Introduction

Based on our initial research and assumption, we designed a demo that includes basic play mode for patient experiencing. The goal of the interview is to identify the core information that is essential for the patient rehabilitation process, including evaluation process, meaningful recovery movement, common measurement metrics, recommended session time and play position, and doctor's opinion towards traditional rehabilitation method & potential usages.

The process of rehabilitation evaluation

The evaluation process depends on different stages of stroke patients

- 1-3 Months Post-Stroke
    - To restore function as close as possible to prestroke levels or develop compensation strategies to work around a functional impairment. An example of a compensation strategy is learning to hold a toothpaste tube so the strong hand can unscrew the cap. [1]
- 6 Months Mark and beyond. Chronic stroke disease
    - A rehabilitation physician (physiatrist), who can help coordinate aspects of your recovery and keep meeting with you as long as you need the support, whether it's for a few years or the rest of your life
    - Physical, occupational and speech therapists, who can help you recover as much function as possible in day-to-day activities, with a focus on your personal goals
    - A neurologist, who understands the mechanisms behind stroke-related brain injury and can suggest customized treatments to target the affected area of the brain
    - A rehabilitation psychologist, who can help with cognitive, emotional and behavioral functioning as well as reintegrating with the community, which can aid in recovery [1]

Evaluate Movement/Action Completion

Common metrics are used for stroke evaluation

- Fugl-Meyer (FMA)
    - Fugl-Meyer Assessment (FMA) scale is an index to assess the sensorimotor impairment in individuals who have had strokes. [3]
- Jebson Taylor
    - The Jebsen Hand Function Test (JHFT) assesses fine motor skills, weighted and non-weighted hand function activities during performance of activities of daily living. [4]

Metrics for cognition testing:

- MMSE
- MOCA

Meaningful evaluation movements:

- Making a fist then opening hands
- Picking toy bricks
- Picking screws(tiny items)

Take Away

- Movement completion is one of the most important parts for evaluating patients' capability.
- *Flexibility > Accuracy > Speed > Power*

A Typical Recovery Session
- Around 30 mins per session.
- 6-7 different movements
- Better using seating position for upper lamb and finger rehab
- <u>Motor Imagery.</u> Sometimes giving patients time to imagine that they are using their body to move an item. (a type of mind training) [2]

Opinions from Dr.Ran
Dr. Ran mentioned that the fingers and hands could be the hardest part in rehabilitation because those are controlled by a large part of the brain neuro. Compared to lower lamb, the upper body takes a longer time to recover and they did let patients do upper body recovery at home, so she agreed with the VR game focusing on the upper body.

Traditional Methods
- Using cameras to see patients' movements when they are at thome.

Potential Usage Scenario
- Orthopedic Rehabilitation (Larger Population) - Even simpler because the movement is easier to measure than fingers & hands. (ex. Elderly knee replacement recovery)

Reflection
<u>Calibration Design</u>
- Calibration should be designed to focus more on letting patients complete simple tasks instead of measuring their rotation or degrees they can move.
- If it is in stroke rehabilitation mode. Should lead the patient in a sitting position to play the game.

<u>Expanded Rehabilitation Mode for More Usage Scenarios</u>
- To expand our patient types to orthopedic rehab, we need to add a process to identify patient's needs when they first enter our game. And the calibration process will be various based on their needs. For orthopedic rehab, the calibration might be more focusing on rotation and detailed movement data compared to stroke rehab. And, the orthopedic rehab might also need extra tracking equipment such as a camera to track lower body movements.

Reference
[1] Stroke Recovery Timeline
[2] Brain-computer interface boosts motor imagery practice during stroke recovery
Chinese Version: https://blog.csdn.net/cc1609130201/article/details/106882154

[3] Fugl-Meyer Assessment
[4] Jebsen Hand Function Test (JHFT)