

# **MAYOCLINIC** ORGHTQVONGKLIRJWAB4 **PROJECT** NGRAABHJKREAKBJWWEAGH EAJGKNB4QB4GG34Q8TUGNVARWJGBE AKWBFKABGIWRH832YT3UO4GHJKRBA JK;F3IUT4NGJLWABLJ'2PTOHIOA'BGJC ENAGTI042QJ'IGEDNJLBGIO42HITO4GH WLABNGJNWRTI24TD **PROCESSBOOK** U9

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## Problem Space

- **Patients and clinicians have different expertise** when it comes to making consequential clinical decisions. While clinicians know information about the disease, tests and treatments, the patient knows information about their body, their circumstances, their goals for life and health care.
- **The choice of depression medications in primary care is difficult** as there are many choices and the best evidence does not indicate a clear winner in terms of efficacy.
- *How can a decision aid, one which presents issues that patients care about, be designed to facilitate patient-doctor conversations during the clinical encounter?*

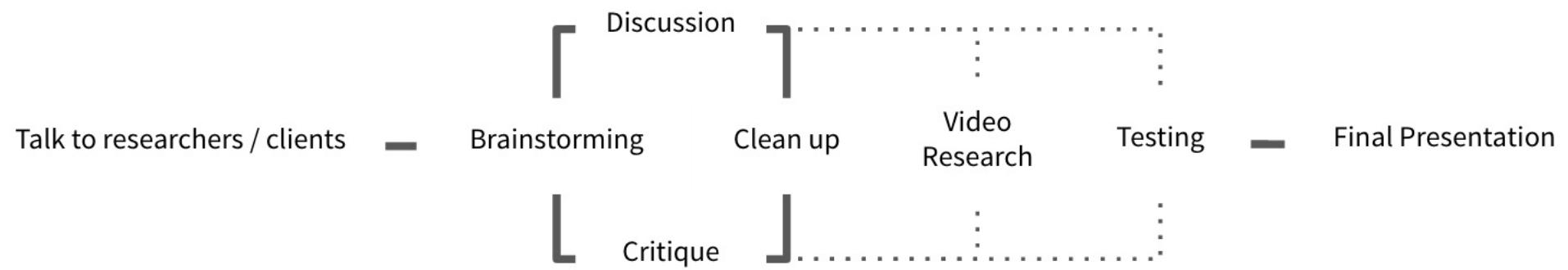


## Design Challenge

- Avoid quantification/ calculation
- Fluid interaction - flat structure
- Accommodate various scenarios
- No mental model to refer to
- Real-estate problem
- Can't have tutorial, interaction is required to be intuitive and users should be able to use it with minimum instructions; can't interrupt with the conversation
- The design should support both user groups: patients and physicians
- Avoid creating just a decision making tool for independent usage by patients



# Strategy



# Prototype 1

Parallel Coordinates  
[marvelapp.com/13be9i7](http://marvelapp.com/13be9i7)

Making Wiser Choices About Medicines  
A take-home guide to help patients compare depression medicines

Will this medicine work for me? How long before I feel better? Understanding side effects

- The **antidepressants** presented in this decision aid **all work the same** for treating depression.
- Most people** with depression can **find one** that can make them feel better.
- 6 out of 10 people** will feel better with the **first** antidepressant they try and the rest will have to try other antidepressants before they find the one that is right for them.

Most people need to take an antidepressant regularly for **at least 6 weeks** to begin to get the **full effect**.

Many side effects **go away after a few weeks**, but some only go away after you stop the medicine.

Most people taking antidepressants have **at least one side effect**.

GOT IT >

MAYO CLINIC  
This information reflects the best available research studies. It was prepared by Mayo Clinic researchers without funding from makers of depression medicines.

- *Information Visualization design method*
- Presents all options : **Overview**
- Allows comparison and selection : **Drill Down**
- Key features: **Fluidity, Color coding**



# Prototype 2

## Cards as Medicines

[marvelapp.com/ci75j7](http://marvelapp.com/ci75j7)

- Process based design method
- Presents factors in a sequence
- Allows for comparison and selection
- Key features: **physical form to virtual entities**

The screenshot shows the home screen of the Cards as Medicines app. At the top, there is a navigation bar with icons for Home, Sleep, Weight Change, Stopping Approach, Sexual Issues, Cost, Class, and a share icon. Below the navigation bar, the title "Making Wiser Choices About Medicines" is displayed, followed by the subtitle "A guide to help patients compare depression medicines." and the Mayo Clinic logo. The main content area is titled "What You Should Know". It includes sections for "Will this medicine work for me?", "How long before I feel better?", and "Understanding side effects". Each section contains a bulleted list of information. At the bottom of the screen, a note states: "This information reflects the best available research studies. It was prepared by Mayo Clinic researchers without funding from makers of depression medicines.".

The screenshot shows a detailed view of the Cards as Medicines app comparing six antidepressants: Fluoxetine, Fluvoxamine, Paroxetine, Sertraline, Desvenlafaxine, and Duloxetine. The interface includes a navigation bar at the top with the same icons as the home screen. A message at the top states: "Some people may experience weight change. It is most likely to occur over six to twelve months and depends on your actual weight. The scale below is based on a 150 lb person." Below this is a weight scale slider ranging from "Weight loss (1 to 5 lbs)" to "Weight gain (1 to 5 lbs)". The main content area displays a grid of cards for each medication, each containing four categories: Sleep, Weight Change, Sexual Issues, and Cost. Each card also has a "More" button at the bottom right. Below the grid, a note for each medication provides additional details: Fluoxetine (More), Fluvoxamine (More), Paroxetine (More), Sertraline (More), Desvenlafaxine (More), and Duloxetine (More). At the bottom of the screen, a note states: "Can help with pain. Tell your doctor if you have high blood pressure." and "Nausea, heart palpitations".

## Design Process

8 weeks

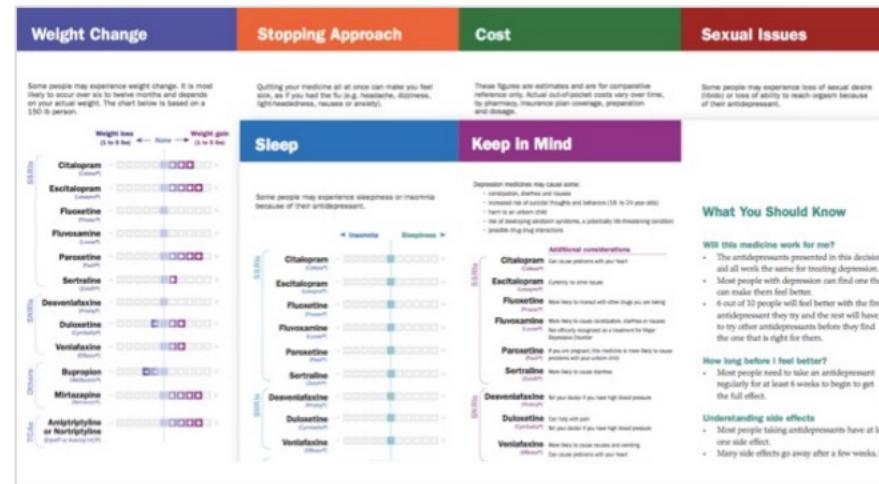
7 rounds of iterations

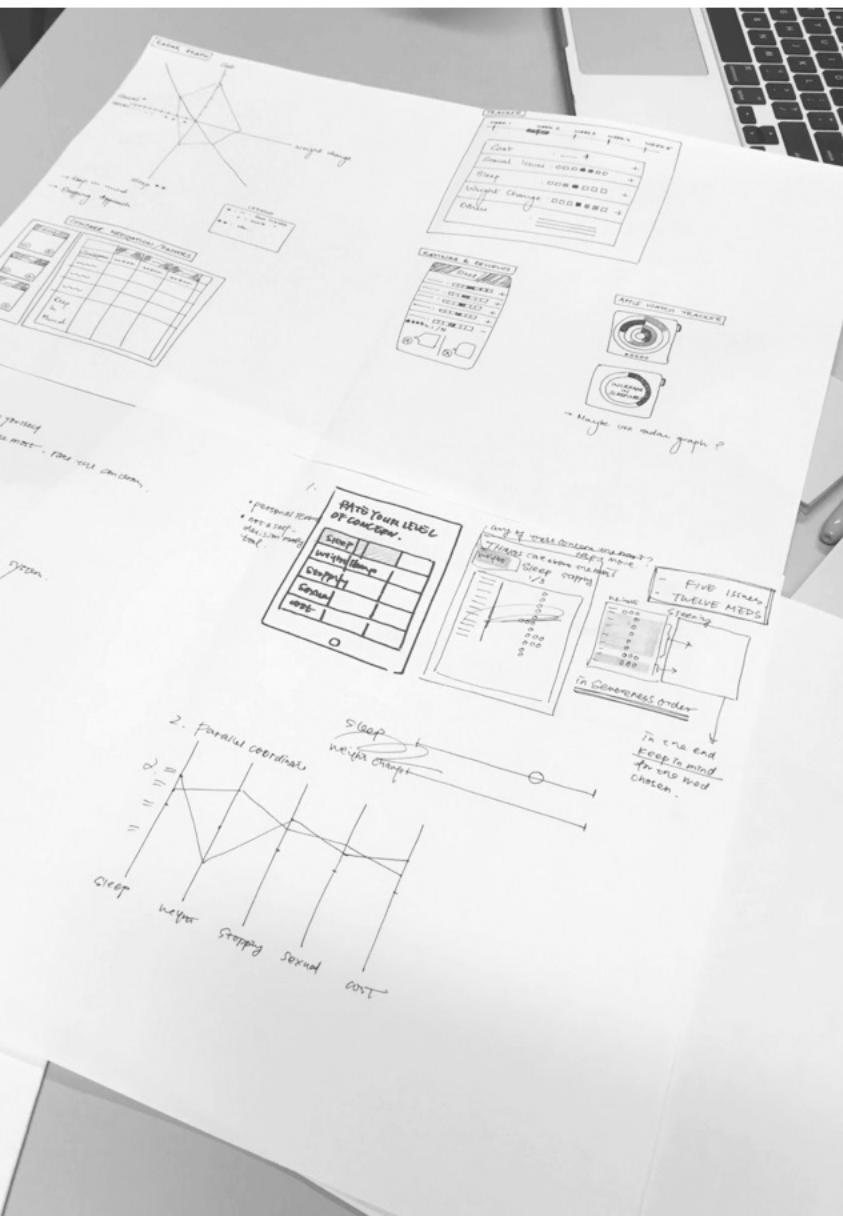
3 usability testings

*We followed a user-centered design approach, did quick iterations based on heuristic evaluations and usability testing feedback. During design and presentation, we adopted role playing and conversation based strategy in order to mimic the clinical settings.*

# Stakeholder Interview Sep.22

- Spoke with Mayo Clinic researchers to clarify the design challenge
- Pros and cons of the current physical cards  
**pros** | *low cost, secure, safety, comfort, reliability, readability*  
**cons** | *hard to update, maintenance problem, limited presentation, no easy comparison, no easy sharing*
- The history of card design  
*(iteration, observation, scenario, validation)*
- Competitives, expected platform, data source





## 1st Brainstorming Sep.25

- This happened prior to studying videos in order to avoid bias
- **2 design directions**  
*innovate the process  
 new information visualization techniques*
- **3 design models/ criteria**  
**Weaver** | self report, choose factor, rate concern level  
**Goffman** | peer's choice, survey to match persona  
**Dewey** | facilitate conversation, go back and forth
- **10 design ideas**  
*multi-platform explorations*

Studied 3 videos from Mayo Clinic showing the usage of physical medication cards during actual clinical encounters

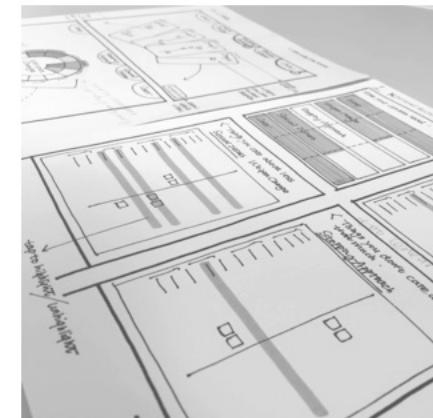
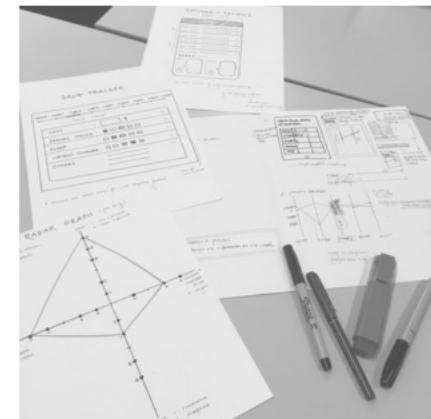
- *Various usage scenarios*
- *Different conversation strategies*
- *Generated basic function requirements*
  
- *Acknowledgement from the patients getting involved*
- *No voice or video recording*



**Observations** Sep.26

## 2nd Brainstorming Oct.02

- Reviewed current ideas
  - Radar graph** | *hard to compare because of overlapping*
  - Drug tracker** | *feelings are hard to scale, different criteria for different people so can't compare*
  - Ratings and reviews** | *what are the inputs from patient, doctor may lose power, privacy issue*
- Refinement and discussion about the new ideas



## Class Critique 1 Oct.06

- Feedbacks | *Be careful about any kind of calculation*  
“Not taking medicine is also a good decision.”
- Think back to the REAL problem space  
How do you describe the project to a person who knows nothing about this?
- Keywords | *collaborative inquiry, shared stories, enhancing conversations, human technology*

## 3rd Brainstorming Oct.09

### Problem of the current designs

- Too clinical tone | *try to be narrative about the scales by using life scenario*
- Not transferring all information on the physical cards | *what you should know, grouping, price*
- No images for pills
- More emphasis on promotional names
- Rely too much on the elimination model | *when criterias are too narrowed, result can be useless*

### Start over | *What enhances clinical conversation*

- music
- constantly receiving feedbacks
- emotion “anchor” (pillow, stuffed animal etc.)
- doodling
- stress ball
- sandplay | *in psychological treatment*

2 ideas for iteration: parallel coordinates, cards

## 4th Brainstorming

Oct. 18 via Google Hangout

Realized that we might be in the wrong direction for the previous design without focusing on enhancing conversation

### IDEA I

An interactive room that can separate and combine, with a splittable screen wall, sound proof

- *people feel uncomfortable to talk when face to face*
- *sense of insecurity in open space*

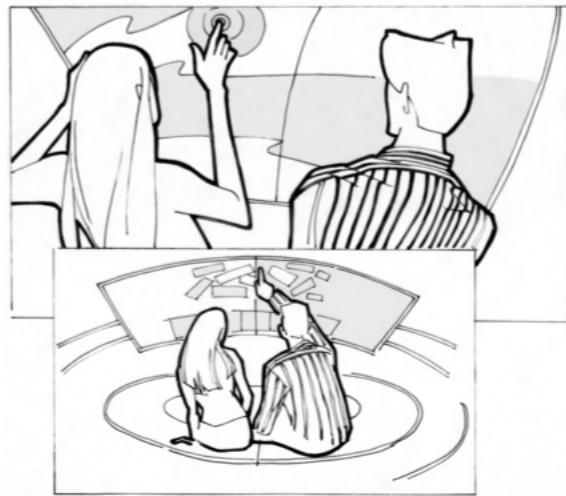
### IDEA II

Word game that encourages self expression

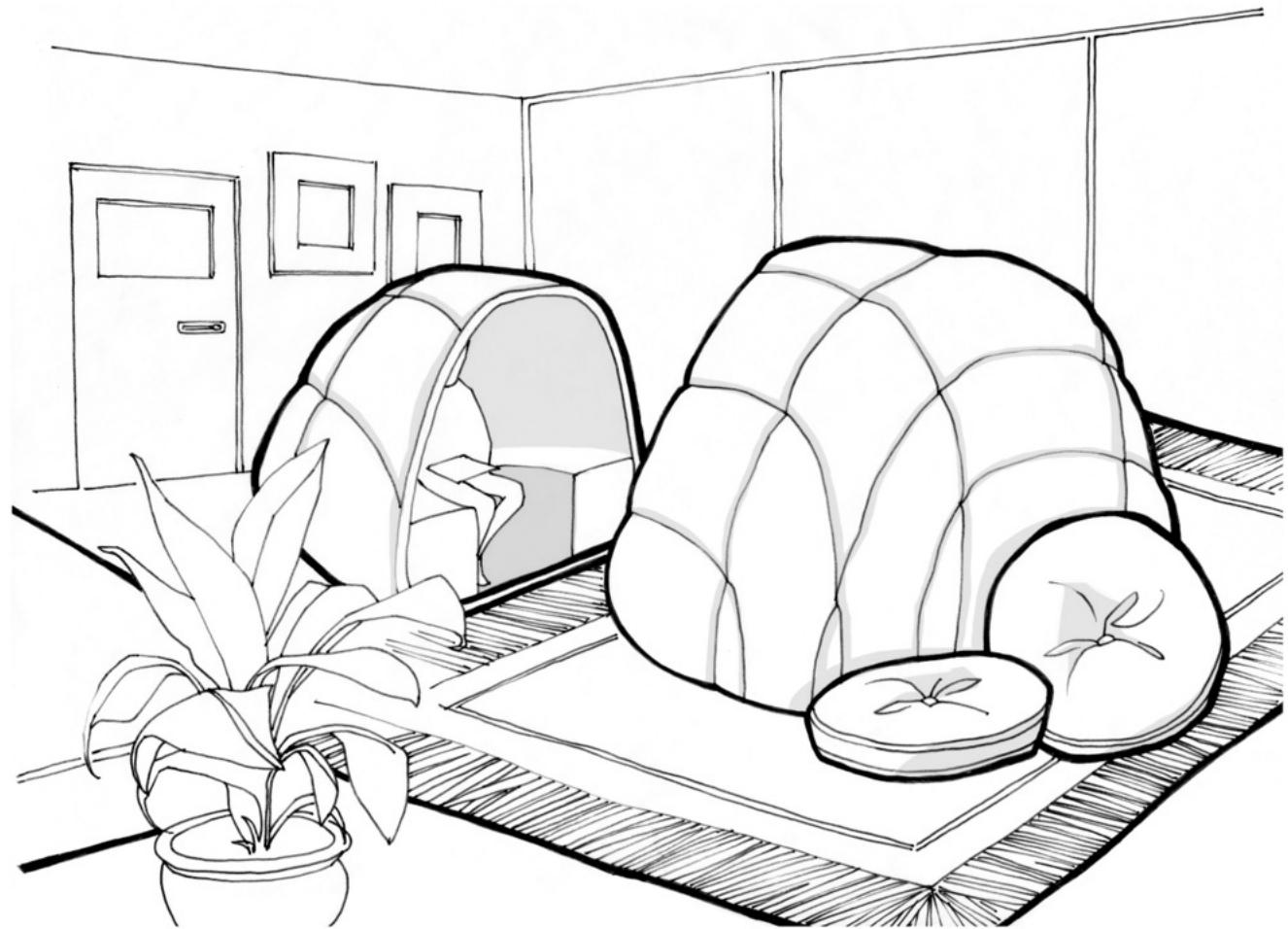
- *reverse version of Taboo*
- *choose from a bundle of adjectives to explain the five main factors of the medicines*
- *word cloud + buckets*



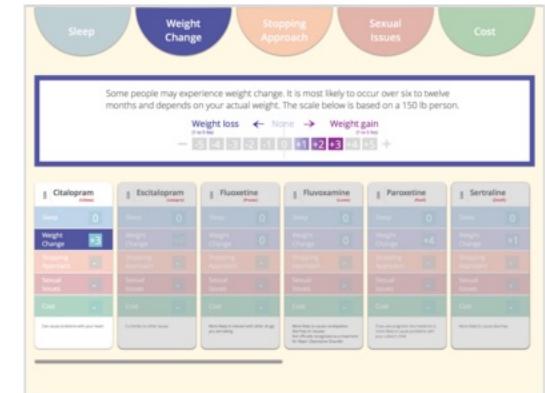
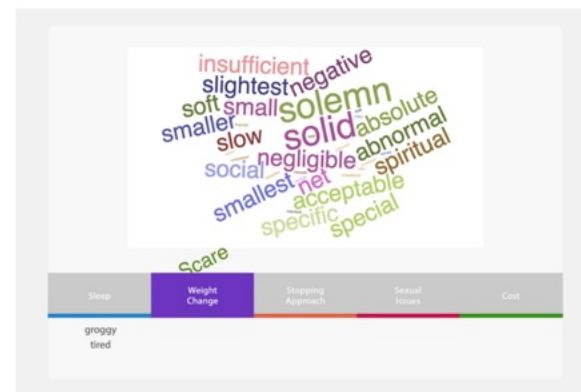
Storyboard



Scenario



# Clean-up Discussion Oct.19



Parallel coordinates & Medicine as cards ↑  
← A-room & Word game



## Class Critique 2

Oct.20 Present to Mayo Clinic Researchers

This is basically like participatory design because  
of the conversation based design strategy

### Feedbacks

*decision making is hard because*

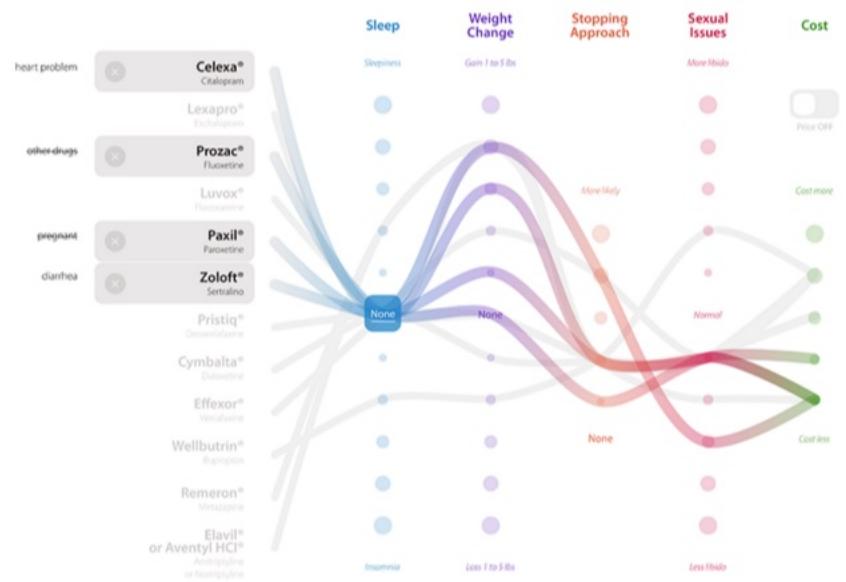
1. *clearness of information*
2. *information itself can't make decision,  
cooperation with people do*

### Parallel

- ✓ good color and opacity, fluidness, use of gradience
- ✗ scales are presented the same way, but factors are actually not comparable
- ✗ be cautious of using numbers, units can be better

### Medicines as Cards

- ✓ neatly designed
- ✗ too linear

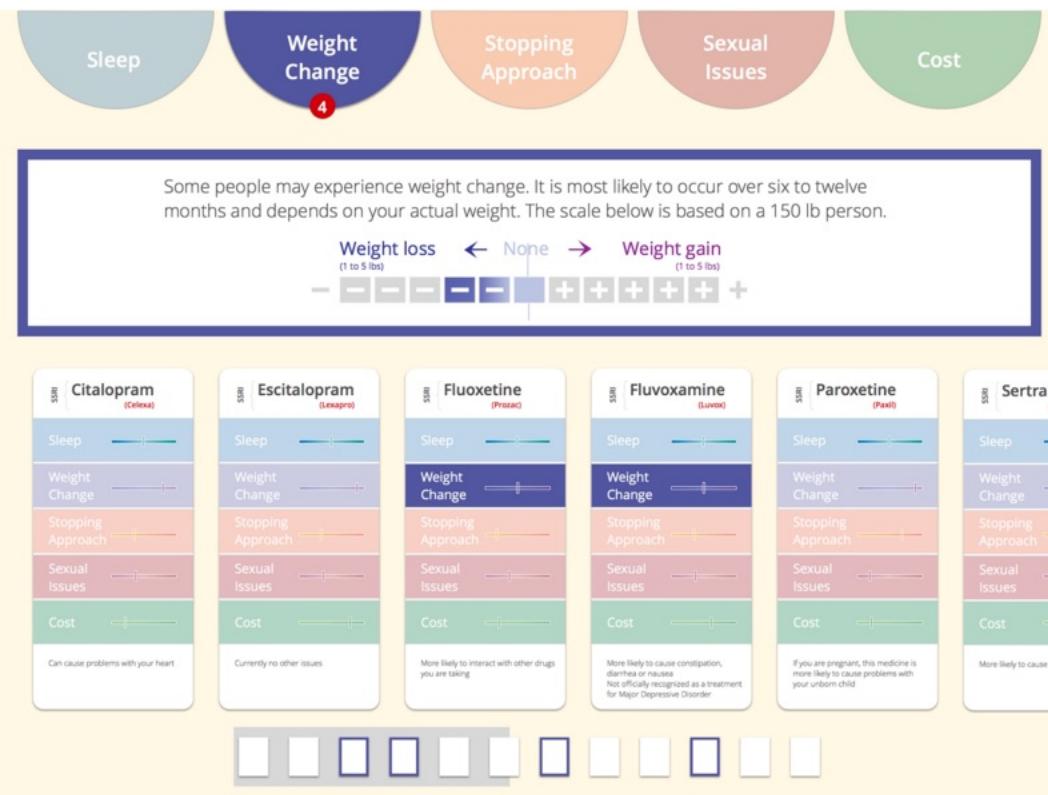


## Clean-up Discussion Oct.23

*Also created persona for user journey*

### Parallel key refinements

- Think of scales that are neutral, non-comparable, radical but not numeric
- For “Keep in mind”, break text body into keywords
- Add visual clue for clickable items
- Enhance selection mechanism



## Clean-up Discussion Oct.23

*Also created persona for user journey*

### Medicines as Cards key refinements

- Allow users to reorder
- Add ½ card at the edge to indicate hidden cards
- Change units to static slider to show scale
- Add thumbnail feature

## Video Research 2 Oct.27

*Rewatch the use of card video followed by discussion  
Focus on flexibility - Tools should be quiet and fluid*

### Patient 1

- Patient chose 3 key factors
- Doctor mentioned the particular medicine name
- Doctor taking notes, pointing on the cards, using marker to highlight the medicine line, and gave the card to the patient

### Patient 2

- Doctor taking charge, introduced card by card, factor by factor
- "This is our winner"
- "Do you agree?"

### Patient 3

- Doctor already knew what to prescribe
- One-sided conversation
- Very comprehensive introduction
- Hard to keep track of what the doctor had mentioned or not

# Clean-up Discussion Oct.30

## Parallel key refinements

- Add “lock” function
- Enhance “Keep in mind”
- Test display on iPad
- Add “print” and “email” function
- Add “What you should know” screen
- Mayo branding



## Clean-up Discussion Oct.30

### Medicines as Cards key refinements

- Enhance thumbnail interaction
- Enlarge the cards
- Add an extra tab for groupings on the top
- Add “print” and “email” function

Some people may experience weight change. It is most likely to occur over six to twelve months and depends on your actual weight. The scale below is based on a 150 lb person.

Weight loss ← None → Weight gain  
(1 to 5 lbs)

**Citalopram (Celexa)**

**Escitalopram (Lexapro)**

**Fluoxetine (Prozac)**

**Fluvoxamine (Luvox)**

**Paroxetine (Paxil)**

**Making Wiser Choices About Medicines**

A take-home guide to help patients compare depression medicines.

**What You Should Know**

Will this medicine work for me?

- The antidepressants presented in this decision aid all work the same for treating depression.
- Most people with depression can find one that can make them feel better.
- 6 out of 10 people will feel better with the first antidepressant they try and the rest will have to try other antidepressants before they find the one that is right for them.

How long before I feel better?

- Most people need to take an antidepressant regularly for at least 6 weeks to begin to get the full effect.

Understanding side effects

- Most people taking antidepressants have at least one side effect.
- Many side effects go away after a few weeks, but some only go away after you stop the medicine.

The information reflects the best available research studies. It was prepared by Mayo Clinic researchers without funding from makers of depression medicines.



**Class Critique 4 Nov.03  
+ Clean-up Discussion Nov.06**

*Detailed enhancements*

# Usability Testing

Nov. 12/13

*Benchmark tasks based on each prototype*

*Test with hypothesis*

*Followed by session and comparison interview*

- Participants recruited by proximity, no HCI specialists
- 3 within subject testings with randomized prototype order
- 1hr for each participant
- Quiet and comfortable settings
- No voice or video recording
- Chocolates were provided as compensation

# Usability Testing Results

Nov. 12/13

## Likes

### Parallel Coordinates

- ✓ *Visibility of grey lines, gives a sense of understanding*
- ✓ *Visual design of colors*

### Cards as Medicines

- ✓ *Thumbnails reordering which indicate state*
- ✓ *Specific comparison of drugs*

## Dislikes

### Parallel Coordinates

- ✗ *Context of “What You Should Know” page not obvious; headings help, but confusing at first*

### Cards as Medicines

- ✗ *Confusing interaction for card scrolling and thumbnail slider*
- ✗ *Didn’t notice number callout for each factor*

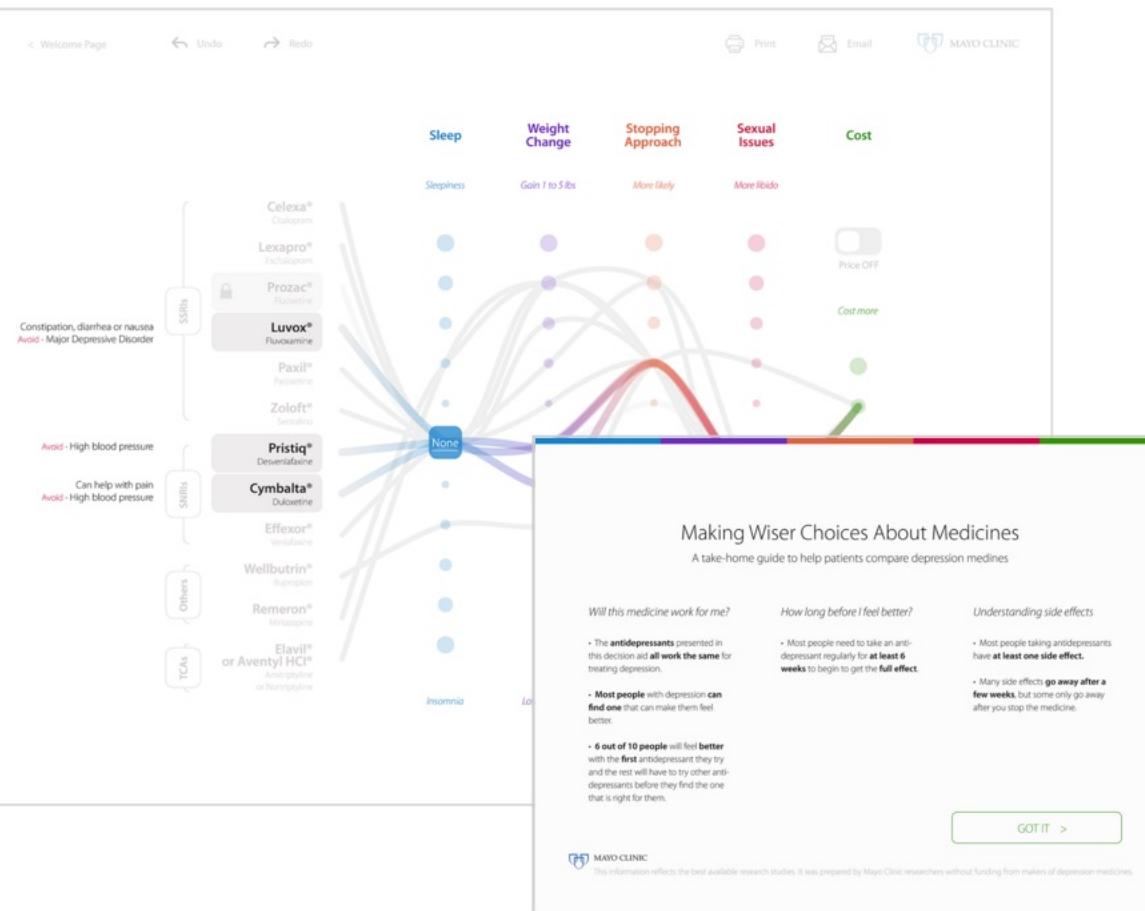
## Recommendations

### Parallel Coordinates

*Visual feedback of things that are not clickable*

### Cards as Medicines

*Explicit back button to go to the home screen*



## Class Critique 5 Nov.17 + Final Clean-up Nov.20

### Parallel Coordinates key refinements

- Bolded, highlighted keywords within paragraphs
- Enhanced layout: spacings, size of legends, alignment, clickability visual cue
- Flexible interaction: multiple tapping choices for a single objective
- Change baseline for stopping approach
- Add Back and Forward function

Below are the different types of antidepressants based on how they affect chemicals (called neurotransmitters) in your brain. Click to see their groupings.

SSRIs    SNRIs    Others    TCAs

Citalopram (Celexa)	Escitalopram (Lexapro)	Fluoxetine (Prozac)	Fluvoxamine (Luvox)	Desvenlafaxine (Pristiq)	Paroxetine (Paxil)	S
Sleep	Sleep	Sleep	Sleep	Sleep	Sleep	Sleep
Weight Change	Weight Change	Weight Change	Weight Change	Weight Change	Weight Change	Weight Change
Stopping Approach	Stopping Approach	Stopping Approach	Stopping Approach	Stopping Approach	Stopping Approach	Stopping Approach
Sexual Issues	Sexual Issues	Sexual Issues	Sexual Issues	Sexual Issues	Sexual Issues	Sexual Issues
Cost	Cost	Cost	Cost	Cost	Cost	Cost
Can cause problems with your heart	Currently no other issues	More likely to interact with other drugs you are taking	Constipation, diarrhea or nausea more likely Not officially recognized	Tell your doctor if you have high blood pressure	If you are pregnant, more likely to cause problems with your unborn child	More like

## Class Critique 5 Nov.17

+ Final Clean-up Nov.20

### Cards as Medicines key refinements

- Organic scrolling
- Thumbnail interaction for positioning
- Bordered the cards to show grouping

## Reflections

- Targeting on special population, such as children, the elderly and etc. from the beginning can be a good way to achieve better usability in the end.
- Icons can be overvalued. Sometimes text is more effective.
- Always provide options and examples.
- Freedom for customization.
- **Never be afraid to start over.** User research runs through the entire design process.
- Always be fully prepared for presentation in advance. Always have backup plans.
- Role playing and conversation flow can be a good way to present prototypes.
- It takes a lot more time to work in groups, but the results are going to be much better.
- Designers can't work separately - constant critiquing is the one and only way to great design.

## *Appendix*

1. "The Mathematics of Communication," Weaver
2. Presentation of Self in Everyday Life, Intro and Chapter 1; Erving Goffman
3. Selections from "Democracy and Education" by John Dewey
4. Keeping the Patient in the Equation — Humanism and Health Care Reform (Pamela Hartzband and Jerome Groopman)
5. The Case Against "the Evidence": A Different Perspective on Evidence-based Medicine
6. Visualizing Uncertainty about the Future, by David Spiegelhalter, Mike Pearson, Ian Short
7. Selections from "The Company We Keep, an Ethics of Fiction," by Wayne Booth

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**WL THANK YOU! VEU9BNGJNWRTI24TDP**

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