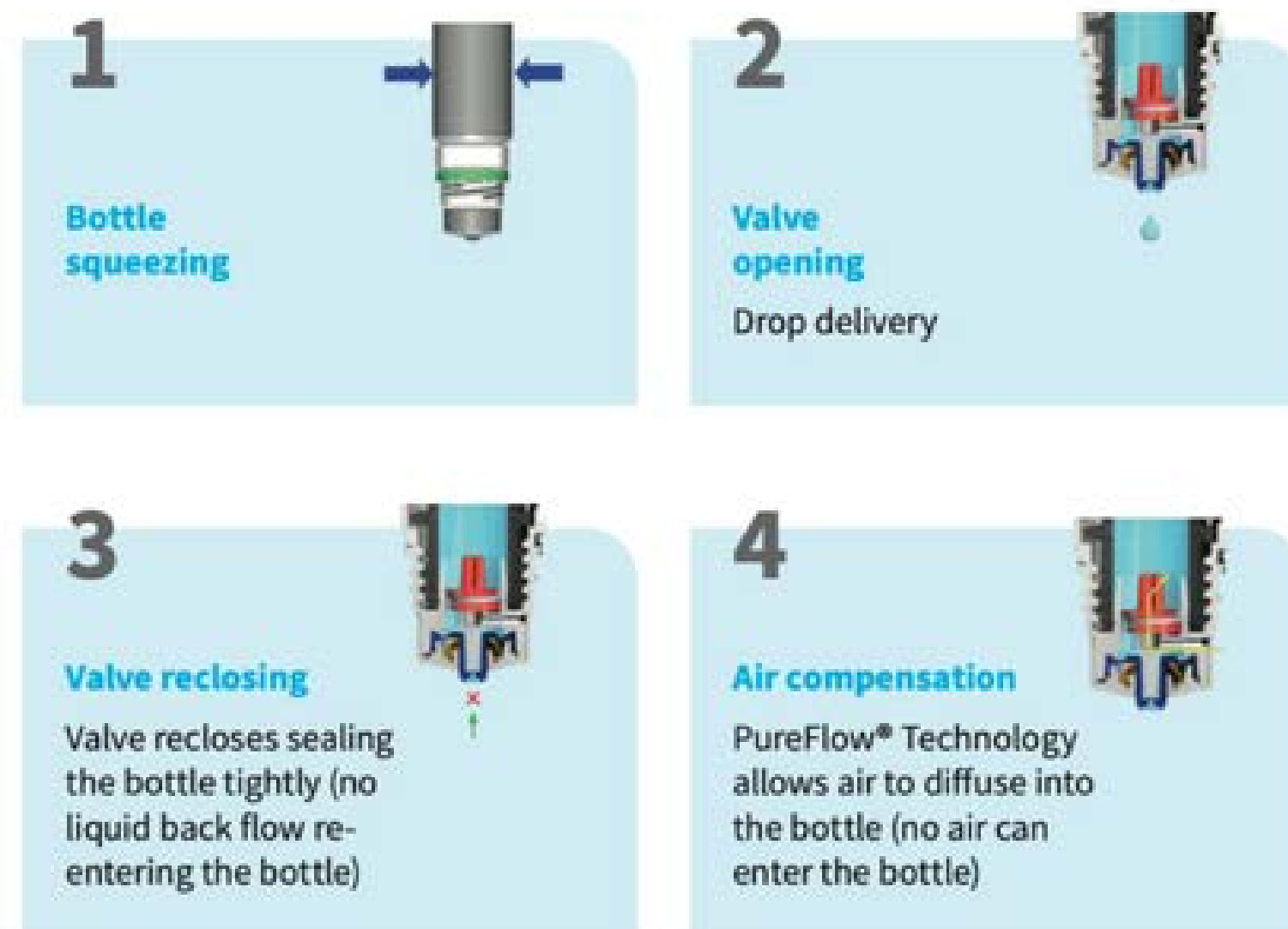


HOW THE PUREFLOW® TECHNOLOGY WORKS:

PureFlow technology guarantees integrity of the system.

The Novelia® device features a one-way valve that ensures that liquid can be re-introduced into the container after a drop has been dispensed, completely removing the need to filter the liquid.

The intake of air into the dispenser takes place via a separate venting system with a silicone membrane referred to as PureFlow® technology. This is a continuous barrier of homogeneous material which guarantees the integrity of the system.



Novelia® and PureFlow® are trademarks of Nemera La Verpillière SAS.
The shape and color of the nozzle of Novelia dispenser are protected by trademarks of Nemera La Verpillière SAS.



Ophthalmic 5

Research - Problem with Tens Machine

iTENS



Therabody powerdot 2.0 duo



Research - Problem with Tens Machine

compex - mini wireless tens ems



OSITO TEN + EMS machine



Research - Problem with Tens Machine



devices needs to guide treatment, or guide what function level the user needs

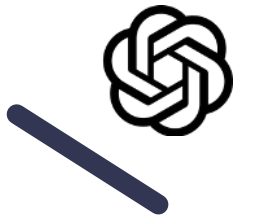


Relieve Your Pain

A safe, non-invasive and drug free method for pain relief and pain management.



Research - Problem with Tens Machine

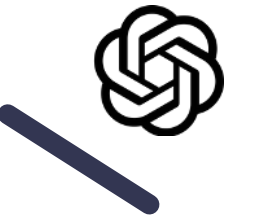


Comparison Matrix: PulseSense vs. Leading Market Devices						
Feature	PulseSense (Your Concept)	PowerDot 2.0	iTENS	Compex Mini	OSITO TENS + Heat	Auvon D58
Wireless Use	✓ Yes – fully wireless, wearable-integrated	✓ Yes	✓ Yes	✓ Yes	✗ No	✗ No
App-Controlled	✓ Yes – mood + sensor integrated	✓ Yes	✓ Yes	✓ Yes	⚠ Partial	✗ No
Biofeedback Sensors (HRV, GSR, Skin Temp)	✓ Core feature for adaptive pain relief	✗ No	✗ No	✗ No	✗ No	✗ No
Adaptive Pulse Response	✓ Automatically adjusts to user state	✗ No	✗ No	✗ No	✗ No	✗ No
Multi-Modal Relief (e.g. EMS/Heat)	✓ Future-ready (heat + EMS modular)	✓ Yes (EMS)	✗ TENS only	✓ Yes	✓ Yes	✗ TENS only
Emotional Awareness / Mood Syncing	✓ App tracks stress & emotion for tailored treatment	✗ No	✗ No	✗ No	✗ No	✗ No
Custom Sensory Profiles	✓ Yes – based on learned preferences	✗ No	⚠ Manual settings	✗ No	⚠ Limited	✗ No
Wearable Integration (e.g., back wrap, bra, scarf)	✓ Seamless, fashion-inspired	✗ Pads only	✗ Pads only	✗ Pads only	✗ Belt only	✗ Clip device
Gender-Neutral + Style-Driven Design	✓ Central design philosophy	✗ Athletic look	✗ Medical aesthetic	✗ Sporty	✗ Clinical	✗ Medical
Chronic Use Friendly (low friction setup)	✓ Designed for daily pain + fatigue users	⚠ Fitness-focused	⚠ Basic controls	⚠ Recovery-driven	⚠ Best for acute use	⚠ Traditional design
Stigma-Free Aesthetics	✓ Discrete, soft, and body-conscious	✗ Visible gear	✗ Gel wings visible	✗ Athletic gear	✗ Belt-based	✗ Clinical

How PulseSense Stands Out

Category	PulseSense Differentiator
UX/UI	Emotionally intelligent, sensory-safe interface with minimal overload risk.
Accessibility	Easy for users with fine-motor or cognitive fatigue; no small buttons or confusing modes.
User Empowerment	Builds trust through body-mood syncing and control, not dependency on pain peaks.
Aesthetic Integration	Fashion-forward design that belongs on the body – not hidden like a medical device.
Data-Driven Care	Tracks pain patterns over time and surfaces insights without overwhelming charts.

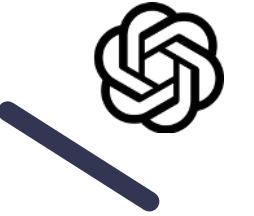
Research - Problem with Tens Machine



led colour indicator to show that the tens machine is regulating the user's nerve needs



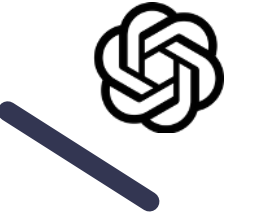
Research - Problem with Tens Machine



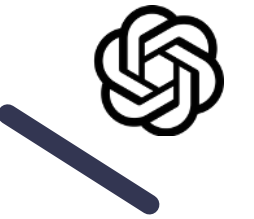
Data-Driven Care that Tracks pain patterns over time and surfaces insights without overwhelming charts. the tens machine includes a physical sliding mechism to the tens machines that allows the user to regulate the pulse rate to thier customisation and is attached to a person with a minimalistic design for adult integrity and does not look too medical. make a rotating circle dial mechism that allows the user to adjust the pulse rate to the user



Research - Problem with



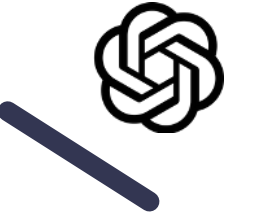
Research - Problem with

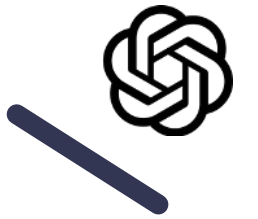


arm band - great use of the dial and being able to adjust the pulse pressure feed



Research - Problem with





Research - Problem with Theragun - Sound

sound-proof massage gun that incorporates A compact, curved triangular body with rounded corners, like a pebble or the shape of a closed-loop handle. It has an ergonomic loop handle grip, so the user's hand slides inside the arc comfortably, distributing weight evenly to reduce wrist fatigue.

Material Aesthetics: Exterior shell made from matte silicone rubber with a soft-touch feel, like a noise-dampened electric toothbrush or premium phone case. It comes in calming muted colors: fog grey, olive green, or sand beige. No shiny plastic or reflective materials.

Size: Slightly smaller than a standard Theragun Mini—think hand-sized, with dimensions of approximately 15cm x 15cm x 5cm.

Motor Isolation: The motor is suspended inside the casing using silicone or Sorbothane dampers, which absorb mechanical vibration and prevent it from reaching the casing.

Casing:

Double-layer housing:

Inner Layer: rigid polycarbonate for structural integrity.

Outer Layer: thick acoustic silicone shell that deadens external vibration and prevents echoing.

Massage Head:

Rather than a rigid plastic ball, the massage tip is gel-filled and surrounded by a soft TPU membrane. It gently compresses on contact, reducing the harsh thump usually heard with typical massage guns.

Motion Type includes using oscillating compression rather than full-impact percussion. The head moves in micro-pulses instead of slamming back and forth, dramatically reducing noise. **Main Button** includes One flat capacitive button on the back with three vibration modes: calm (green light), normal (white), and intense (orange). No loud click—just haptic feedback and a quiet tactile buzz.

Slider Mechanism (Physical):

On the side, a low-resistance rubber-coated slider allows the user to smoothly control the pulse intensity from low to high. It moves like the volume slider on a premium audio mixer—dampened and silent.

LED Feedback Strip:

A small vertical LED strip glows in different colors:

Green = user is relaxed / good pressure level

Yellow = mild tension

Red = overstimulation detected (if synced with optional HR or GSR wearable sensor)



Research - Non-Verbal Autism Communication

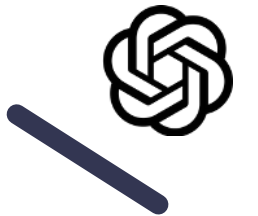
non-verbal high functioning autism tablet



A Kindle-like tablet designed for non-verbal, high-functioning autistic users who require deep sensitivity to cognitive load, sensory processing, communication autonomy, and emotional safety. It should be made non-visually cluttered or linguistically overwhelming. with personal identity expression can feel infantilising or frustrating. non-bright colours, animations, or sound cues may be overstimulating for some users.



Research - Non-Verbal Autism Communication



Types of AAC devices

Step-by Step	Talkables	Cheap Talk 8	Tech/Talk 8 with Tactile Supports	GoTalk Express 32
				
iPod Touch w/Proloquo2Go	Vantage Lite	TuffTalker	Allora	EyeMax
				

► Gaps & Unmet Needs

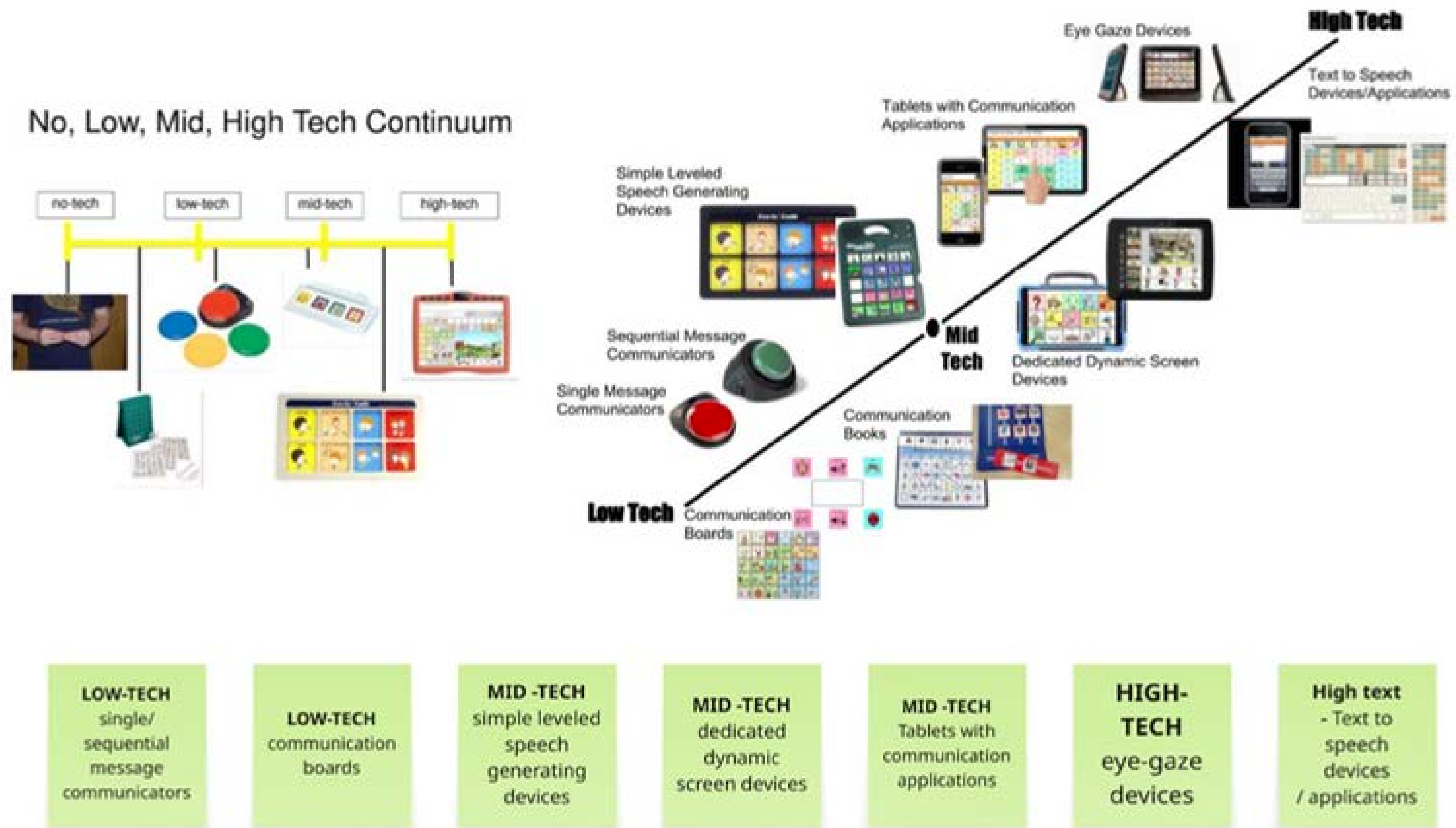
- **Biofeedback-integrated AACs** (detecting stress or frustration and adjusting tone/layout)
- **Wearable AAC options** (bracelets, rings, haptic buttons — discreet, always available)
- **Emotion-based language suggestions**
- **Custom voice tones** to reflect personality
- **Playful, gamified experiences** to encourage usage and reduce anxiety
- **Offline/non-digital backup modes** for high-stimulation environments

⚠ Common Pain Points & What Doesn't Work

Issue	Why it Matters
✗ Rigid or Cluttered Interfaces	Not responsive to sensory needs or cognitive load fluctuations
✗ Slow Communication Speed	Delays meaningful interaction, especially during emotional or urgent moments
✗ Not Emotionally Expressive	Tone, mood, sarcasm, frustration — hard to express through static symbols
✗ Stigma or "Medical" Aesthetic	Makes users feel othered; devices look more clinical than personal or playful
✗ Limited Personalisation	Difficult for users to reflect their unique personalities or interests
✗ Caregiver Dependence	Many need extensive setup or maintenance by adults
✗ No Real-Time Adaptivity	Cannot adjust output based on user stress, fatigue, anxiety, or frustration
✗ Too Touch-Dependent	Doesn't help those with fluctuating motor skills or sensory-seeking behaviors

Research - Non-Verbal Autism Communication

high tech aac examples



Research - Occupational Therapist Interview



New grid

Name:	Anika
Occupation:	Occupational therapist

Suggested products --> high functioning children with physical disabilities

- *pro low quo, pro locative, go lamp --> speechies*

AAC

- assisted automated communication

intermediate functioning | non-verbal

- doesn't engage with iPad - uses regulation through YouTube kids - he likes constant auditory input - he also eats non-food items = he doesn't like paper or laminated things he will eat them
- talking buttons don't work -
 - materials that could work include silicone

vibrating communication devices are effective

- they like 'proprioceptive input' calming

02 week

Overview

Things to do | 4

Rewatch lecture and take down notes

Write project synopsis

Make a product matrix and research into pre-existing in-market products for medical reminders / pill boxes

look into what the needs and psychology background is regarding adherening to medical treatment

Questions to Ask | 3

What are different eye infections that require users to be reminded to take prescribed treatment and medication plans?

What is the psychology and human bahviours behind why users do not adhere to their medical and therapudic treatment?

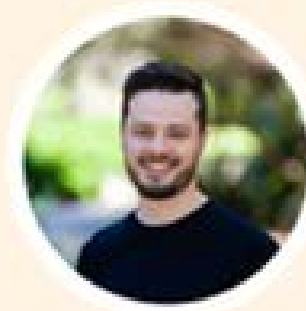
How do Integrate mdular design and what other design principles should I adopt into project

Other Notes | 2

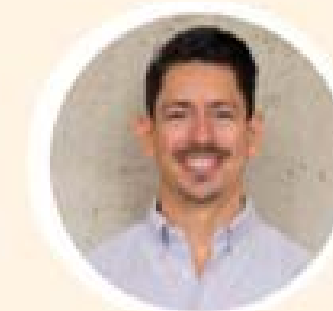
Consider user journey and why users do not adhere to medication treatment

Are wearable devices the best techonology to remind users to do something

Tutor Discussion feedback - RAF



- Do what you are passionate about and think is interesting
- The pill reminder is a great device that would be very useful for neurodivergent users that tend to forget whether they have taken their medication for the day or whether they have re-filled their medication
- make a product-matrix and that will help consider whether you want to make an expensive or simple device



- Automotive vehicle industry project is very interesting and has room for improvement with four years of research
- but do what you are passionate about

Designer – deconstruct me

WHAT

What is the value you are gaining from this experience

- philosophy
- thinking (process)
- approach
- techniques
- skills

strategies

- make a mood board
-

WHY

You can always bring these attributes to any situation. Any given problem/opportunity you should have a **basic set of tools, techniques and methods** to tackle it. This is an incredible advantage to have! Not many disciplines outside of design have the expertise to do this...

Henry Greyfuss – designing for people

Victor Megolin – the politics of the artificial

"Design, if it is to be ecologically responsible and socially responsive, must be revolutionary and radical"

"There are professions more harmful than industrial design, but only a few..."

WHY

"Design must be an innovative, highly creative, cross-disciplinary tool responsive to the needs of men [people]. It must be more research-oriented, and we must stop defiling the earth itself with poorly-designed objects and structures"

"Advertising design [industrial design?], in persuading people to buy things they don't need, with money they don't have, to impress people who don't care, is probably the phoniest field in existence today"

Design process – IDEO

Feasibility

- technology, human values etc

Viability

Desirability

Various design processes and methodologies. They all share these basics features:

DEAL WITH COMPLEXITY/AMBIGUITY (NO ONE SOLUTION)

ITERATIVE

USER FOCUSED

SYSTEMS FOCUSED

VISUAL COMMUNICATION (DRAWING/MODELS/DATA/CAD/ETC)

REFRAMES PROBLEM

VISIONARY (FUTURE FOCUSED)

In-market Device | Nemera

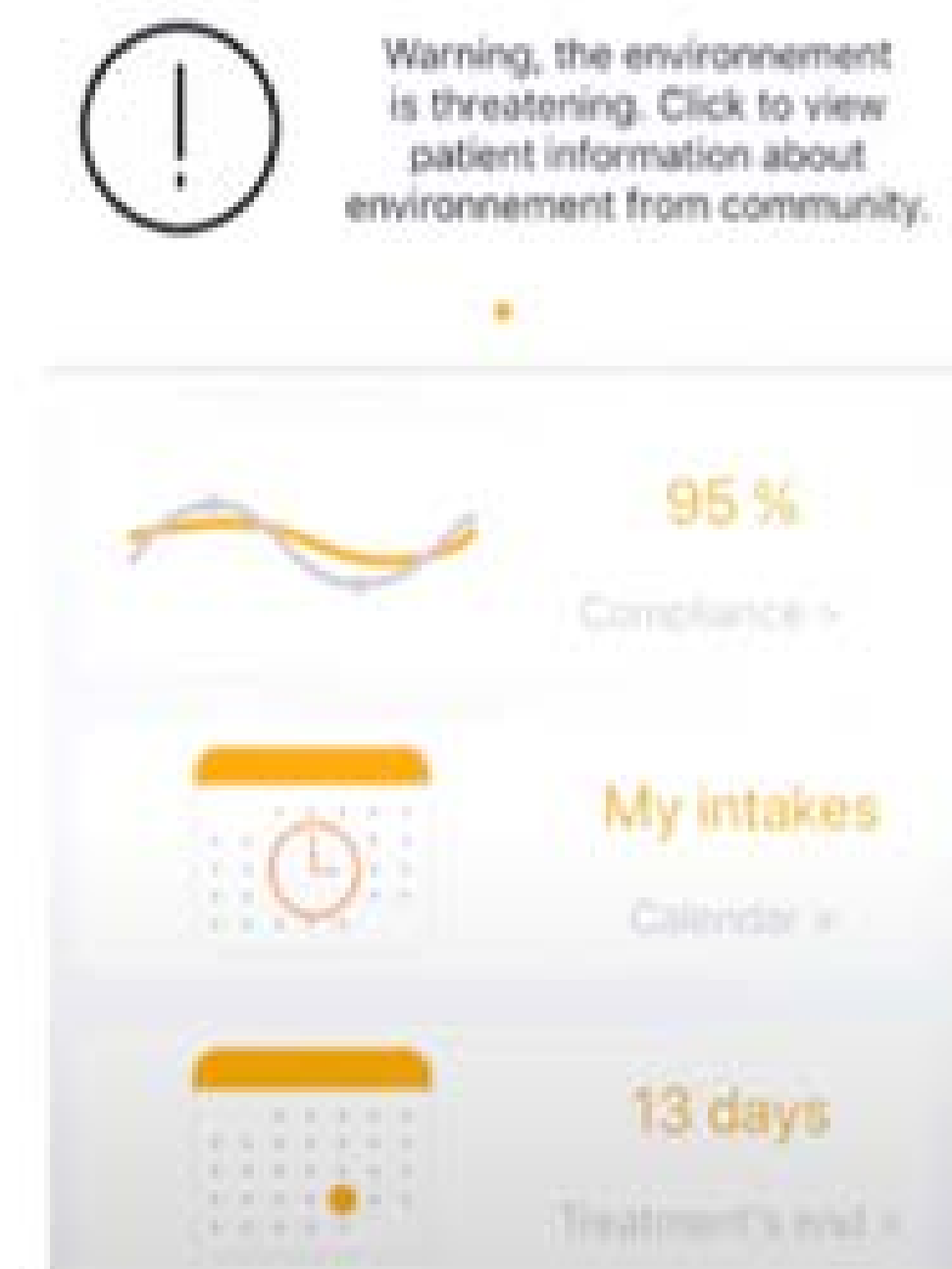
User journey - How to use Nerma

- Arm position
- Tilting head up and back
- Using in the context at work
- Device is small, compact, and used with one hand



User journey - How to use Nerma

- Device is connected to App for tracking progress and calendar reminders



In-market Device | Nemera



- drug identification
- on-device display
- posology indication
- electronic IFU
- Reminders
- Shaking Sensors
- Smartphone communication
- Location tracking
- position AID
- Shelf-life management
- drop detection

Research - Designing for Health Products

Electronic IFU

TGA www.tga.gov.au

Supplying electronic instructions for use (eIFU) for medical devices

Guidance for manufacturers of medical devices considering supplying the instructions for use of their device in an electronic or online format.



www.imdrf.org

International Medical Device Regulators Forum (IMDRF)

The International Medical Device Regulators Forum (IMDRF) aims to accelerate international medical device regulatory harmonization and convergence.

The 10 guiding principles for Good Machine Learning Practice (GMLP)



Final Document

IMDRF/AIML WG/N88 FINAL 2025

Good machine learning practice for medical device development: Guiding principles

AUTHORING GROUP

Artificial Intelligence/Machine Learning-enabled Working Group

Guiding principles

1. **The intended use/ intended purpose of the device is well understood, and multi-disciplinary expertise is leveraged throughout the total product life cycle:** In-depth understanding of a medical device's intended use/ intended purpose¹ including context of use within the clinical workflow, and the desired benefits and associated patient risks, can help ensure that AI-enabled medical devices^{2,3} address clinically meaningful needs over the total product life cycle of the device⁴. Multi-disciplinary expertise provides context-specific insight and experience, informs the intended use/ intended purpose, and enhances the safety and effectiveness of the device.
2. **Good software engineering, medical device design, and security practices are implemented throughout the total product life cycle:** Model design is implemented and maintained with attention to the fundamentals: robust software engineering practices, usability, data quality assurance, data management, cybersecurity^{5,6,7}, and quality management practices⁸. These practices include methodical risk management⁹ and design processes that can appropriately record and communicate decisions and rationale, as well as ensure traceability, reproducibility, data authenticity, confidentiality, integrity, and availability. The infrastructure needed for model deployment, monitoring, and maintenance is carefully considered. These practices help support the rights, safety, and welfare of patients, including through the ethical use of patient data.



Medicines Adherence

Medicines adherence

It is estimated that adherence to medicines for chronic conditions stands on average at only about 50%. Health professionals need to be aware of adherence issues and work with patients to address them in an acceptable manner.

As with lifestyle, adherence to medicines is suboptimal for most chronic conditions and chronic disease risk factors. Challenges to improving adherence can vary between conditions. For example, hypertension is generally asymptomatic so the patient doesn't feel 'sick' and may not see the benefits of treatment; treatment can be expensive, can cause side effects, and requires them to visit health professionals regularly. Smoking cessation on the other hand is symptomatic, but patients perceive social and personal benefits from continued smoking (e.g. stress relief), and very likely have physical dependence on tobacco; again treatment can be expensive, and there is often a preference for going 'cold turkey' when quitting, despite improved likelihood of success with pharmacological treatment.

Overall, only about 50% of patients remain fully adherent to their blood pressure medication 12 months after therapy initiation, many not persisting at all with therapy and others taking 'drug holidays' or missing occasional doses (Vrijens et al, 2008). Fish et al (2009) and other international studies suggest that less than one third of patients commenced with nicotine replacement therapy (NRT) will complete the recommended course. Additionally, many patients will not opt to attempt going 'cold turkey' and will not follow recommendations to start NRT.

<https://www.monash.edu/pharm/current/step-up/clinical-roles/med-adherence>

Research - Motivational Interviewing

Motivational interviewing

Motivational interviewing

Motivational interviewing (MI) is a counselling technique that supports patients to work through their beliefs about health issues until they actively seek change and become engaged in how to effect change. It is more likely to produce an acceptable and sustained change than having the health professional dictating the best course of action to them. MI is defined by the following principles:

- 1 Empathise:** Show the patient that you can identify with them.
- 2 Roll with resistance:** When the patient presents barriers or arguments against change, investigate them further rather than dismissing them.
- 3 Explore discrepancy:** Identify inconsistencies between current health behaviours and the patient's desired health outcomes.
- 4 Avoid arguments:** Don't allow the conversation to become a conflict; motivation implies discussing health behaviours until the patient is arguing for change.
- 5 Support self-efficacy:** Work with the patient to optimise self-management of their health.

Before becoming motivated to change a health behaviour or treatment, patients should believe they can manage the changes being recommended (a belief known as self-efficacy), must believe that the health risks mean they need to change, and must be reasonably convinced that the change recommended is good for them.

<https://www.monash.edu/pharm/current/step-up/motivational-interviewing>

Mood board - Aesthetic

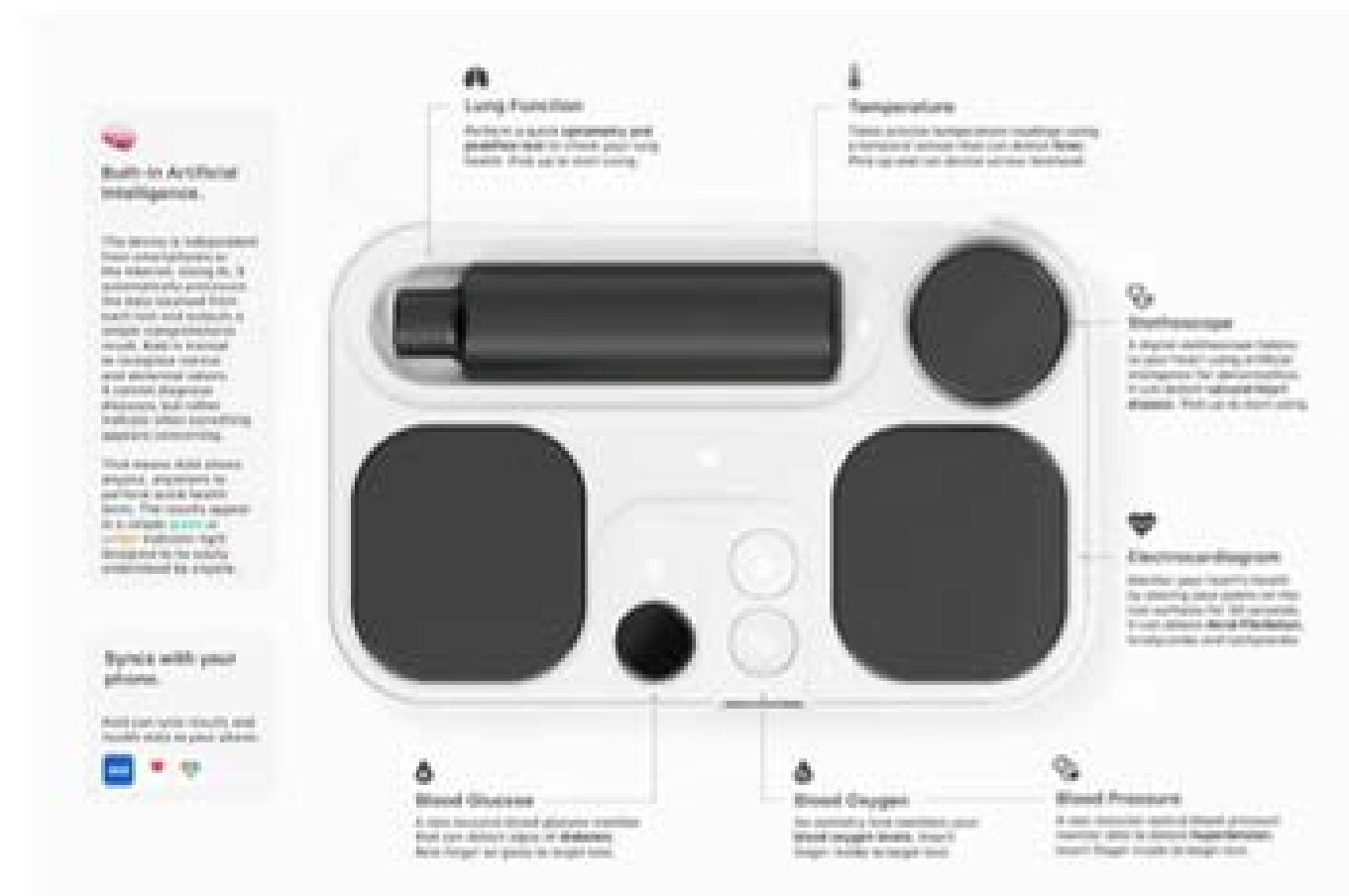


Key words for aesthetic / mood board

- clean
- modern
- dignifying
- adult -friendly
-



Mood board - Aesthetic



Mood board - Aesthetic



Research - Scleral and RGP contact lens

Scleral and RGP contact lens insertion and removal

- The scleral lens is hard to remove due to it suctioning on and needing to be removed in a special way to break the suction
- It is difficult to insert due to needing to be filled with fluid which can very easily get bubbles if not inserted facing down and having to fold it under the eyelid



Interviewee - Masters Final Year Optometry Student \

1. why do people use this device

- The scleral lenses are useful for those with corneal ectasia (misshaped cornea due to keratoconus or trauma or injury) as the fluid underneath improves vision massively by neutralising / eliminating aberrations (irregular optics / distortions). Also for those with very severe dry eye or damage to the front of the eye (mainly Sjögren's syndrome or corneal grafts) it protects the eye and bathes it in fluid constantly

2. what developments in the technology have helped patients

3. is the device a one-size fits all? What age demographic uses this device the most?

- elder people most prevalent
- most commonly females
- arthritist and

4. what are the negative attributes of using this device for users with neuro-divergent or physical disabilities?

- It is difficult to insert due to needing to be filled with fluid which can very easily get bubbles if not inserted facing down and having to fold it under the eyelid

5. what is the importance of this device and what do you wish to see in the development of this device? what is difficult about using this device?

Interviewee - Masters Final Year Optometry Student \

people who have eye issues also have these other issues

6. what are two main eye health concerns that happens at the same time -

- Sjogrens syndrome affects old ladies which typically will struggle more with old ladies and that causes very severe dryness which may need scleral lenses
- they also struggle with arthritis -

lens - contact lens that has fluid so it doesn't get dry

- if they have it th

applicator

- helps remove it without tearing the eye on
- if you have arthritis or difficulty grasping things then it can be very difficult
- needs to be inserted faced down - this is because this prohibits bubbles forming and ruins the vision
- applicators are small and hard to put in properly - for old people it would be very difficult -
- for vision correction -
- if not cleaned properly then you can get infection

joint issues - auto-immune issues- corneal issues

dry eye.- everyone has - treatment for it is eye drops four times a day

- no one does - lid and warm compress
- Dry eye- The treatment is lubricant eye drops 4x per day, warm compress nightly with a lid massage.

Scleral and RGP contact lens & modular design

modular design



- modular design
- reminder to put drops in
- main body is bigger handle and then you can change out the heads - one with scleral applicator - or eye drop bottle insert
- these people face dry eye issues and need different functions - main issue is handling and administering



Scleral and RGP contact lens & modular design

modular design – reminder device

Dry eye // infection // administering medication and addressing or reminding

- The treatment is lubricant eye drops 4x per day, warm compress nightly with a lid massage. So like an accessible heat mask / lid massager to help with dry eye or a way of reminding to use it or put the drops in

features it needs

- Heating eye mask
- Eye drops
- shaking accommodating handle
- reminding device

Other diseases also need reminder – if they have another infection

- Infectious keratitis needs to put drops in (bacterial) or cream for herpes for 1hr, 2hr, 4hr, then 4x per day can be very hard to time and keep track of often need 4-5 different drops as well
- Especially herpes because it is much more recurrent, or uveitis which needs drops like every so often and is more recurrent and related to systemic conditions (HLA-B27 is a genetic mutation very recurrent uveitis and linked to many forms of arthritis)
- cant put eye drops in as easily – acute
- People with severe allergies need lifelong eyedrops 2-3x per day to manage allergies eg atopic keratoconjunctivitis

incentives to do treatment

- eyes will feel better – blurry vision with eye dry – gunky eyes --> the consequences are not associated with being able to get better – users don't remember doing remember – they don't associate it with dry eye – they think the consequences aren't a big deal –

DRY ISSUE IS A ISSUE THAT EVERYONE TO DEAL WITH – REMIND PEOPLE TO DO IT AND ADD INCENTIVE

- watch device that has a LED light rim and it is green and has a clean eye when you add ur eye drops at the right time but if you don't then the little light goes red and has a gunky eye to associate your eye will get angry

Electronic Medication Reminder



- which medicine to take and to actual take the drop
- make it re-useable



Medical Reminder Devices

Customisable medication reminder device that allows medical professional to send info to

- **educational tool**
- schedule reminder / planner
- medical professional communication device
- reminder them to come into appointment - for users with re-current appointments -
- physical reminder to take certain medication



- **connect to USB-c convertor so that the medical professional**



Medical Reminder Devices

complicated eye drop regime

doctor administer // medical device - to load in information to the device

- and can add information by sending to user or putting it into machine when you are at the appointment
- all recoveries are pre-planned schedules or recovery - pre-loaded schedules for recovery
- people can turn the kit when they are done
- if its chronic people will pay up but if its one off infection schedule scheme then make it disposable
- PEOPLE WITH ADHD meds - This is permanent , but then people with adhd needed an eye drop then

MAKE IT CUSTOMISABLE AND PERSONAL TO YOUR MEDICATION NEEDS

stake holder / user - male, adhd, financial bro , who had herpies and needs antibiotics and eye cream,

Trachoma

Early access and hygiene – MASSIVE ISSUE THAT NEEDS TO BE HELPED -- TRACHOMA

RURUAL COMMUNITIES – PREVENTABLE BLINDNESS

- COMMUNITY ENGAGEMENT TO PREVENT
- EARLY TREATMENT WITH ANTIBIOICS

Trachoma is the leading cause of preventable blindness, repeat infections from poor hygiene and over and over again the eye gets scarred. Easy to stop with better hygiene and a single dose of a tablet

Type of bacterial infection in the eye and if the users get this infection repeatedly then they go blind and they only need a single dose of anti-biotic tablet

- THE ISSUE IS THAT THEY KEEP GETTING IT SO THE EYE GETS SCARED AND THEY CANT FIX THAT –

ISSUE

- education around this
- **safe strategy for trachoma** – surgery anti-biotics – scaring makes lashes turn inward – face washing is needed – -->



Optical Conditions Chronic vs Temporary

chronic vs temporary issues / infections with eyes

Chronic

- Chronic is always there, a lot slower less treatment but always needs treatment e.g glaucoma
- recurrent acute eg herpetic eye infections or acute uveitis if HLAB27
- Could do a more expensive one for like chronic / long term conditions eg glaucoma diabetes adhd meds etc

Temporary

- Acute conditions are more temporary and rare e.g infective keratitis tend to have faster more symptoms more consequences and need more treatment / easier to forget treatment schedule
- Or a cheap affordable one for acute / short term conditions eg infections / keratitis / post surgery recovery
- disposable // surgeon can just give it out post surgery

Medical Adherence & Anxiety

strategies to improve persistence in anxiety disorder patients

stigma with taking medication

Informing users with anxiety to administer medication and make them feel more secure in their treatment

Informing users with anxiety to administer medication and make them feel more secure in their treatment



The findings of this study suggest that it is essential to consider anxiety disorder patients' beliefs about illness and treatment strategies to increase their compliance with the therapeutic plan.

Why Beliefs Matter in Anxiety Disorder Treatment Adherence

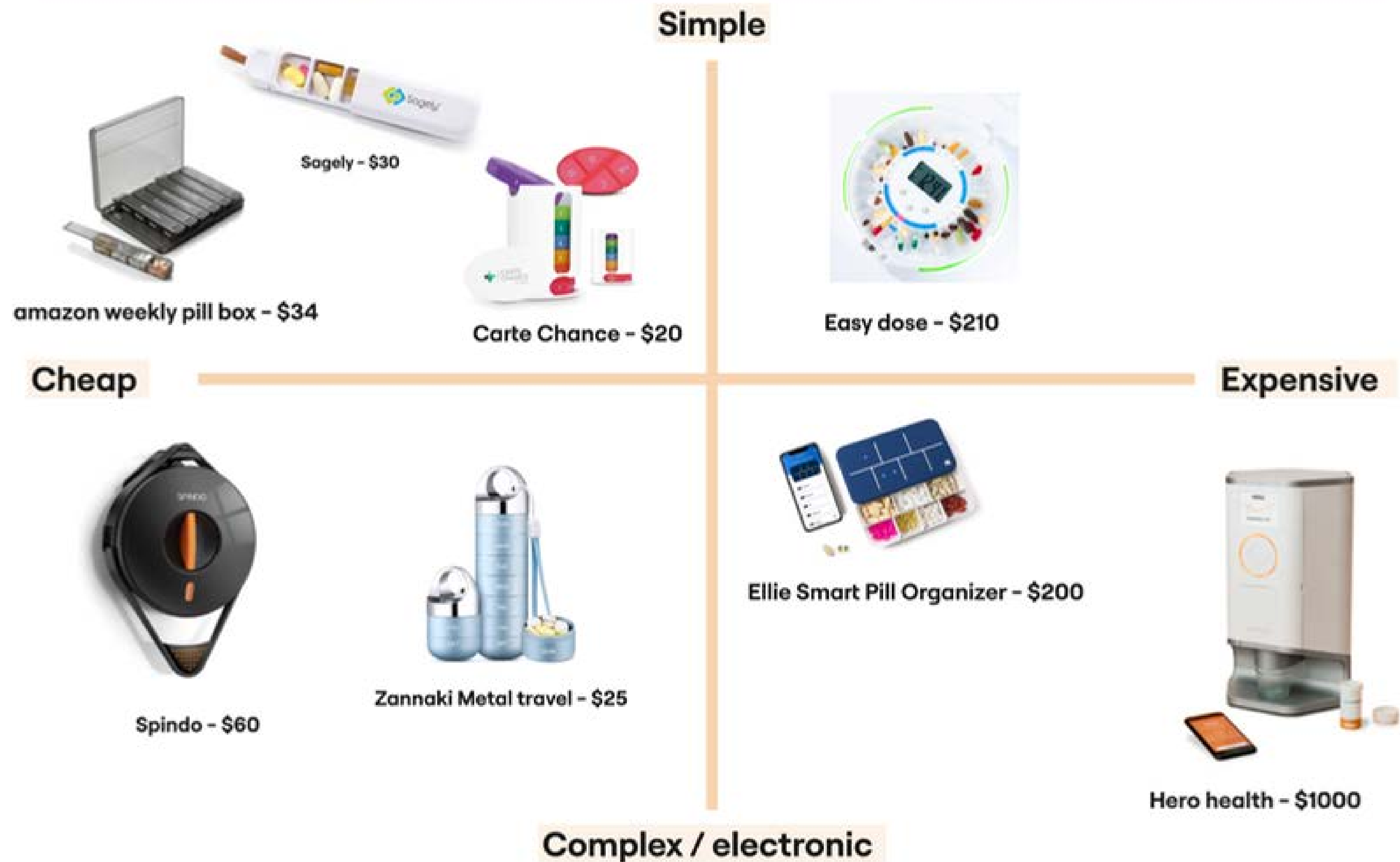
illness perception - how patients understand anxiety itself

treatment beliefs = how patients view medication or therapy

expectations of recovery

internal vs external control beliefs

Product Matrix - Pill Organisers



Exploring Reminder Mechanisms

Wearable Physical reminder devices – purely for vibrational purposes –

1. ring
2. watch
3. carabiner
4. necklace

ring

- light up or vibrational ring to remind users to administer medication

watches

1. wearable watch – Discrete vibrating

Concept designs like Dialog (for epilepsy users) show how subtle vibration and simple user-triggered data input can support self-management in a privacy-preserving way



WATCHMINDER MINI



pill organiser / reminding user they have taken pill today



TabTime

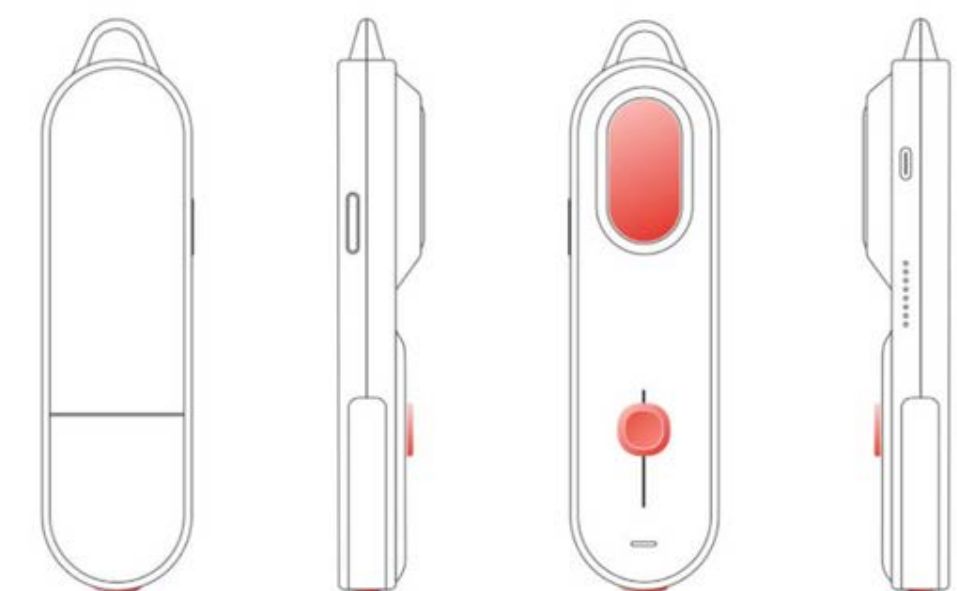
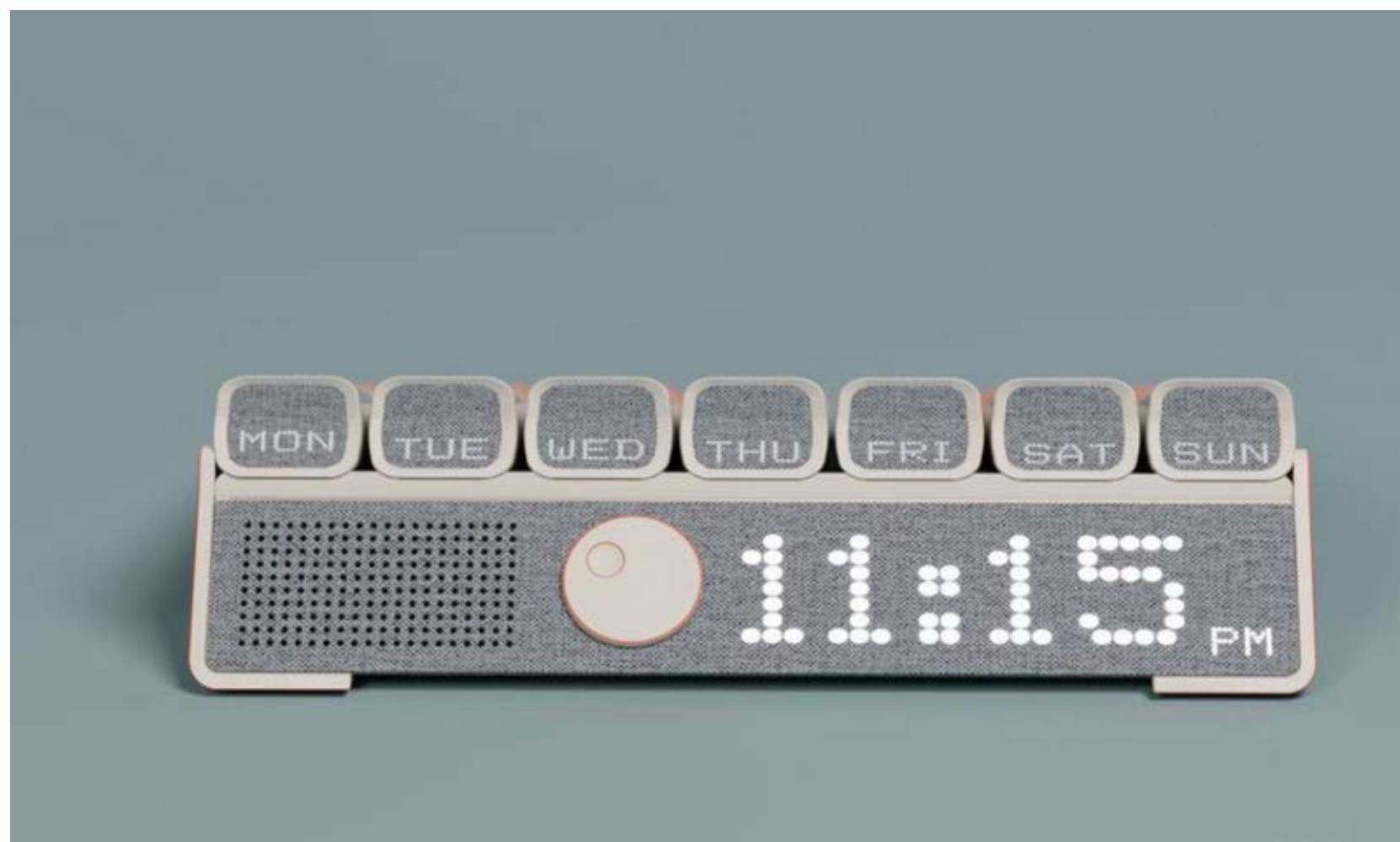
press down mechanism with light that goes green when you have opened up pill compartment and taken pill for the day

Pivotell



In-Market Reminder Devices

Attachable and detachable accessory



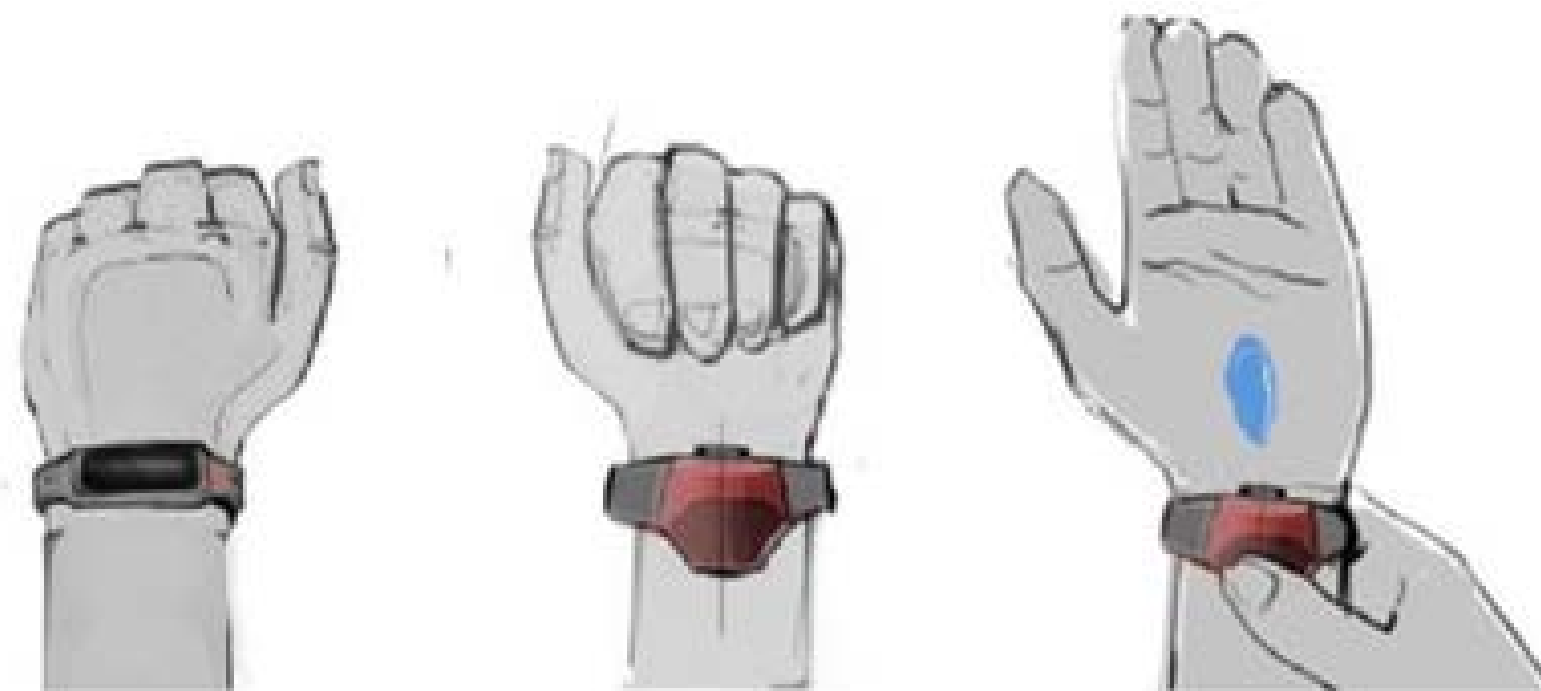
first stage

at the first stage of development, we defined the shape and convenient dimensions to accommodate all the functions.

Exploring Different User Interactions



light projection



Project Synopsis

This project aims to examine ways to support patients in the medical sector, specifically, neurodivergent, physically impaired and elderly users, in maintaining adherence to their prescribed medical treatment plans. The objective is to promote active and voluntary participation by patients in the management of their health through improved treatment compliance and adherence. The research will consider a range of factors contributing to human behaviours and reasonings to why non-adherence of patient posology occurs. Therefore, by considering the practical, behavioural, psychological, physical and emotion barriers to adherence and administration to treatment plans. The project will also explore strategies to improve adherence through interactive and self-participation design, such as effective reminding, educational systems and supportive tools that aim to foster collaborative and consistent engagement between patients, medical professionals, and their therapeutic plans.

Research Question Lecture

WHO

WHAT

WHERE

How can patients with different backgrounds including neurodivergence, physically impaired users and elderly users be supported and encouraged to actively and consistently adhere to their prescribed treatment plans?

Your research will be guided by your **Research Question (RQ)**. The RQ may evolve over the course of the research, but important you begin with one.

Exploratory
Explanatory
Descriptive
Predictive

(Marshall and Rossman, 1989)

Exploratory

Exploratory questions are used when relatively little is known about the research topic or when the area is new or under-researched.

"Exploring the impacts of..."
"Understanding robot and human interaction in..."
"How do particular users perceive..."
"What are the motivations to use..."

Predictive

Predictive questions start from the phenomena of interest and investigate what ramifications it might have in the future. To predict the outcome of the phenomenon.

"How might AI impact the future of design ideation..."
"What are the long-term effects of..."
"In what ways might experience with emerging technology..."

Descriptive

Descriptive questions aim to document and record what is happening. To document the phenomena of interest.

"What are the experiences of disabled users in..."
"How do healthcare professionals describe the use of..."
"What are the challenges of..."

Explanatory

With explanatory questions, the research topic is approached with a view to understanding the causes that lie behind phenomena. However, unlike a quantitative project, the focus of explanatory questions is on qualitative analysis of multiple interconnected factors that have influenced a particular group or area, rather than a provable causal link between dependent and independent variables.

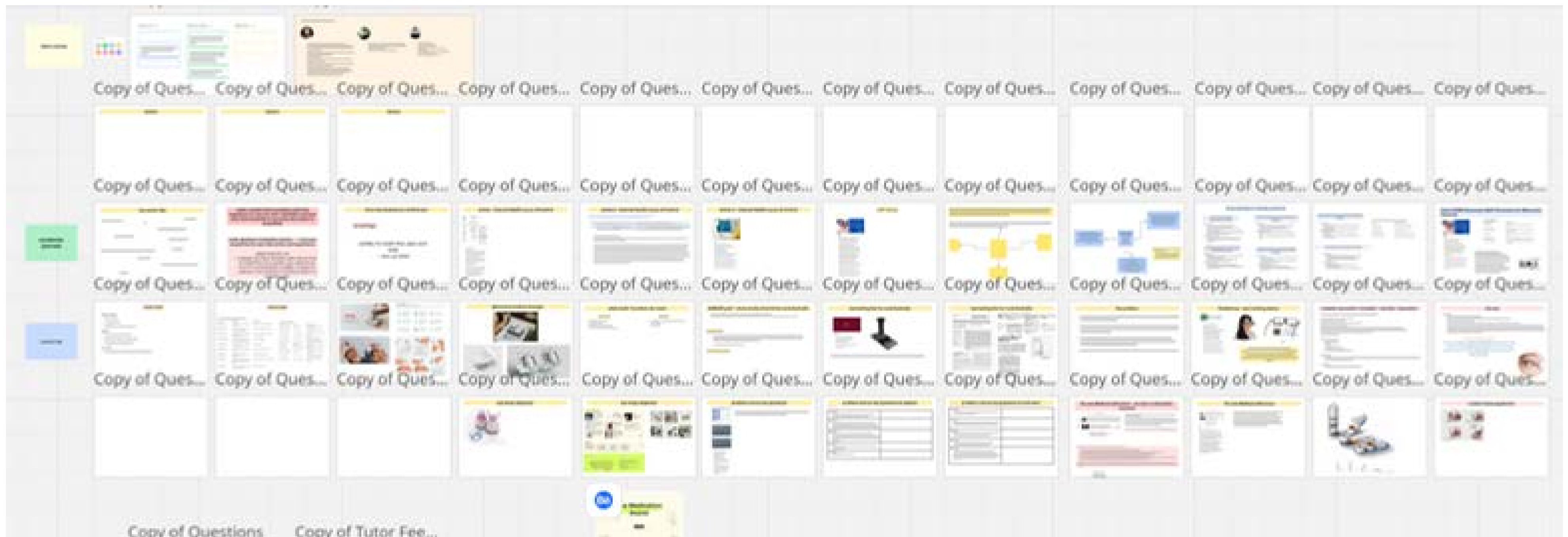
"Why do some students excel in..."
"How does expertise impact the use of specialised equipment..."
"What factors contribute to improved emotional..."

Make sure your research question states:

- **What:** what is it that you are doing (exploring, understanding, clarifying, comparing, etc)
- **Who:** be specific about who you are researching (people with disabilities, manufacturing workers, healthcare workers, etc)
- **Where:** specify the context, scenario, location (in Australia, manufacturing industry, care homes, hospitals, etc)

03 week

Week Overview



Tutor Feedback

Things to do | 3

Make ethics document

keep researching medical adherence and that topic through academic journals

Type something

+

Questions to Ask | 3

Should I take the optometry route and commit to making a reminder device?

how do i integrate an education tool that isnt just a screen - or is a screen an effective way to display information visually to user?

How can I effectively incorporate modularity into my design?



- look into autonomous vehicle with haptic technologies !
- make a system that translates what the experience of a person with a disability and how does that translate to someone who wants to empathise
- **multi-disciplinary translation device → increase empathise for user interaction and experience**
- what interests me?
- a design tool that educates users about how to empathise to a certain user experience
- how to communicate complex or areas of unknown information to someone else in a seamless way
- Can look into cross referencing with legislation regarding 'disability, safety, transport, defining what devices are needed, defining what autonomous vehicles are' as they are not yet established - what are the perimeters of the law

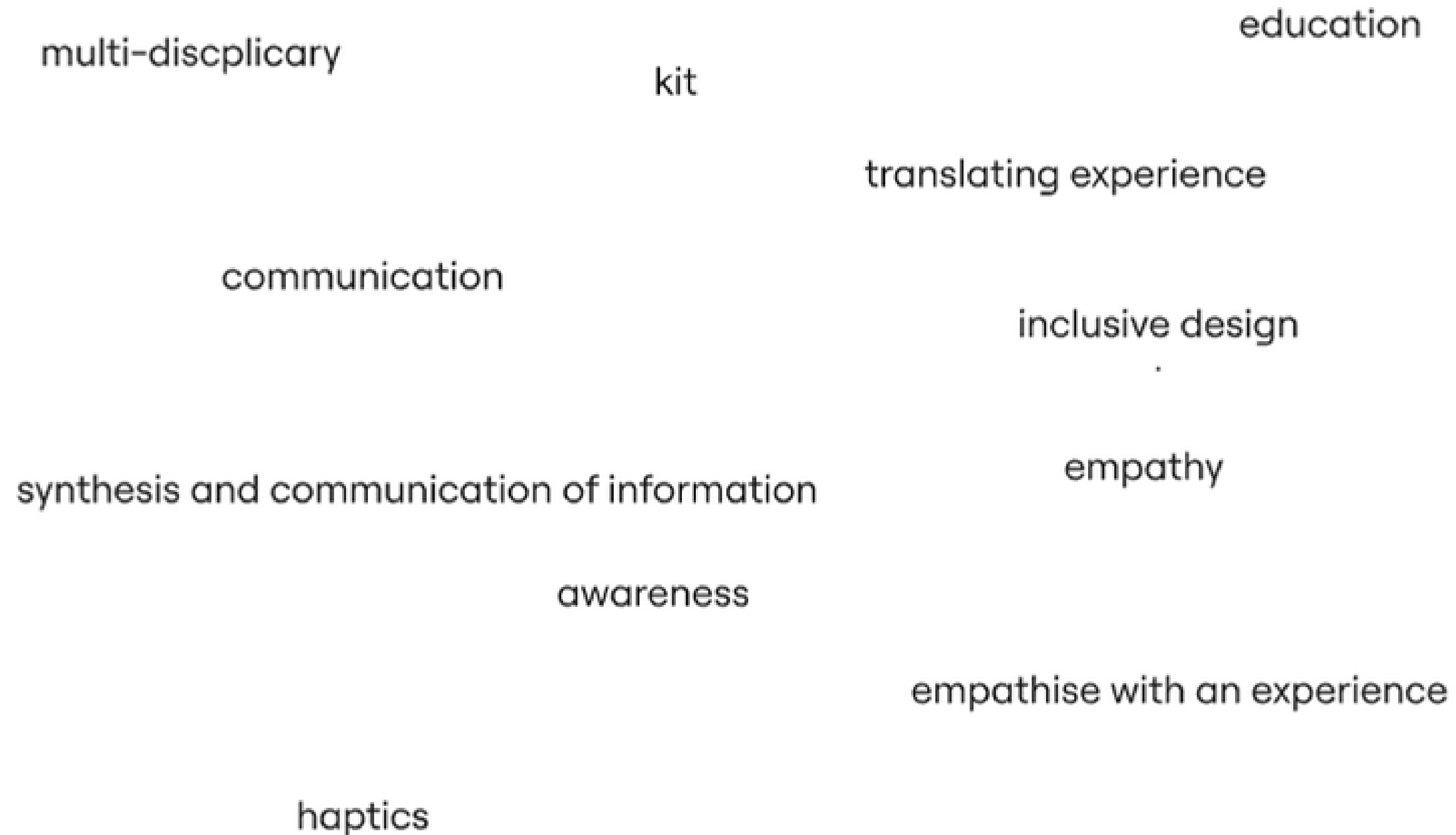


- do as much academic research as you can into the behavioural and psychological background into your problem and technology
- make a list of key words that interest me



- maybe don't do rural
- empowerment, advocacy,
- usability and motivation
- master of experience - can be done well
- building trust
- agency - needs to be a drive for it - can be a positive feedback loop -
- gamification - rewarding system
-

Key Words to Narrow Topic Scope



Narrowing Project Scope



make a system that translates what the experience of a person with a disability and how does that translate to someone who wants to empathise

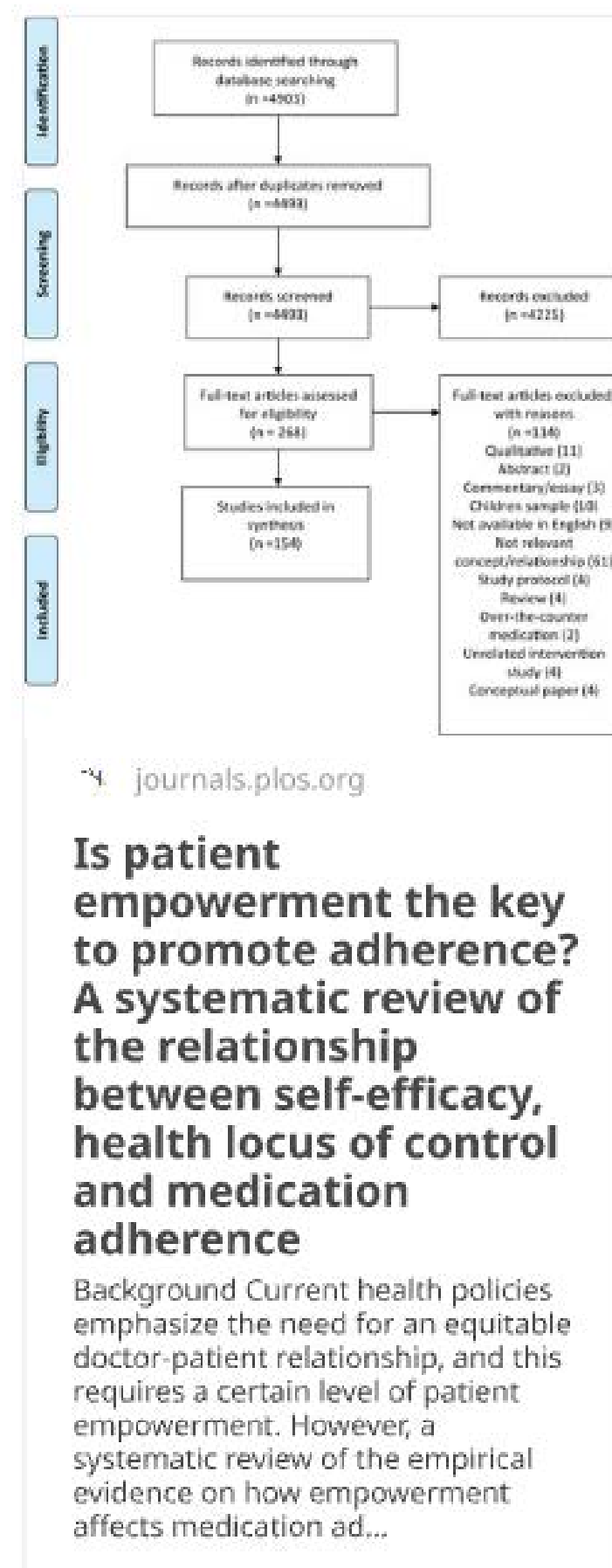
multi-disciplinary translation device --> increase empathise for user interaction and experience

what interests me

- a design tool that educates users about how to empathise to a certain user experience
- how to communicate complex or areas of unknown information to someone else in a seamless way

Internal Health Locus of Control

Article



Notes

Locus of control predicts health through different pathways, including social capital and [health behaviors related](#) to smoking, drinking and [physical activity](#). Similar pathways can explain the link between [locus of control](#) and [curative care](#) but not necessarily [preventive care](#). Interventions considering not only the direct but also the indirect effects of [locus of control](#) are promising avenues for promoting better health.

- non-cognitive skill = locus of control
- Locus of control is a psychological concept capturing “whether or not the person perceives a causal relationship between his own behavior and the reward” (Rotter, 1966, p. 1).
- A multidimensional conceptualization proposed originally in management literature [29,30], and adapted to the health context by Schulz and Nakamoto [31], perceives empowerment as a motivational construct, holding that patients participate as autonomous actors in health care decisions and consequentially take increased responsibility for such decisions [31]). This concept has four components: 1. Meaningfulness (refers to the value of activities), 2. Competence (belief in one’s own capabilities), 3. Impact (belief in making a difference), and 4. Self-determination (refers to the extent to which a choice is characterized by autonomous initiation). Based on this conceptualization, in the present review, patient empowerment is operationalized as patients’ perceptions of their own capacity for disease management and their beliefs about how much control they have over their own health outcomes. This definition leads to two main constructs constituting empowerment, which have been widely studied in medication adherence literature: self-efficacy and health locus of control.

Research Articles - Locus of Control



www.i-jmr.org

Health Locus of Control and Medical Behavioral Interventions: Systematic Review and Recommendations

Background: Health locus of control (HLOC) is a theory that describes how individuals perceive different forces that influence their lives. The concept of a locus of control can affect an individual's likelihood to commit to behaviors related to their h...



pubmed.ncbi.nlm.nih.gov

Design and Delivery Features That May Improve the Use of Internet-Based Cognitive Behavioral Therapy for Children and Adolescents With Anxiety: A Realist Literature Synthesis With a Persuasive Systems Design Perspective - PubMed

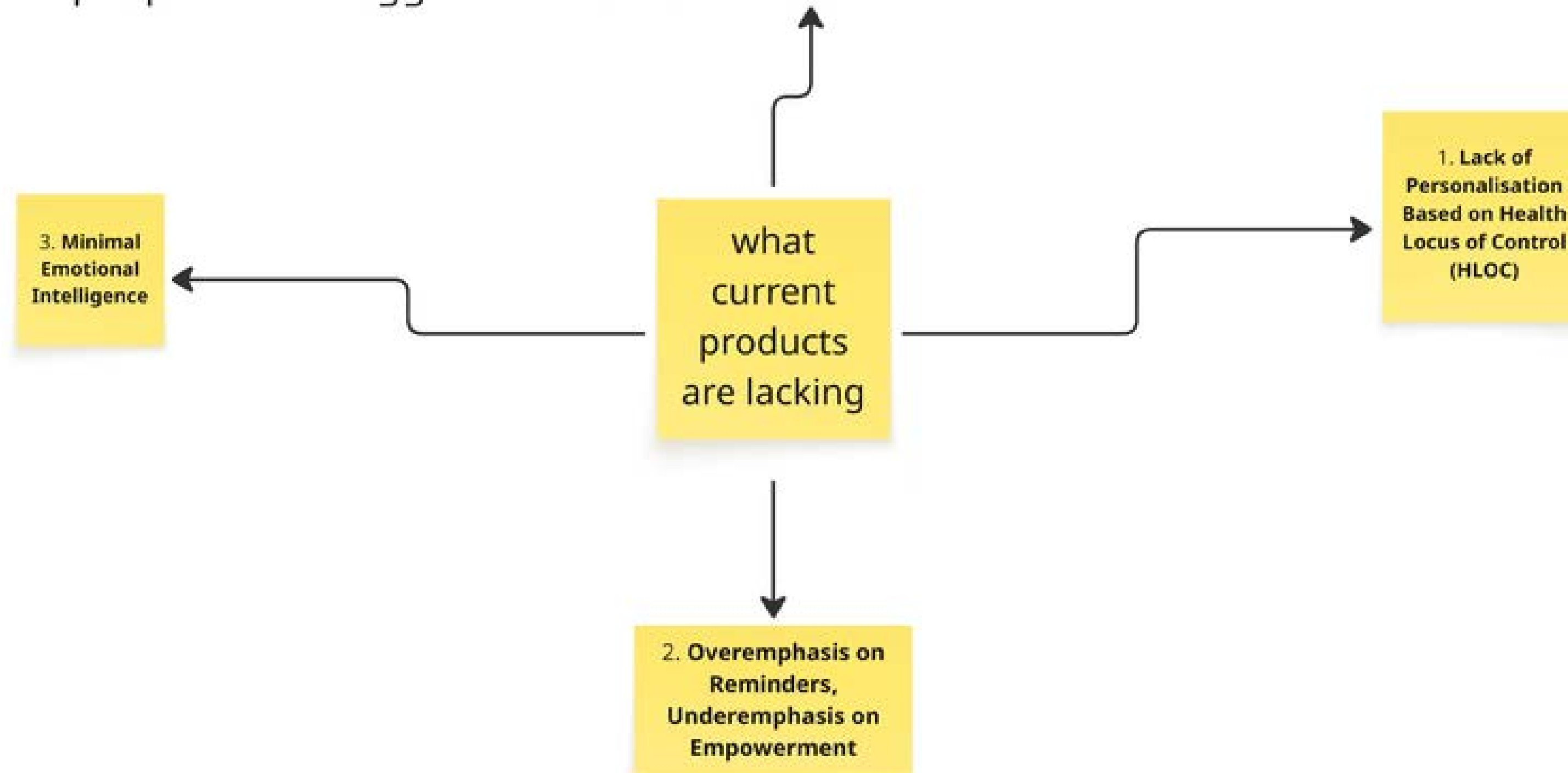
The Context-Mechanism-Outcome configurations we developed suggest that, when delivered with adjunct support, certain PSD features contribute to moderate-to-high use of iCBT prevention and treatment programs for children and adolescents with anxiety. Sta...

Correlation between 'locus of control' and designing for cognitive behavioural therapy

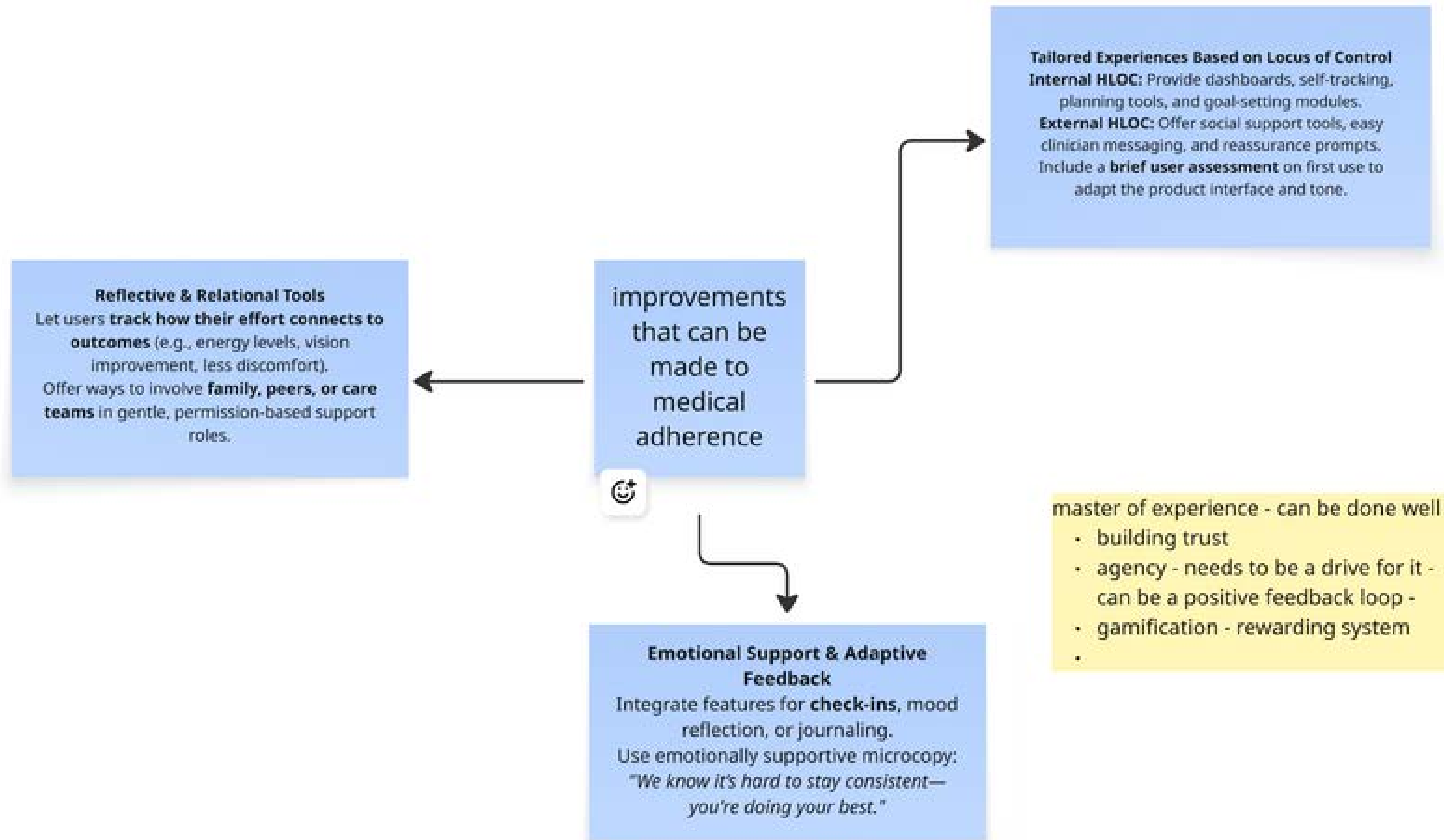
'Locus of Control' & Design

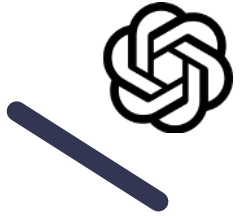
what is currently missing in the design market regarding products not helping users with Locus of control, health and healthcare utilisation, what improvements can a product make to a user with medical adherence

Designs that **build understanding, confidence, and self-efficacy**—especially crucial for people who struggle with motivation or trust.



Medical Aherence Improvements





In-market Products for Empowerment

empowering in-market products

MySugr (Diabetes Management App)

What it does:

- Lets users track blood sugar, food intake, medication, and mood in one place.
- Offers playful, gamified feedback (e.g., “tame the diabetes monster”).
- Empowers users to **understand trends** in their health data and feel proud of progress.

Why it's empowering:

- Supports **self-efficacy** through visual feedback.
- Makes patients feel more in control of a chronic condition.

FreeStyle Libre (Continuous Glucose Monitor)

What it does:

- Sensor worn on the arm allows users to **scan blood glucose levels painlessly**.
- Data is displayed in a user-friendly app with patterns, insights, and forecasting.

Why it's empowering:

- Removes the need for painful finger pricks.
- Builds **health literacy** and real-time understanding of body feedback.

Cue Health (At-Home Diagnostic Testing)

What it does:

- Delivers medical-grade COVID, flu, and other test results from a portable reader and app.
- Provides guidance on next steps after results.

Why it's empowering:

- Gives users **clinical-level insights without a clinic visit**.
- Encourages **autonomous decision-making** in acute care.

Propeller Health (Smart Asthma Inhaler)

What it does:

- Bluetooth-connected inhalers track when and where medication is used.
- Users can view patterns (e.g., outdoor triggers) and share data with clinicians.

Why it's empowering:

- Promotes **ownership of respiratory health**.
- Builds collaborative understanding between patient and provider.

Tivic ClearUP (Drug-Free Sinus Pain Relief)

What it does:

- Uses gentle microcurrent waveforms (TENS-like) to relieve sinus pain.
- Users apply it themselves via guided app interface.

Why it's empowering:

- Offers a **non-invasive, self-directed** treatment alternative.
- Feels like **a tool, not a prescription** — giving users a sense of control.

EllieGrid (Smart Pill Organizer)

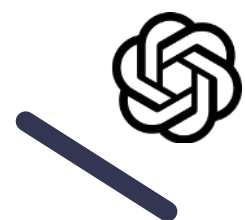
What it does:

- Organizes pills in a sleek, minimalistic device that buzzes when it's time to take medication.
- Connects to an app for schedule tracking and progress.

Why it's empowering:

- Makes medication **feel more like a self-care ritual** than a chore.
- Adds **design dignity** to daily health management.

Use of Chat GPT



iCare HOME Tonometer (Self-Tonometry for Glaucoma Patients)



pubmed.ncbi.nlm.nih.gov

The Icare HOME (TA022) Study: Performance of an Intraocular Pressure Measuring Device for Self-Tonometry by Glaucoma Patients - PubMed

Not all participants could learn how to use the Icare HOME device, but for those who could, most were able to obtain measurements similar to those obtained by GAT. The Icare HOME device is safe and reliable for self-tonometry, but nearly 1 in 6 individu...

Why It's Empowering:

Empowerment Aspect

Autonomy in care

Increased health literacy

Reduced anxiety

Better disease control

Comfort and accessibility

Design Feature

Patients can track their IOP independently, without waiting for clinical visits.

Data can be viewed over time and shared with doctors, improving patient understanding.

Regular self-monitoring reduces the stress of relying on one-off check-ups.

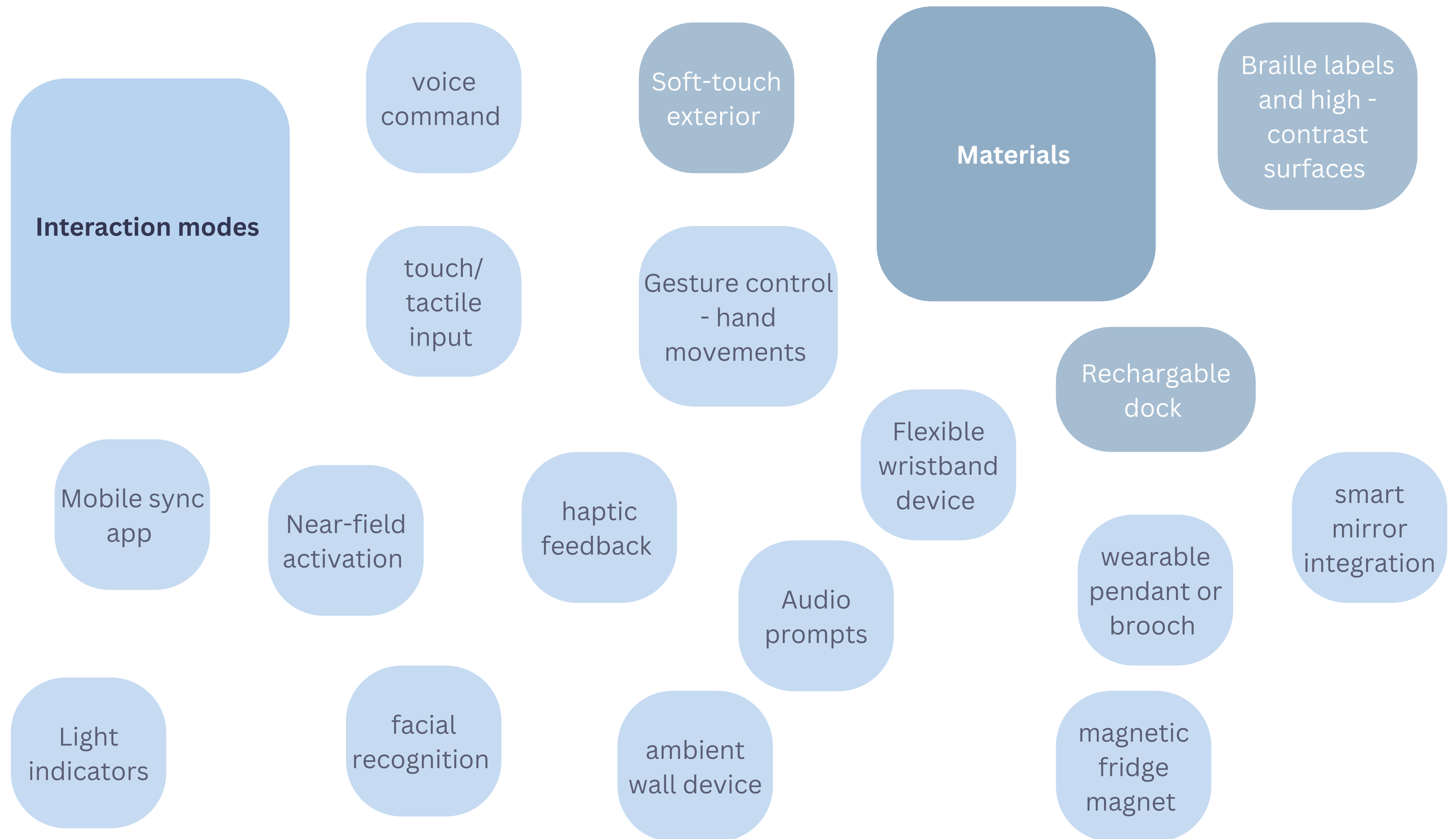
Enables proactive, timely action based on personal IOP trends.

The device is designed to be easy to use and non-invasive, with guided prompts.

In both studies, however, a comprehensive assessment of a patient's ability to use the device was the basis for certification; the patient had to demonstrate good positioning of the device as well as to obtain measurements that fell within a specified range (when compared with their own measurements and with those obtained by a trainer)



Product Needs



Design Concept Behance



Problem summary
Usability issues present in eyedrop bottles result in misuse and poor patient adherence, causing a poor patient-drug relationship.

Preservative-free medication is available but only in single dose-units. SDU's aren't recyclable and have large environmental impact because of this.

Glaucoma patients are often within an older demographic. Some patients report issues with remembering to adhere to their medication regime.

Medication bottles are small and easily misplaced, which can affect adherence.

Preservatives in multi-dose medication bottles keep the drug sterile, but can cause ocular surface disease.

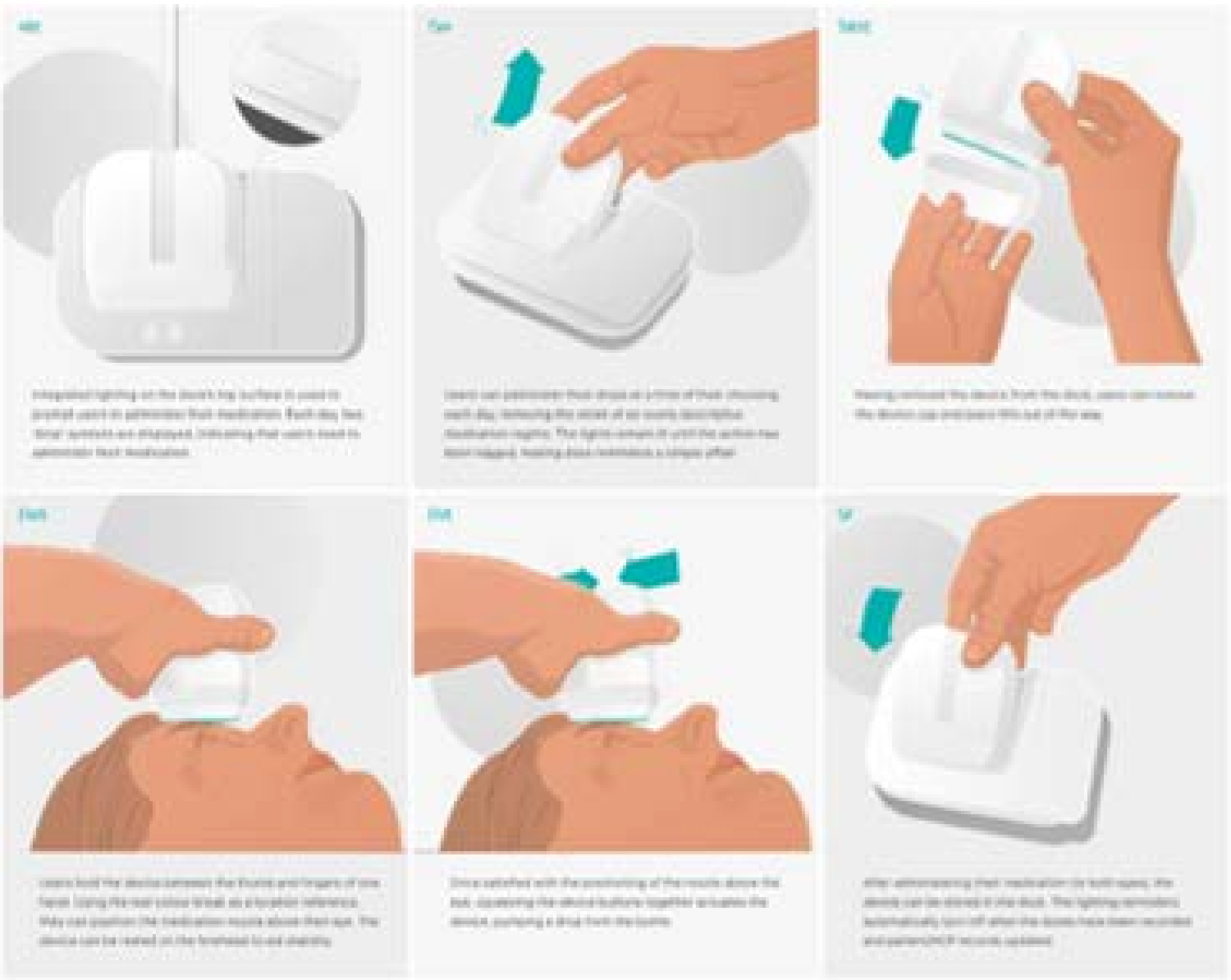
It is difficult to correctly align the medication nozzle above the eye and keep it in position during the administration of a dose.

Healthcare providers desire patient specific adherence records to assist with the better prescription of medication.

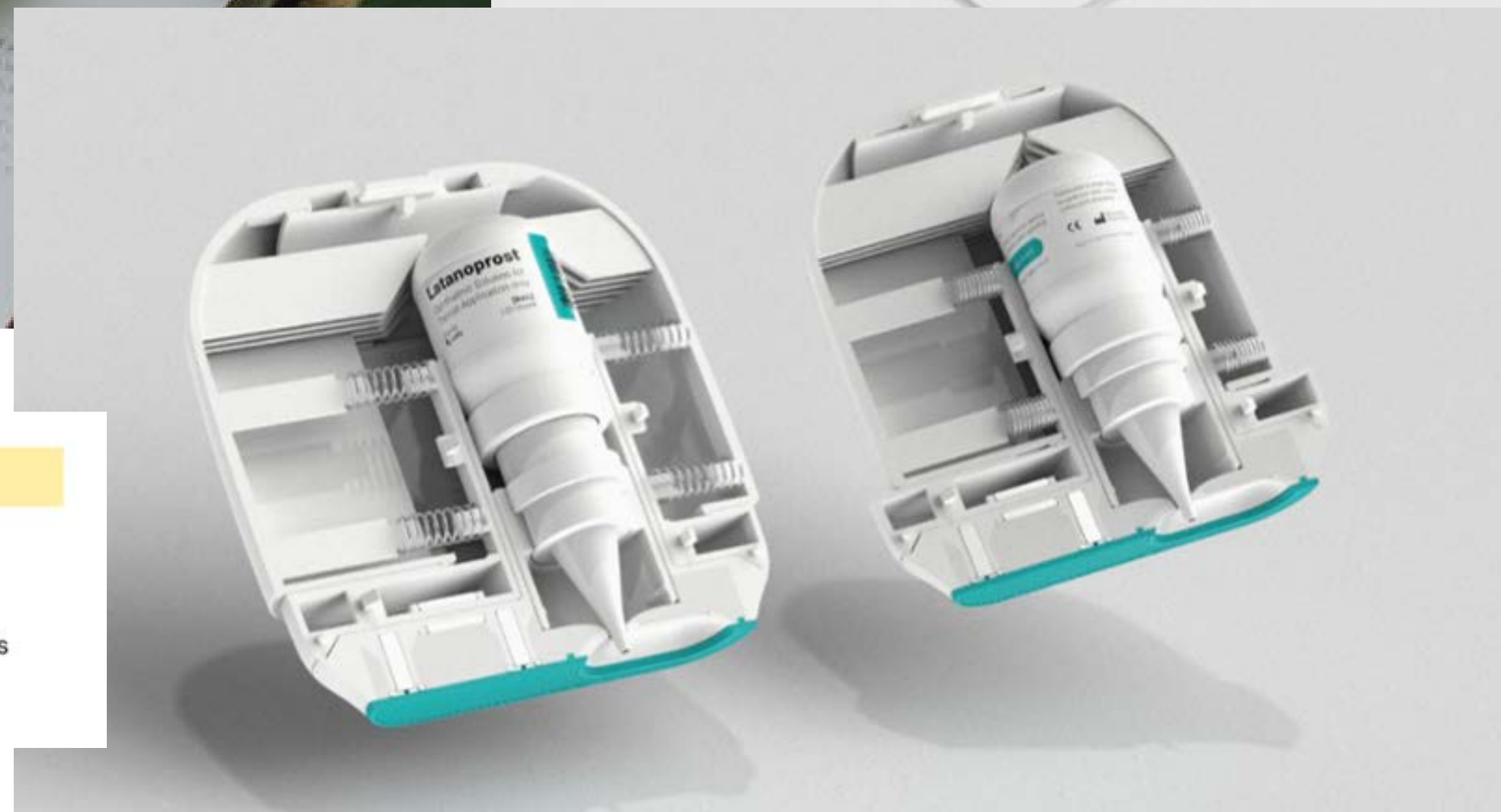
The consistency of drop size is known to vary significantly between individual drops. This affects medication efficacy.

Elderly patients are unable to self-administer their drops and rely on friends or family members to help.

Poor medication regimes result in the worsening of patients' glaucoma, causing irreversible vision loss.



Drop Design Product



what multi- functions do i want

emotions

- medical adherence
- empowerment
- voluntary monitorisation
- Internal Health Locus of control

journey

- automotive tactile pad for blind users
- reminders
- wearable
-

AMSLER Grid & Rural Australia

AMSLER grid / visual acuity chart kit for rural Australia

- user dont know when to get help or when they need to be checked
- alot of dieases happen when things get worse so the user doesnt know when to go to a doctor
-

AMSLER grid

- The Amsler grid is a visual test used to monitor central vision, particularly for detecting early signs of macular degeneration and other macular diseases. It helps identify distortions or missing areas in your field of vision that could indicate a problem
- needs to be checked once a week

Visual acuity chart

eye testing kits for rural Australia



issue = eye lash issues - if the eyelashes can be easily removed this wil helpful

Research - Rural Eye Testing

eye testing kits for rural Australia

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WILEY

Optical & Experimental Ophthalmology

REVIEW

Telemedicine and delivery of ophthalmic care in rural and remote communities: Drawing from Australian experience

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Abstract

Rural and remote communities in Australia are characterised by small but widely dispersed populations. This has been proven to be a major hurdle in access to medical care services with screening and treatment goals repeatedly being missed. Telemedicine in ophthalmology provides the opportunity to increase the availability of high quality and timely access to healthcare within. Recent years has also seen the introduction of artificial intelligence (AI) in ophthalmology, particularly in the screening of diseases. AI will hopefully increase the number of appropriate referrals, reduce travel time for patients and ensure timely triage given the low number of qualified optometrists and ophthalmologists. Telemedicine and AI has been introduced in a number of countries and has led to tremendous benefits and advantages when compared to standard practices. This paper summarises current practices in telemedicine and AI and the future of this technology in improving patient care in the field of ophthalmology.

KEYWORDS

Australia, ocular disease, telemedicine

1 | OVERVIEW OF TELEMEDICINE AND ARTIFICIAL INTELLIGENCE EYE-CARE IN AUSTRALIA

Australia is a large country with a relatively low population density of 3 persons/km², when compared to countries such as the USA (33 persons/km²), the UK (265 persons/km²) and India (421 persons/km²).¹ To add to challenges around 7 million people (20%) of Australia's population live in rural or remote areas.² It is well documented that people living outside of major cities in Australia are more likely to be diagnosed with a chronic medical condition such as asthma or diabetes, with a greater burden of disease being attributed to individuals living in remote regions. They are also more likely to die at a younger age than individuals in major cities.³ Compounding these difficulties, people in remote and very remote regions are more likely to have poor access to health services. With Medicare claims showing that the number of non-hospital referred attendances (e.g., General Practitioner visits) were lower per person, with 4.8 and 3.4 attendances per person for remote and very remote areas, respectively,⁴ in comparison people living in major cities and inner regional areas had 6.4 visits per person.⁵ Alongside this is a chronic health workforce shortage despite the

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Optical & Experimental Ophthalmology. 2022;10(7):1-10.

TABLE 1 Different models of telemedicine and technological requirements

Technology modality	Definition	Technological requirements	Timing
Store and forward	Transfer of patient data (including images and tests)	No communication b/w patient and reviewing clinician. Requires ocular imaging equipment when patient attends	Asynchronous
Real time	Real time communication between patient and specialist at time of appointment with ocular imaging and tests	Stable video/audio conferencing requirement	Synchronous
Hybrid	Patient attends site for required tests prior to telehealth appointment with specialist at home or future time	Equipment for patient exam at site. Stable video/audio conferencing requirement	Asynchronous and Synchronous

4 | TELEMEDICINE AND EYE CARE IN ABORIGINAL AND TORRES STRAIT ISLANDER COMMUNITIES

Within Australia and internationally Indigenous people have poorer health and social outcomes compared to their non-Indigenous counterparts. This includes a shorter life expectancy, increased infant mortality and morbidity and lower educational attainment.²¹ Australia is no exception to this trend, with the life expectancy of

8 | FUTURE DIRECTIONS

A maldistribution in Australia's eye health clinical workforce means rural and remote populations have chronic issues with eye healthcare access. Therefore, the role of ophthalmologists will be in the management and treatment of surgical management or complex eye diseases. Current telemedicine programs integrate optometrists, nurses and general practitioners; however, further technological advances in ocular imaging and data sharing mean that this can be augmented further and, in some cases, conducted by patients themselves using artificial intelligence.^{7,20}

Telemedicine with the addition of artificial intelligence provides many advantages in an aging population with increased healthcare needs, with artificial intelligence screening systems becoming more effective and their integration into telemedicine cheaper. This enhances primary care screening and ensures patients are well triaged for specialist clinician input as required and in an appropriate time frame for optimal visual outcomes.

A03 | ID7 | DDR

Sophie Montgomery 81

Optical challenges identified so far...



the problem

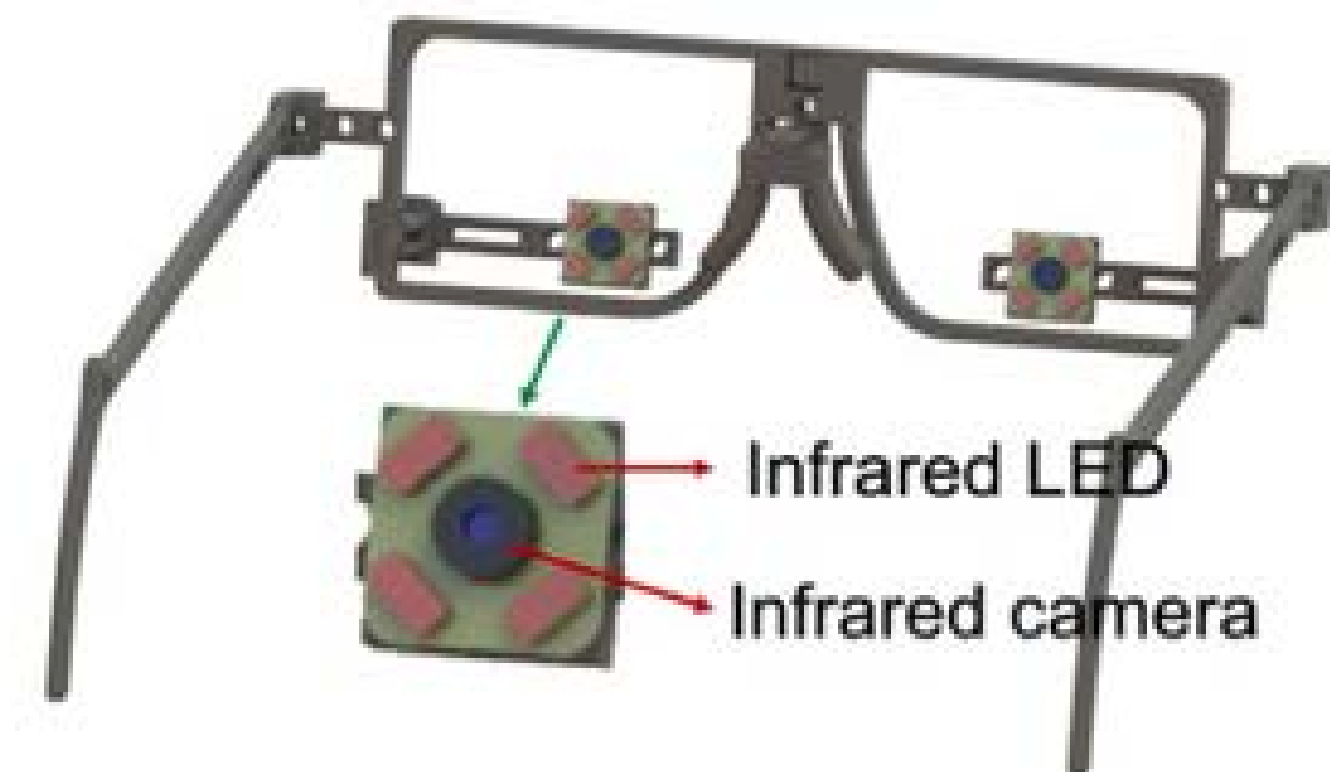
1. Rural australia lack of access to ocular health / education / hygiene/ tests / lens / accessibility / management /
1. Users do not conform to medical adherence due to lack of 'internal health locus of control' and do not feel empowered to take voluntary steps to administer and manage their own health
1. screening for eye turns - quantitatively - based on a tests regarding lights reflecting on a eye - means they have a eye turn and - DEVICE to capture that reflection and whether they have a turning eye
1. people do not administer medication at the actual frequency they need to be at

Strabismus

Strabismus – eye tracking device



(a)



(b)

The Hirschberg test, also known as the **Hirschberg corneal reflex test**, is a quick and simple method used to assess eye alignment and detect strabismus (misaligned eyes).

Modular Optical Device Narrowing Scope

modular eye assist / reminder / monitor / education

main design = accessible and easy to use handle for all users -

modular / interchangeable heads =

- a. eye drop and gel nozzle
- b. warm compress heating eye lid massager
- c. contact lens assist inserter
- d. heating mechanism for dry eye = needs to be combined with eye massager --> steam
- e. lid wipes = hygiene is important = for blepharitis - they need to be able to wipe their eye lids
- f. administering eye gel = be able to squeeze out of tube
- g. spray eye drops -

issues people face

- fine motor skills
- arthrist
- lack of education
- lack of empowerment
- internal health locus of control

mechansim

- button that does not need pressure = metal sprial that sits on plastic - finger glently touches to activate drops or squeezing machanism

additional

- disinfectant for the contact len solution

Dry Eye

dry eye

problems

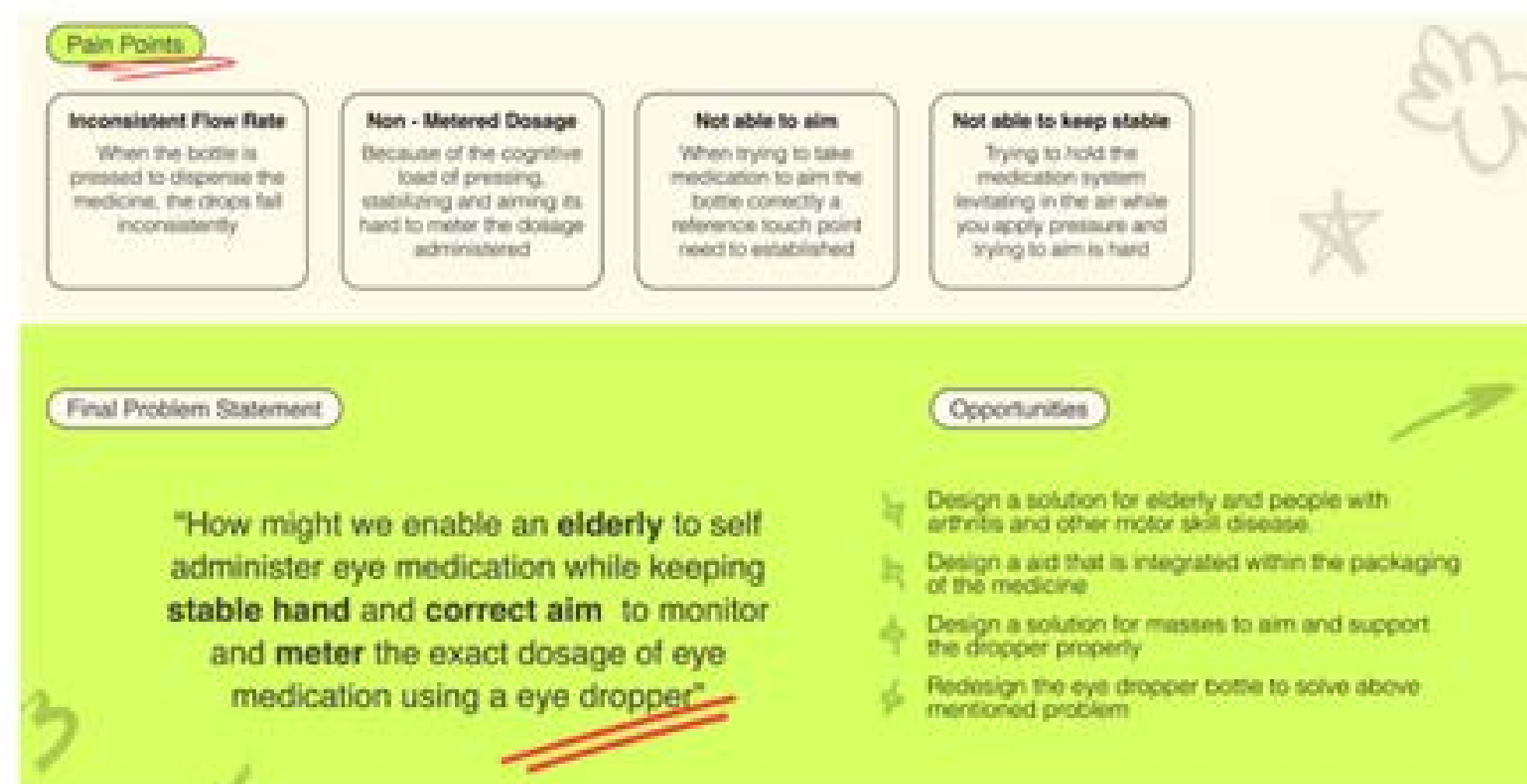
- everyone has it -- extremely prevalent
- no one does the treatment plan due to issues with medical adherence
- lack of voluntary participation
- gets worse with screen time and air conditioning - which is increasingly common
- only way to truly treat it is eye drops four times a day, eye lid massages after warm compressions which has to be 42.5 degrees for 10 minutes which can only be achieved through a heating or mask device and it needs to be massaged in a specific manner - for example applying pressure to underneath the eye lid in an upward motion after pulling the lid tight

WHAT IS THE TEARCARE® SYSTEM?

The TearCare® System is intended for the application of localized heat therapy in adult patients with evaporative dry eye disease due to meibomian gland dysfunction (MGD), when used in conjunction with manual expression of the meibomian glands.



Behance Design Product



- Low fidelity
- low electronics

Managaing Dry Eye Diease Literature Review



paitent medication preference for managing dry eye diease:
the importance of medication side effects

Patient responses from Literature Review stating their experience
with why they do not administer eye drops

Question 1	R1 (Because I used the eye drops after feeling symptoms such as dryness in my eyes.),
Question 2	R2 (Because I forgot to carry my eye drops with me when I went out, or because it's bothersome to carry it around.), 1.
Question 3	R3 (Because the symptoms were relieved with the eye drop treatment, I did not need to use the eye drops.)
Question 4	R4 (Because the frequency of use instructed by the ophthalmologist or pharmacist was high.), and
Question 5	R5 (Because unit dose bottles are too bulky to carry around.). There was no difference in the proportions of patients by reason for not following medication instructions among the three groups categorized by eye drop type (Figure S2).

Stating Optical Problems from Literature

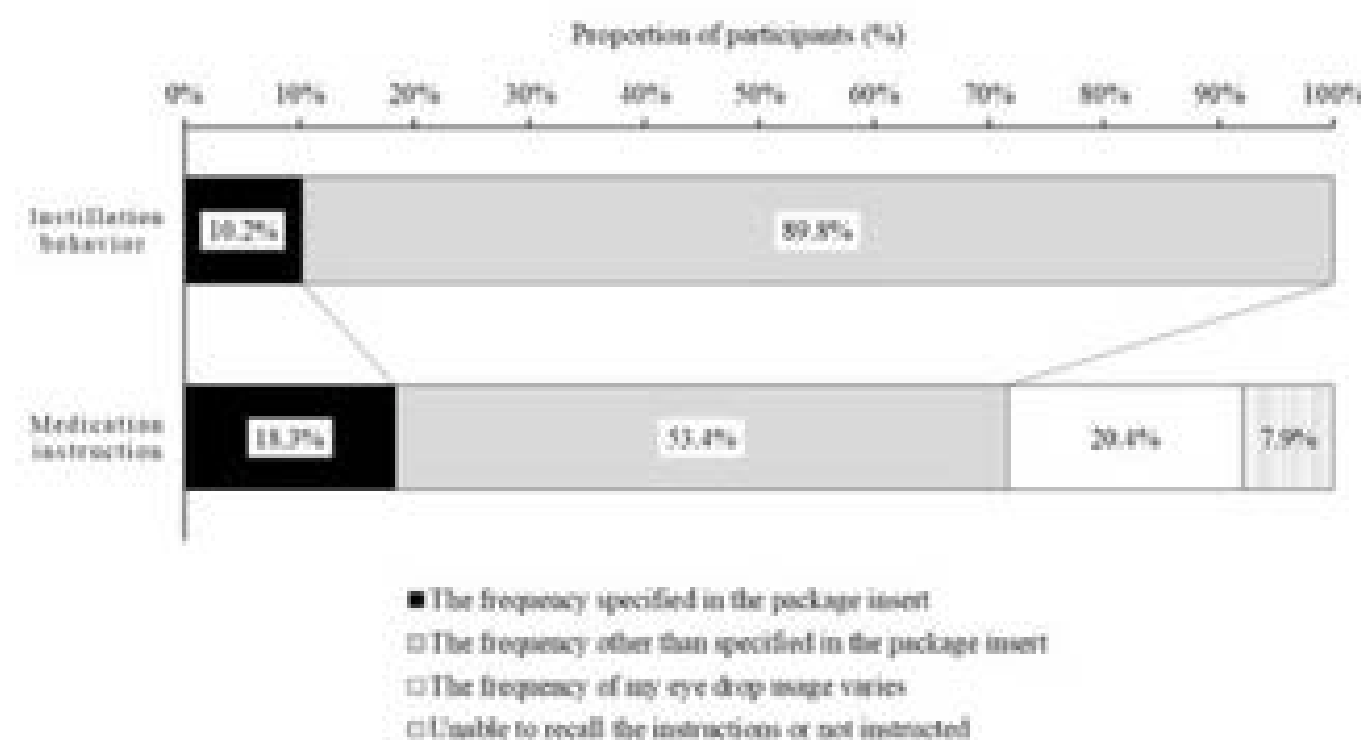


to Formulate Survey Questions for Optometrists

Question 1 • Rural australia lack of access to ocular health / education / hygiene/ tests / lens / accessibility / management /
Question 2 1. Users do not conform to medical adherence due to lack of 'internal health locus of control' and do not feel empowered to take voluntary steps to administer and manage their own health
Question 3 1. screening for eye turns - quantitatively - based on a tests regarding lights reflecting on a eye - means they have a eye turn and - DEVICE to capture that reflection and whether they have a turning eye
Question 4 • people do not administer medication at the actual frequency they need to be at
Question 5 • what devices help for dry eye?

Stating Dry Eye Problems from Literature

Dry eye Medical adherence – surveys conducted in research



3.2. Frequency of Instillation of DED Eye Drops: Instillation Behavior and Medication Instruction

[Figure 1](#) shows the distribution of participants according to the actual frequency of instillation and medication instruction knowledge status. In all, 10.2% of participants instilled the eye drops at the specified frequency and 18.3% of participants knew or were cognizant of the specified frequency instructed by their ophthalmologist or pharmacists.

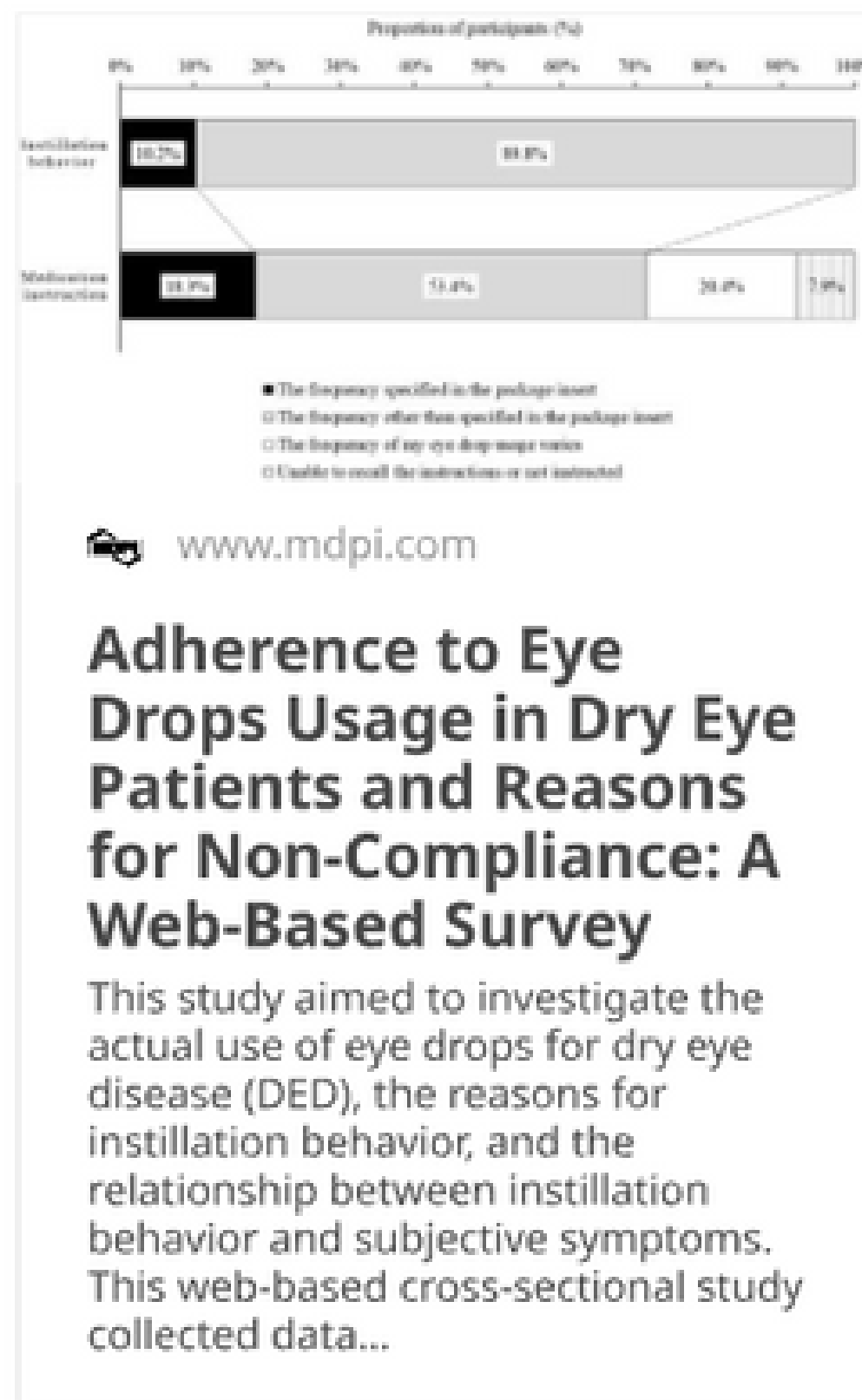
PROBLEM – people do not administer medication at the actual frequency

Participants “agreed” or “strongly agreed” with the following reasons:

- R1 (Because I used the eye drops after feeling symptoms such as dryness in my eyes.),
 - R2 (Because I forgot to carry my eye drops with me when I went out, or because it’s bothersome to carry it around.),
 - R3 (Because the symptoms were relieved with the eye drop treatment, I did not need to use the eye drops.),
 - R4 (Because the frequency of use instructed by the ophthalmologist or pharmacist was high.), and
 - R5 (Because unit dose bottles are too bulky to carry around.).
- There was no difference in the proportions of patients by reason for not following medication instructions among the three groups categorized by eye drop type ([Figure S2](#)).

Among participants who received instruction from ophthalmologists or pharmacists, the reasons given for not following instructions in the order of highest to lowest proportion of participants was R1, R2, R4, R3, and R5. In this population, the frequency of the R4 response was higher ([Figure S3](#)).

Dry Eye Medical Adherence



- "In conclusion, most participants did not instill the DED eye drops at the specified frequency to alleviate symptoms. In order to obtain the appropriate effect of eye drops, ophthalmologists need to impress upon patients the importance of regular instillation at the frequency specified in the package insert, while taking into account patient characteristics."

Optical Challenge - Contact Lense Applicator



04 week

Overview

Things to do | 3

Make survey and interview questions and have a rough plan of what kind of answers you want

Before you conduct a survey, document and fill out ethics documents

start to make the report outline with information outlined in it

Questions to Ask | 3

Type something

Type something

Type something

+

Other Notes | 3

general consent form is done

Type something

Type something

+

Tutor Discussion feedback



- try to split your questions into single based questions
- try not to ask three questions into the one
- i like that you have written your questions with research / academic journal feedback
- do a 1-5 scale



- research is looking good, keep going!
- your survey looks good as well - try to split up the questions and add writing sections to some questions
- start your report - perhaps the layout for it and add info

Lecture

Go back to your topic

What are you interested in?
Is there a problem / opportunity?
What is context?

Identify the variables in your collected data that will address what you are interested in...
Age + Context + Time of day + Weather + Experience + Action
+ Choices + Preferences + Etc

DATA ANALYSIS



DATA ANALYSIS

Eight Steps to Consider

1. Get a sense of the whole. Jot down notes.
2. Pick one document and study in detail. Write thoughts in margin.
3. Make a list of topics that have arisen. Cluster similar topics into lists and develop codes.
4. Take codes and go back to data. New codes and categories may arise.
5. Find descriptions for for topics and turn into categories.
6. Make a final decision on abbreviation for categories.
7. Assemble data material belonging to each category and perform *prima* analysis.
8. If necessary recode your existing data.

(Bach, 1993)

data analysis

- cluster similar topics into lists and develop
- don't go straight into analysis for qualitative data
- pick one description that you have received from participant and analyse what interesting things are coming from video
-

DATA ANALYSIS

Qualitative Rigour + Verification

Systematic process

Meticulous record keeping (software helps)

Collect quotes that reflect evolving narrative (to verify examples of coding)

Identify themes that might be "contrary" to emerging themes

Iteration of methods (data should be improving or refining each time)

Consider having more than one researcher review

Consider "member checks" – take back to participants to check

Clearly identify the limitations of the study

interview strategies

- consistent plan of action
- keep a good record of step by step / strategic process
- software – take images of your process –
- quote people word by word

Lecture

QUESTION + DATA TYPES

Question and data types influence analysis and presentation.

Levels of measurement:

- Nominal/categorical
- Ordinal
- Interval
- Ratio/continuous
- Short answer (textual)

NOMINAL/CATEGORICAL

Different categories No order to categories

Examples:

- What is your design discipline?
- How do you commute to work?
- What is your preferred laptop brand?

2. What is your preferred laptop brand?

- ☐ Apple
- ☐ Microsoft
- ☐ Dell
- ☐ Asus
- ☐ Toshiba

NOMINAL/CATEGORICAL

Summarising:

- Number of responses to each category
- Percentage of responses to each category
- Calculating mean and median is meaningless (categories have no order)
- Sometimes makes sense to collapse categories



CENTRAL TENDENCY

Describes a data set by typical value and distribution.

Mean

Average

Median

50th percentile

Mode

Most common



Lecture

SENTENCE (TEXT)

Requires short or long written response
Usually not categorical, ordered or able to establish distance between response

Sentence response questions require analysis of text content:

- Principles of qualitative analysis apply
- Identify / codify keywords to convert to categorical data
- Count and report frequency of keywords

4. Describe your ideal entrance to walk

Describe your ideal entrance with all aspects you think is important

MULTIVARIATE ANALYSIS

All the examples above are univariate analysis.

ie. They examined one variable at a time.

Great for describing data...
But it doesn't explain why or what contributed to this.

5. How often do you use the library?

Frequency	Number of Responses	Percentage of Responses
1-2 times per week	25	25%
3-4 times per week	35	35%
5-6 times per week	40	40%
7-8 times per week	10	10%
9-10 times per week	10	10%

"90% of respondents reported using the library at least once per week"

MULTIVARIATE ANALYSIS

Show comparisons, contrasts, differences

What useful comparisons can you make in your data?

Show Causality, Mechanism, Structure, Explanation

Is there anything in your data that helps to explain what might be going on?

Show multivariate data

Show more than one variable together to present relationships and comparisons

MULTIVARIATE ANALYSIS

Bivariate analysis: Analysing relationship between two variables

Multivariate analysis: Analysing relationship between two or more variables

Useful for making comparisons and identifying patterns and relationships in the data.

- Finding meaningful (significant) relationships requires use of statistical models (beyond scope).
- Comparisons and relationships should be driven by research question - don't compare/relate everything

BIVARIATE ANALYSIS

Relationship between two categorical variables:

I have designed two different concepts for the library entrance, and I've shown those to design students in a survey. Participants were asked to choose their preferred design. I am interested how students from different design disciplines responded.

Two variables:

- Preference of Library Entrance Design
- Design Discipline

BIVARIATE ANALYSIS

Crosstabulation: Relationship between two categories

Calculate using:

- Online survey software
- Manually sort/filter data using Excel

Visualise:

- Number / graphic matrix
- Bar graph
- Flow diagram



Lecture

MULTIVARIATE ANALYSIS

Relationship between a categorical and numerical variable:

I am interested in the environment in which people take their lunchbreak. I've presented people with pictures of two different seating areas and asked them to rate how relaxing each looks.

Two variables:

- Seating location (categorical)
- Relaxation rating (numerical)

INTERVIEWS



INTERVIEW ANALYSIS APPROACH

A typical approach to analysing interview and other textual data is to codify themes and concepts that emerge.

- Apply structure to the data
- Identify common themes
- Identify patterns and relationships

Two analysis methods:

1. Content / Thematic Analysis
2. Affinity Diagramming

1. CONTENT ANALYSIS

A structured approach to analysis used to identify meaning and patterns in textual information.

Content analysis requires **coding**:

- Assigning categories or themes to the text
- A bit like annotating a document with comments

Developing a coding scheme, what to code?

- Should link back to your research question
- Applying a coding scheme from an existing framework or method
- Deriving codes from concepts in the literature
- Developing your own codes inductively – 'open coding'

CODING TEXT

Using specialised software:

- Nvivo
 - Atlas.ti
 - Atlas.ti Q (QUD) (limited functions)
- <https://atlasti.com/cloud/>

Atlas.ti trial <https://atlasti.com/free-trial-version/>

Requires transcribed data.

- User creation of coding scheme
- User application of coding scheme
- Software generated analysis



CODING TEXT

Transcription software:

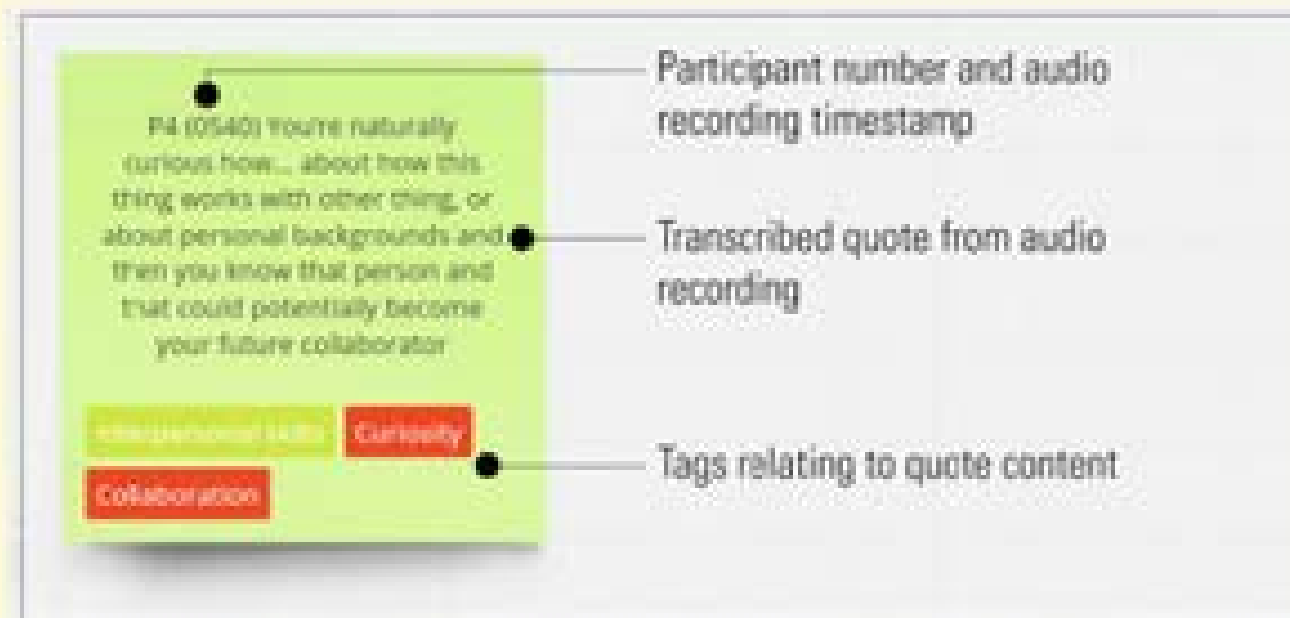
- Otter.ai
- oTranscribe
- Express Scribe
- Inscribe

Free coding software:

- Tigue
- Qualcoder
- QDA Miner Lite

(always need to double-check transcription for accuracy and timestamping capabilities)

Lecture

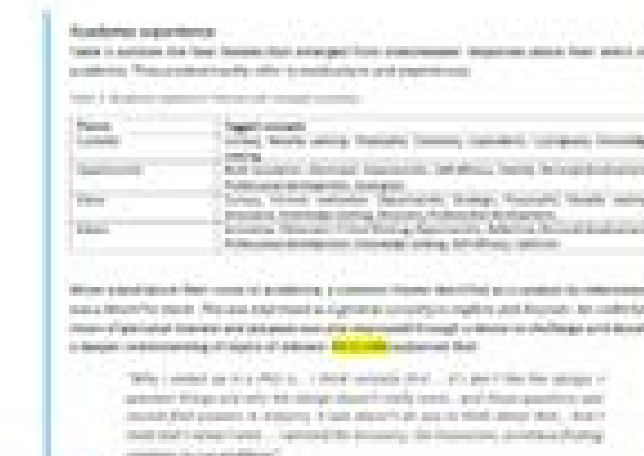


CODING SCHEME

[illegible]

REPORTING RESULTS

- Summary table identifying themes and related concepts
- Interpretation in text
- Supporting quotes



WHAT YOU NEED TO DO

Conduct research appropriately

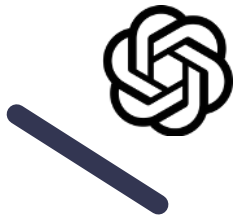
- Conduct research rigorously (collection, analysis, results)
- Prepare for each stage effectively (collection, analysis, results)
- Be methodical in your preparation and execution
- Systematic process
- Keep a good record of process, and data

WHAT YOU NEED TO DO

Present evidence of relevance, quality and integrity

- Take care in the collection and treatment of your data, and present data honestly.
- It is your job to clearly present the data that most directly answers your research question(s).

- Give priority to analysing and presenting data that directly addresses your topic and theme
- Present very relevant information in more detail, and summarise other information more briefly
- Using your research questions to plan your analysis and structure your results section



Designing for Parkinson's Disease

When designing **ergonomic handheld devices** for users with **autism, Parkinson's disease, or reduced upper-arm mobility/dexterity**, the challenge is not just "making it easier to hold" — it's making it **effortless, predictable, and confidence-building**. The shape, size, grip, and handle design have to account for **motor control, sensory processing, and fatigue** in ways that standard ergonomic guides overlook.

1 Shape & Contour

Goal: Stabilize the device in the hand without requiring constant muscle tension.

- **Oval / Elliptical Cross-Section**
 - More natural for the human grasp than perfect circles; allows wrist-neutral grip.
 - Reduces pronation fatigue for limited arm mobility users.
- **Palm-Conforming Sculpting**
 - Asymmetrical bulges matching average palm curvature so the device "nests" into the hand.
- **Pronounced Index Finger Ledge**
 - Helps users with Parkinson's avoid "sliding off" when tremors occur.
 - Offers a tactile reference point for correct positioning without visual focus.
- **Dual-Contact Stabilizers**
 - Small thumb and pinky rests to reduce rolling in the hand during tremor spikes.

2 Size & Weight

Goal: Minimize strain but maintain enough presence for control feedback.

- **Diameter Range:**
 - For low dexterity: **38–50 mm** diameter is easier than slim pens or handles (less pinch force needed).
 - For users with small hands (some autistic users, younger people): 32–40 mm may be optimal.
- **Balanced Weight Distribution**
 - Parkinson's: Slightly heavier base helps dampen tremors.
 - Autism: Lighter for prolonged use to avoid sensory overload and arm fatigue.
- **Weight Placement:**
 - Weight closer to hand = less torque on the wrist.
 - Avoid top-heavy designs unless counterbalanced by a stabilizing grip.

3 Grip Surface

Goal: Maintain secure hold without requiring high grip force or causing sensory discomfort.

- **Soft-Touch but Non-Sticky Textures**
 - Rubberized or silicone with matte micro-patterning reduces slippage but avoids tacky feel (important for tactile-sensitive autistic users).
- **Tactile Zoning**
 - Varied textures (e.g., smooth thumb rest + micro-ridged palm area) act as orientation cues.
- **Moisture-Friendly Materials**
 - Sweat-resistant grip for Parkinson's tremors and anxiety-related sweating.

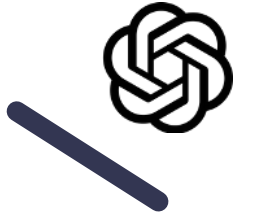
4 Handle Configurations

Goal: Reduce movement range and muscle engagement.

- **Neutral Wrist Angle Grips**
 - Angled handles (15–30°) keep forearm in ergonomic alignment.
 - Ideal for reduced supination/pronation mobility.
- **Offset Handles for Parkinson's**
 - Let the wrist rest while using elbow/shoulder movement to stabilize.
- **Loop Handles**
 - Allow the hand to "rest" in the loop — minimal closing grip needed.
 - Especially helpful for users who fatigue quickly or have partial paralysis.

ChatGPT was used here

Designing for Parkinson's Disease



5 Control & Activation Zones

Goal: Avoid fine motor demands that cause frustration.

- **Large, Low-Force Buttons**
 - 10–15 mm diameter with < 200 g activation force.
 - Positive tactile click for confirmation (but not loud enough to startle sensory-sensitive users).
- **Multi-Point Activation**
 - Allow multiple fingers/thumb to trigger actions from different positions — reduces repositioning effort.
- **Guarded Controls**
 - Prevent accidental activation from tremors by adding a gentle ridge around buttons.

6 Special Considerations by User Group

User Group	Design Insight
Autistic Users	Predictable tactile feedback; avoid unexpected vibration/noise. Provide clear start/stop cues. Use consistent textures to avoid sensory overload.
Parkinson's Disease	Design to absorb tremor vibration. Use weighted stabilizers. Avoid small controls requiring pinch grip.
Low Upper-Arm Mobility/Dexterity	Prioritize short-range motion and vertical/horizontal stability. Reduce wrist deviation by allowing neutral holding posture.

7 Interesting & Insightful Approaches

- **Magnetically Docking Handles**
 - The handle can snap to a lap tray, wheelchair arm, or wall mount when not in use — reduces accidental drops.
- **Dynamic Grip "Sleeves"**
 - Swappable foam or gel sleeves in different shapes for different tasks or user preferences.
- **Passive Motion Dampening**
 - Built-in counterweights or viscoelastic inserts that reduce transmitted tremor motion.
- **"Rest & Go" Mode**
 - A flat base so the device can stand or rest between uses without rolling away (important for people with slow reach).

4. Additional Thoughtful Details

- **Visual contrast:** High-contrast markings for controls help those with vision impairments.
- **Auditory & tactile feedback:** Clicks, soft vibrations, or sound cues confirm actions without requiring visual monitoring.
- **One-handed stability aids:** Wrist straps or hand loops so users can let go without dropping the device.
- **Magnetic docking:** For charging or storage without requiring precise hand movements.

5. Real-World Examples of Thoughtful Ergonomics

- **OXO Good Grips kitchen tools** — thick, non-slip handles designed for arthritis.
- **AbleNet Big Red Switch** — large, flat activation surface for users with low dexterity.
- **ErgoPen** — pen designed for minimal finger flexion with angled tip.
- **Lifeware Steady Spoon** — self-stabilizing utensil for tremor reduction.

ChatGPT was used here

Planning Interview Participants



Primary user	Medical professional
1. Ava's grandma has parkinson = interview	1. Joe = final year optometry student = interview
2. Elderly paitents = interview	2. Masters optomery students = survey
	3. QUT optometry clinicians = survey and potentially interview
	4. ophthalmologist = interview / email response

Iterating & Planning Interview Questions

New grid

interview questions and academic journal answers options

Question 1 • R1 (Because I used the eye drops after feeling symptoms such as dryness in my eyes.),	Question 1 Is feeling dryness of the eyes a notable symptom to trigger users to act on treatment acts? •
Question 2 • R2 (Because I forgot to carry my eye drops with me when I went out, or because it's bothersome to carry it around.),	Question 2 Are there any products in market that you suggest to patients to help carry or remind patients to administer eye drops? Have you noted any technology that works or acts if improvement?
Question 3 • R3 (Because the symptoms were relieved with the eye drop treatment, I did not need to use the eye drops.)	Question 3 From your experience, why do you think patients rely on the eye drop treatment opposed to not using eye drops
Question 4 • R4 (Because the frequency of use instructed by the ophthalmologist or pharmacist was high.), and	Question 4 How do you encourage users to administer and adhere to the frequency of use instructions by the ophthalmologist or pharmacist was high?
Question 5 • R5 (Because unit dose bottles are too bulky to carry around.). There was no difference in the proportions of patients by reason for not following medication instructions among the three groups categorized by eye drop type (Figure S2). •	Question 5 In your experience, do patients ever report that unit dose eye drop bottles are too bulky to carry around, and if so, how does this impact their adherence to treatment compared to other eye drop formats?

Iterating & Planning Interview Questions

New grid interview questions and academic journal answers options	
feedback 1 Low-vision subjects struggled to self-administer eye drops. An NPDD can improve bottle tip contact	Question 1 "Have you observed that low-vision patients struggle to self-administer eye drops, and could a non-patient dependent delivery (NPDD) device improve their ability to make correct bottle tip contact?"
feedback 2 whether a nose-pivoted drop delivery device (NPDD, GentleDrop) can improve eye drop delivery in these patients.	Question 2 what is the general feedback and concense of recommending eye drop aid? and which ones do you recommend and what do paitents thnk about them?
feedback 3 Exclusion criteria included presence of generalized or localized motor disorder affecting hand to eye co-ordination such as Parkinsonism; disease conditions with impaired memory and titration of doses or change of medication regimen to achieve IOP control during study period.	Question 3 How do you advice paitents to administer eye drops - espically paitents with upper mobility issues?
feedback 4 Eye care providers could consider screening low-vision patients about difficulty with eye drop self-administration and recommending eye drop aids.	Question 4 "Do you currently screen low-vision patients for difficulties with eye drop self-administration, and if so, do you recommend specific eye drop aids to address these challenges?"
feedback 5	Question 5 what is the frequency at which paitents need to administer eye drops - regarding time frames and dosage - is it subject to the paitent's age, gender, treatment plan and severity of glaucoma or eye issue
Feedback 6 It included specific inquiry into difficult targeting, extra drop squeeze, and difficulty in squeezing the bottle, shaking hands and missing doses.	Question 6 have you come across any eye drop aids or devices that allow squeezing the eye drop bottle easier?

Survey Questions Planning



Add a question or title - what are you aligning on?

Click to place your avatar

Strongly disagree

Neutral

Strongly agree

1-5 scale

Question 1 Is feeling dryness of the eyes a notable symptom to trigger users to act on treatment acts? .
Question 2 Are there any products in market that you suggest to paitents to help carry or remind paitents to administer eye drops? Have you noted any technology that works or acts if improvement?
Question 3 From your experience, why do you think paitents on rely on the eye drop treatment opposed to not using eye drops
Question 4 How do you encourage users to administer and adhere to the frequency of use instructions by the opthalmogist or pharmacist was high?
Question 5 In your experience, do patients ever report that unit dose eye drop bottles are too bulky to carry around, and if so, how does this impact their adherence to treatment compared to other eye drop formats?

Question 6 "Have you observed that low-vision patients struggle to self-administer eye drops, and could a non-patient dependent delivery (NPDD) device improve their ability to make correct bottle tip contact?"
Question 7 what is the general feedback and concense of recommending eye drop aid? and which ones do you recommend and what do paitents thnk about them?
Question 8 How do you advice paitents to administer eye drops - espially paitents with upper mobility issues?
Question 9 "Do you currently screen low-vision patients for difficulties with eye drop self-administration, and if so, do you recommend specific eye drop aids to address these challenges?"
Question 10 what is the frequency at which paitents need to administer eye drops - regarding time frames and dosage - is it subject to the paitent's age, gender, treatment plan and severity of glaucoma or eye issue
Question 11 • have you come across any eye drop aids or devices that allow squeezing the eye drop bottle easier?

Research Literature - Glaucoma Treatment

issues with self administration of eye drops

https://journals.lww.com/JCOR/fulltext/2015/03020/Difficulties_with_self_instillation_of_eye_drops.5.aspx

Materials and Methods:

A total of 69 persons diagnosed with glaucoma or ocular hypertension (OHT), who were self instilling their eye drops, were included in this study. Patients were interviewed for subjective difficulties being faced during self instillation using a formatted questionnaire. The patients were then subjected to assisted eye drop instillation for 4 weeks. The change IOP and consumption of eye drop bottles were compared between self installation and assisted instillation periods.

Statistical Analysis:

Paired t-test was applied at 5% significance level to compare pre and post interventional change of parameters.

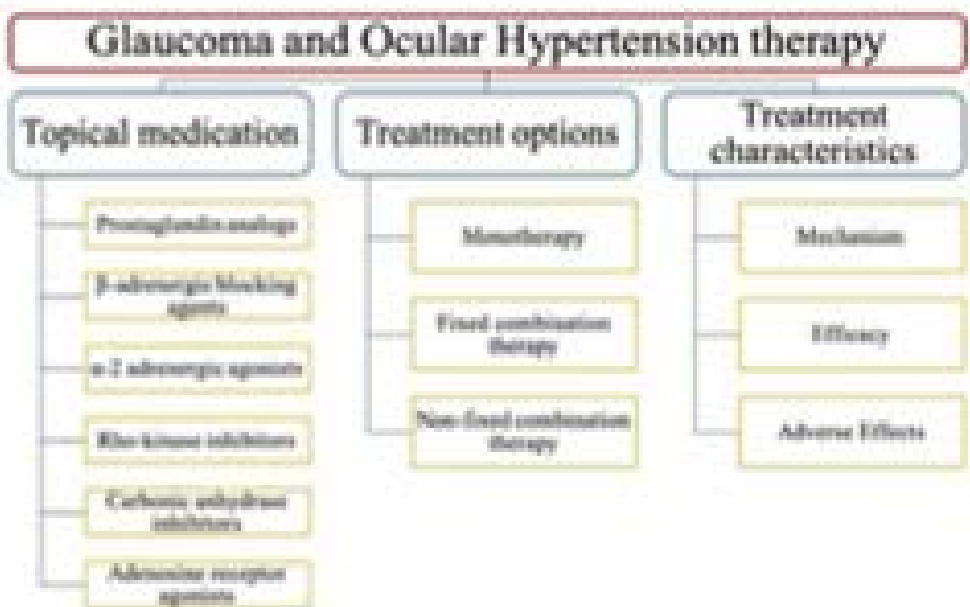
Performance, the ability of correctly instilling the eye drop,[8] is affected by number of factors such as age[9], visual acuity and presence of co-morbid conditions.[10]

These aids are helpful in facilitating self instillation, but are limited by requirement of correct technique[15], physical force[16] dispensing, cost, availability and comprehension.

Exclusion criteria included presence of generalized or localized motor disorder affecting hand to eye co-ordination such as Parkinsonism; disease conditions with impaired memory and titration of doses or change of medication regimen to achieve IOP control during study period.

It included specific inquiry into difficult targeting, extra drop squeeze, and difficulty in squeezing the bottle, shaking hands and missing doses.

assisted instillation of topical anti glaucoma medicine



This study is not without limitations. First, numbers of patient in the study group were small. Secondly, though, we tried to monitor patient's compliance to study protocol and drug instillation indirectly through the daily dose calendar, but fact remains that it is self-reported compliance to protocols. Additionally it is possible that it could have affected compliance positively. Third, the IOP is a dynamic variable and is affected by number of factors including technique of eye drop instillation as discussed in the present study. We tried to minimize other confounding factors such as diurnal fluctuation by taking mean of multiple IOP readings at different times. Fourth, additional crossover of the study participants can enhance the validity of results. And lastly drop out was large (12%) among participants.

Literature Review - Self Administering Eye Drops

Experiment issues with self administration of eye drops

experiment

Enrolled patients were provided a folder containing a pictorial guide of correct technique of self instillation of eye drops and dose calculator sheet (DCS), to track the eye drop instillation. The DCS had boxes each for missed doses and doses instilled by someone else, if any; for each calendar day. The participants had to mark the same if they missed any scheduled dose or if someone else instilled the eye drop dose. A new bottle of topical medicine of same brand which patient was using was given to assess consumption of eye drops during period of self instillation. On first visit after 4 weeks of self instillation, the Goldmann applanation (GAT) IOP was recorded by taking three readings at interval of 2 hours to minimize the diurnal variation. A standard format questionnaire was used to probe problems faced during self instillation. It included specific inquiry into difficult targeting, extra drop squeeze, and difficulty in squeezing the bottle, shaking hands and missing doses.

improvement experiment

Patients were then switched to assisted instillation of topical anti glaucoma medicine for 4 weeks and new bottles of medicine were provided. The care taker accompanying the patient was demonstrated the method of instillation of the eye drop, and a folder containing pictorial guideline for eye drop instillation technique and DCS was provided. The DCS was provided to record missed doses and to record self instilled doses. At the end of 4 weeks of assisted instillation, GAT-IOP was recorded by taking three readings at interval of 2 hours.

Subjective difficulties in maneuvers requiring physical force or better hand to eye coordination such as targeting and squeezing the bottle showed an increasing trend with age [Figure 2], others like forgetfulness about scheduled doses was not significantly related to age (0.3). There was no statistically significant relation with visual acuity in better eye and frequency of subjective difficulties ($P = 0.067$).

However, most patients are unaware of the faulty techniques and often claim to have no difficulty whatsoever in self instillation.[21]

Most common problems reported by patients in our study included targeting the eye drop, squeezing the bottle, forgetting to instill drop in time, extra-drops instillation, and difficulty in puncturing the bottle entry. These have been noted in previous studies also.[19,23] Burns *et al.*, [22] reported that majority of elderly, experience difficulty or have an unsuccessful self instillation. Poor compliance has also been associated with self instillation[24] which may lead to therapeutic failure.[23] Ashburn *et al.*, [25] estimated that at least ten percent of glaucomatous blindness is due to poor compliance. Self-reported non-compliance, although, was an exclusion criteria in our study, accounted for just three percent. Subjects participating in a study or survey often tend to show better compliance. Novack *et al.*, [26] found up to thirty percent improvement in compliance in glaucoma patients participating in a study. Thus, the estimates of non-compliance may always be conservative ones.

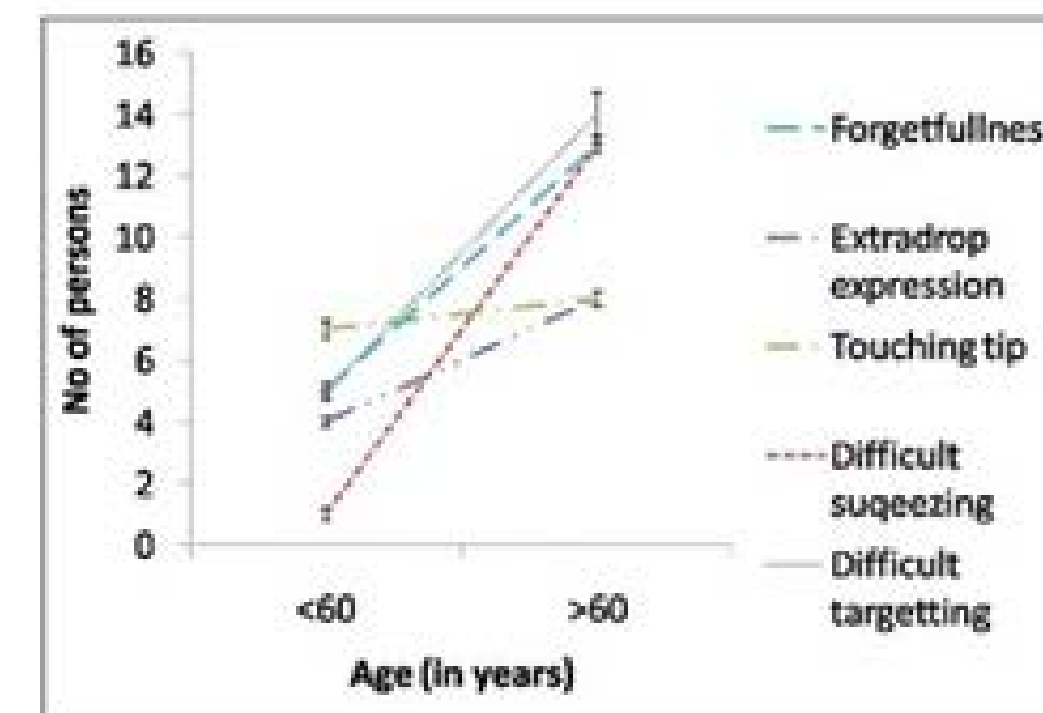


Figure 2: Age wise trend of subjective difficulties



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Skill Development for Self-Administration of Eye Medication among the Adult Patients Attending the Ophthalmology Department of a Tertiary Care Institute in Northern India

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Abstract— Background: Eye problems have been one of the commonest eye among adult population. Therefore, the need is to provide guidance and technical support by developing comprehensive eye care systems to address the problem of self-administration of eye drops among the adult patients. **Objectives:** To develop the skill of self-administration of eye drops among the adult patients. **Hypothesis:** An operational research design was used and Visual Performance after APV (OPI) score tested by pretest-posttest technique. **Study Design:** A descriptive research study of eye health professionals about the clinical practice of patients with eye problems. **Setting:** The study was conducted in the ophthalmology department of a tertiary care institute in northern India. **Participants:** The participants were adults attending the ophthalmology department of the study hospital. **Data Collection:** Data were collected through a structured questionnaire. **Data Analysis:** Data were analyzed using SPSS software. **Results:** After the intervention, the mean visual performance score improved from 21% to 47%, indicating significant improvement in the skill of self-administration of eye drops. **Conclusion:** The study showed that the skill of self-administration of eye drops can be taught to the adult patients. **Keywords:** Skill development, self-administration of eye drops, adult population.

Keywords: Self-administration of eye drops, Adult population.

I. INTRODUCTION

It is the way which health care coverage and costs are important from public health point of view, it is important to estimate the magnitude of the burden of eye diseases [1]. With an increase in system time, the eyes tend to take a lot of stress, which further leads to more problems of eyes. All around the world, an estimated 27.4 million individuals are visually impaired, of whom almost 42.7 million are visually impaired [2]. Of them, 17% million individuals are suffering from cataract and refractive errors. Eye problems were found significantly associated with age and sex. In India, ongoing evaluation reports that the percentage of visual impairment was 8.3%. The percentage fluctuated from 4.2% to 11.7% (not due direct cause). Proper eye-drops administration could reduce the visual impairment burden to half. The commitment of low vision was 13.6% [3]. People falling in the age group of 70 years and above are five times more prone to being visually impaired than people falling in the age group of 30-50 years [4].

Various studies have revealed that eye problems comprise the third largest set of problems [5]. Amongst them, cataracts pose a major threat to the general population and comprises nearly 10% of world blindness, which means 20 million people [6]. The problems show a major impact on the adult population aged above 70 years of age, as 50% of them are severely affected by one or the other eye disease. Various studies have shown

that subjective difficulties arise more among those aged above 60 years. Independent risk factors for worse administration techniques were old age and worse visual acuity. It has been observed from previous studies that previous instructions regarding drop administration techniques were significantly associated with good technique and increasing age was associated with poor technique. With facial support device, there was less contamination of the container in eye throat, but the individuals impaired in being able to use the device [7]. In patients, specifically with glaucoma therapy, effective drop administration skills can be improved by step-by-step instruction. This will further lead to reduced eye infections due to dropper contamination, avoidance of medication and ultimately maximize the effectiveness of treatment [8].

Age-related macular degeneration tends to be the most severe significant cause for visual disability in adults, while refractive anomalies involve 12% of the same consequences [9]. Because eye administration also acts as a barrier to the good eye care, which further impacts the quality of life of the adults. It has been observed that when the treatment continues following a regular proper administration of eye drops is required by the patient, and the efficacy of the topical medication is completely dependent on the accuracy of self-administration. So, the need was felt to conduct a research study among the patients visiting the Advanced Eye OPD, PNMER, Chandigarh, to develop the skill of self-administration of eye drops.

9

Akshita Chaudhary, Divya Singh, Lovandeep Kaur, Neha Rani, Ramarajeev Kaur, Srinivasan Kaur, Mr. Suresh K. Ramania, Sudama K. Saini, Srishri Raj, Mona Duggal, Parul Charola Gupta, "Skill Development for Self-Administration of Eye Medication among the Adult Patients Attending the Ophthalmology Department of a Tertiary Care Institute in Northern India," International Research Journal of Pharmacy and Medical Sciences (IRJPMS), Volume 4, Issue 4, pp. 8-14, 2021.

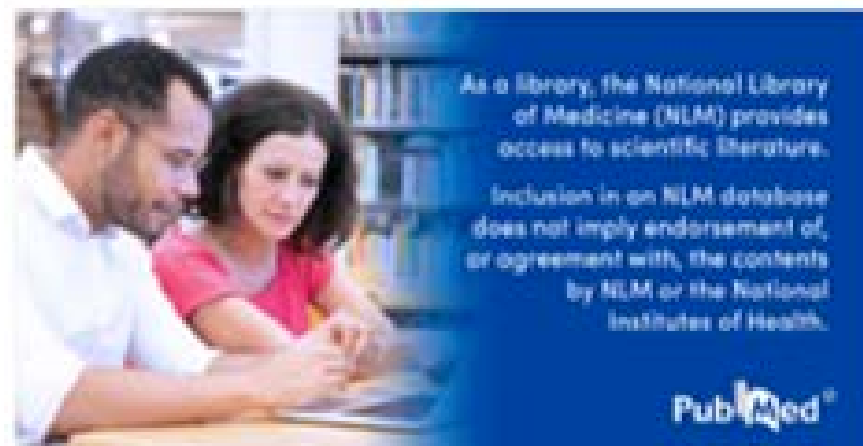
Literature Review - Self Administering Eye drops



pubmed.ncbi.nlm.nih.gov

An improved technique of eye drop self-administration for patients with limited vision - PubMed

This technique of drop instillation may be beneficial for patients with significant visual impairment in both eyes.



pubmed.ncbi.nlm.nih.gov

Patients with Low Vision Struggle with Placing Eye Drops and Benefit from an Eye Drop Aid - PubMed

Proprietary or commercial disclosure may be found in the Footnotes and Disclosures at the end of this article.

Conclusions: Low-vision subjects struggled to self-administer eye drops. An NPDD can improve bottle tip contact, ease-of-use, satisfaction, and independence. Eye care providers could consider screening low-vision patients about difficulty with eye drop self-administration and recommending eye drop aids.

[https://www.aaojournal.org/article/S0161-6420\(23\)00664-4/pdf](https://www.aaojournal.org/article/S0161-6420(23)00664-4/pdf)



Researching Aesthetic Handle Shapes



Researching Aesthetics for Reminder Device



- wearable
- Vibrational
- reminder
- Medical Aesthetic but non-invasive and do not stand out



Researching Aesthetics for Systems Kit



Researching Aesthetics for Systems Kit



yanko design
prize winner



Researching Optical Devices & their Functions

yankodesign.com

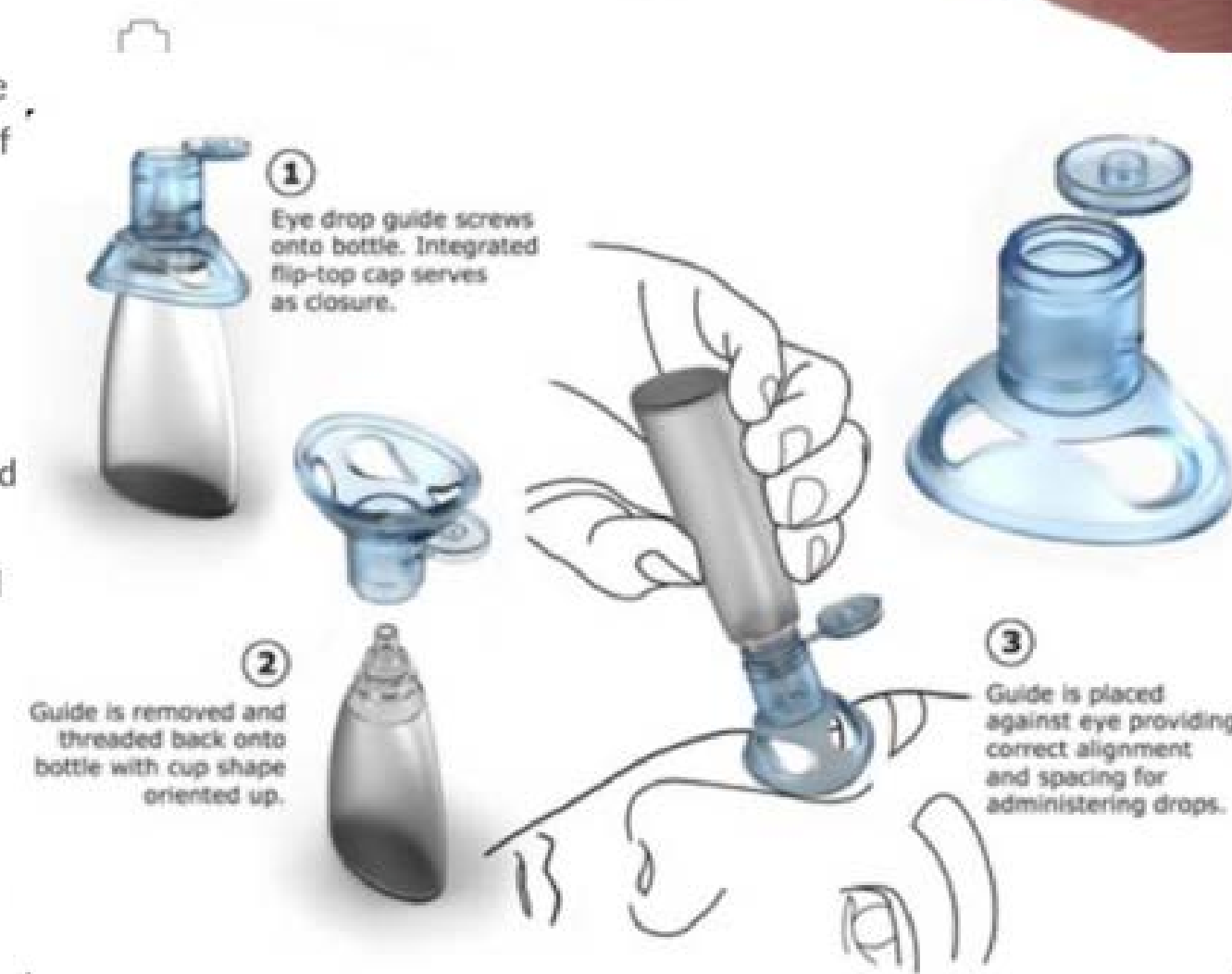
HOPES – International Winner



HOPES (short for Home Eye Pressure E-skin Sensor) is a wearable biomedical device that allows pain-free, low-cost, at-home intraocular pressure (IOP) testing for patients suffering from glaucoma. "It turns out that IOP is the clinician's single metric to assess glaucoma", mentioned the designers behind HOPES, who were motivated after one of the team members' fathers was diagnosed with glaucoma back in 2019. Regular monitoring of IOP fluctuation is critical to help determine long-term treatment goals, although at-home IOP testing still remains faulty at best, and inaccurate compared to the Goldmann applanation tonometry method, which still remains the clinical standard for testing intraocular pressure. The HOPES is a finger-glove with a high-density pressure sensor array embedded at the tip, connected to a smartwatch that sits around the wrist.

Using the device is as simple as running the HOPES app and applying pressure on the center of the eyelid with the fingertip. The wearable then lets you know when the test is complete, and accurately calculates the user's

EASY TARGETING - EYE DROPS
LAND INSIDE THE EYE AND NOT
ON YOUR CHEEKS



Response Feedback from Optometrist

If the drop was bounded within the product as a design, that would be handy such as hylforte alternative pump or system blue target design.

hylforte alternative pump



HYLO-FORTE®



One drop three times a day in each affected eye, or more frequently if required

system blue target design

For use with these bottle types:
Hilo series

