01.101: Technologies for Sustainable Global Health (AY2023 Term 7)

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SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

NKF

PDopoly

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Mentor

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Final Needs Statement

Problem · Population · Outcome

A way to reduce the knowledge gap of peritoneal dialysis (PD) among tertiary students in Singapore and highlight it as an alternative treatment for kidney failure with the goal of fostering wider acceptance of peritoneal dialysis in the future.

Identify

Clinical Need/Opportunity (11 Sep - 1 Oct)

Disease

- Kidney failure leads to the accumulation of waste products and toxins, potentially causing permanent and irreversible damage to body cells, tissues, and organs.
- Treatment is required, but might come **with avoidable risks (e.g., inflammation)** if mismanaged.

Stakeholder

- **Students Open to experimenting** and exploring exciting new topics.

  Can help to educate and allay fears and concerns related to PD if they or their loved ones become patients

The New York Times, 2023
McCrindle, 2016

Treatment

- **30%** MOH is **trying to push** the number of patients who opt for PD from ~20% to 30% by 2025.
- **Limited resources** on how PD works at home

CNA, 2022

Market

- **5 to 6** People in Singapore are diagnosed with kidney failure every day - **a three-fold increase** from two decades ago.
- **$120m** Operating costs in 2019 (~4,500 patients, 36 dialysis centres), up from $60 million in 2012

CNA, 2022
Straits Times, 2019

Needs Criteria (11 Sep - 1 Oct)

Must-Have

1. Exhibits a seamless content flow and effectively convey essential information and steps regarding how PD works
2. Does not require Internet connection
3. Adaptable to both mobile and desktop interfaces

Good-To-Have

4. Videos and animations to explain PD process, care routines and tips for success
5. Resources for patient support
6. Avenue for users to provide feedback and ask questions
7. Provide information in multiple languages

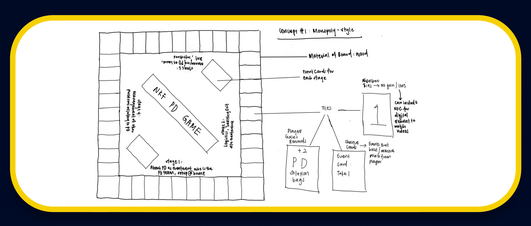
Ideate

Concept Generation and Selection (25 Sep to 15 Oct)

Through classical brainstorming, **10 different ideas** were formed and two rounds of concept selection, together with market research, were conducted before we narrowed down to the idea of creating a **board game**.

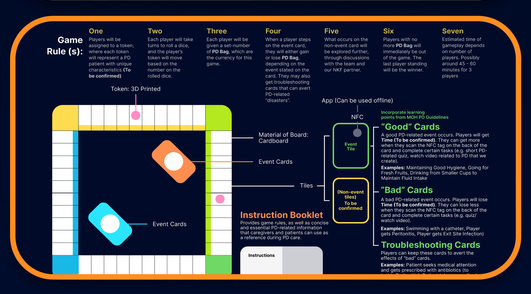
Criteria	Board Game	Deal or No Deal Adaptation	Competitive Card Game	Interactive Storybook	Virtual Reality Game	Mobile + Desktop App	Trivia Card Game	Life Simulator	Kidney Health Visualization Tool	Virtual Escape Room
Feasibility Weight = 3	+2	+2	+2	+1	-1	0	+2	+2	+1	-1
Team's Expertise Weight = 2	+2	+2	+2	+1	-2	-1	+2	+2	0	-2
Team's Interest Weight = 1	+2	0	0	+2	+1	0	0	+1	0	+1
Concept Selection 2										
Market Demand Weight = 2	+2	-	-	+2	-	-	-	+2	-	-
Scalability Weight = 2	+1	-	-	-1	-	-	-	+1	-	-
Potential Costs Weight = 2	-1	-	-	+2	-	-	-	-1	-	-
Total Score	**16**	10	10	13	-6	-2	10	15	3	-6

Ideation and Prototype Journey



C-Sketch (25 Sep to 15 Oct)

Preliminary idea of the game and the components involved in the game



Prototype 1 (15 Oct to 22 Oct)

Refined details regarding the game (i.e., cards, content, and game rules)

NKF's Feedback

A1. Lack of sufficient relevance to PD

A2. Lack of explicit PD learning points

A3. Concerns about using PD Bags as currency as it lacks sensitivity

Professors' Feedback

B1. Lack of relevance to target group (tertiary students)

B2. Suggested making the game more adaptable to other learning objectives to ease creation of games in the future

Playtesting Conducted

Prototype 2 (22 Oct to 26 Nov)

Expansion into an educational system that includes both the board game and microsite

Playtest Overview

Simulated Randomised Controlled Trial with control and experimental groups

Quiz

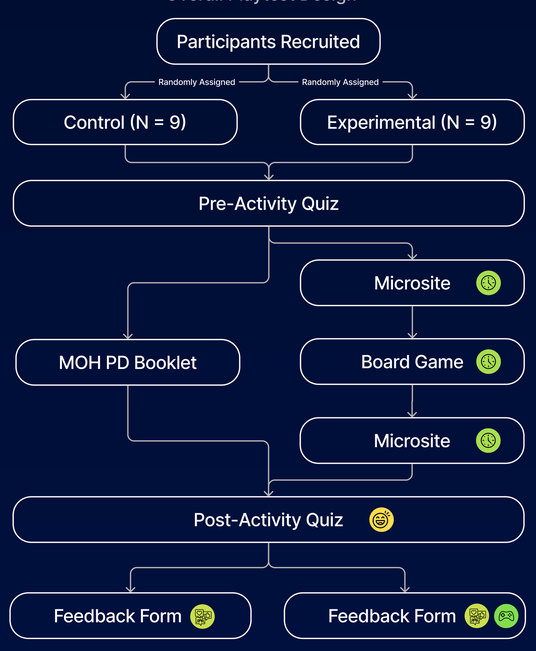
Pre-Quiz and Post-Quiz Format to test which modality is more effective in imparting knowledge and measure level of receptiveness

Feedback Form

Feedback form to understand level of engagement and ease of learning

Results from Functional & Usability Testing

Overall Playtest Design



	Control	Experimental
Receptiveness	Pre-Quiz Average: 6/10 Post-Quiz Average: 8/10	Pre-Quiz Average: 6/10 Post-Quiz Average: 9/10
Engagement	MOH Booklet: 3.2/5	Board Game: 4.3/5 Microsite: 4.9/5
Time Spent	-	20 to 30 minutes
Ease of Learning Gameplay	-	Players asked for more explicit game rules through means like instruction booklets

Playtesters' Feedback

Board Game

C1. More explicit game rules

C2. Simplify content of tile cards

C3. More realistic stories

C4. Clear win condition

Microsite

D1. More intuitive clicker points

D2. Text timing can be improved

Final Solution

Prototype 3 (20 Nov to 30 Nov)

Proposed Educational System

Current Outreach Programme	Didactic teaching of content using slides		Quiz to test learning of audience	End of outreach 30-45 Minutes
Prototype 1	**PDopoly Board Game**		Quiz to test learning of audience	End of outreach 30-45 Minutes
Prototype 2 & Final Prototype	**Microsite**: Learn hrough real-life stories	**PDopoly Board Game** (3-4 players, with the help of a Game Master and NKF Staff)	**Microsite**: To consolidate learning	Still have access to **Microsite** to learn more about PD after outreach programme

Board Game

Designed with Figma

Needs Met

1. Seamless content flow that effectively conveys essential information and steps of PD
2. Does not require Internet connection

Design Features

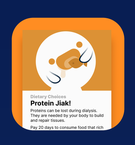
Citizen Card
Reflects real-life stories of patients and contains secret mission for players to win
Feedback Addressed: A1, C4

Currency
In terms of days, which reflects sensitivity towards time for patients
Feedback Addressed: A1, A3

Adaptable
Designed with Figma, making it adaptable and easily modifiable to suit other topics
Feedback Addressed: B1, B2

Instruction Booklet
To make game rules more readily available to players
Feedback Addressed: C1

Story Flow
Introduction to PD, PD management, to returning to normalcy
Feedback Addressed: A1, A2



Bite-Sized Learning
Integrated into gameplay through Tile, Support, PD Challenge and Question cards
Feedback Addressed: A1, A2, C2

Microsite

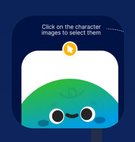
Designed with Figma

Needs Met

3. Adaptable to both mobile and desktop interfaces
4. Videos and animations to explain PD process, care routines and tips for success

Design Features

Real-Life Stories
Accelerable stories of people with kidney failure and undergoing PD
Feedback Addressed: D2



Intuitive Interface
Distinct clicker symbols showing interactable elements
Feedback Addressed: A1, D1

Conclusion

Summary and Analysis

Through our extensive collaboration with **NKF, Dr. Xiaojuan Khoo and Dr. Yajuan (Julia) Zhu**, we have designed PDopoly, an adaptable and complementary educational system aimed at reinventing NKF's current outreach efforts. Our rigorous testing has allowed us to continuously improve our prototype and provided an avenue for us to validate our design features. We believe that PDopoly has the potential to revolutionise how students engage with kidney health information, making the learning process both enjoyable and impactful. By bridging the gap between education and decision-making, we aspire to contribute to a more informed and kidney-conscious community.

Future Considerations

- Continuing our collaboration with NKF to **further refine PDopoly.**
- **Scaling PDopoly** and **testing it** during NKF's outreach programmes in schools.
- **Creating spin-off versions** that cover other topics such as chronic kidney disease, kidney failure and haemodialysis
- Engaging in **collaborative efforts** with industry partners, including hospitals keen on utilising gamification for educating children about diseases and their management.