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Towards a Patient-Centered Design of a Cancer Telerehabilitation System

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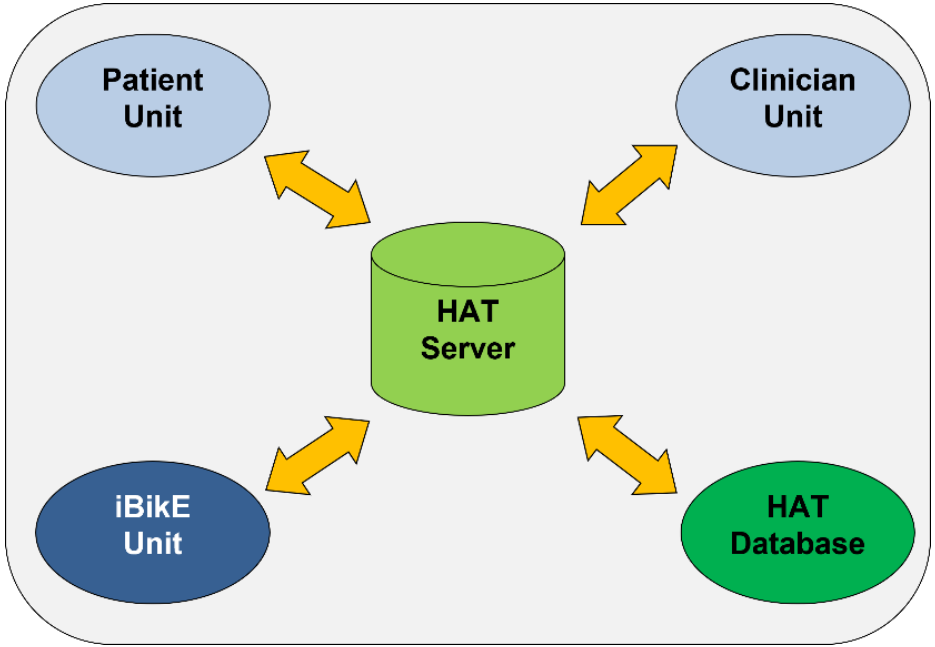
Introduction

- Evidence shows that cancer rehabilitation (CR) can be effective in relieving symptoms, decreasing inactivity and impairment, and improving clinical outcomes and quality of life in cancer survivors.
- Telehealth techniques have the potential to improve access to CR programs.
- However, a thorough understanding of patients' needs preferences, and attitudes toward a home-based telerehabilitation system is required for successful deployment.

Introduction

- In previous work, we defined user-centered requirements and demonstrated high acceptance of telerehabilitation by patients with chronic health conditions and older adults
  - (e.g., cardiopulmonary and neurodegenerative conditions)
- The purpose of this study was to investigate the patient-centered qualities of a cancer rehabilitation system using cognitive evaluation of the user interface and semi-structured qualitative interviews.

Home Automated Telemanagement (HAT) System



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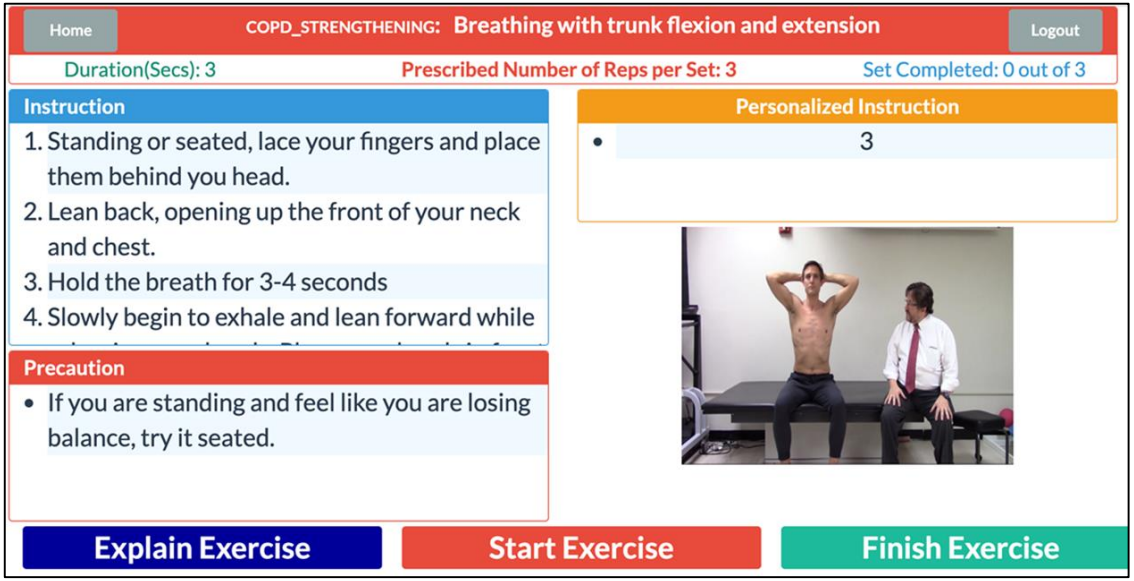
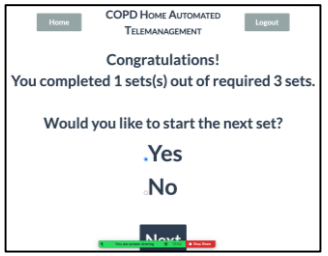
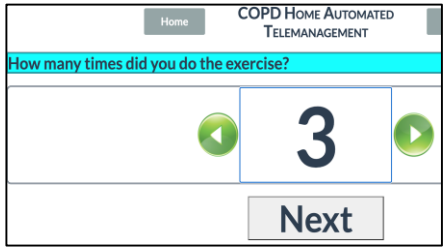
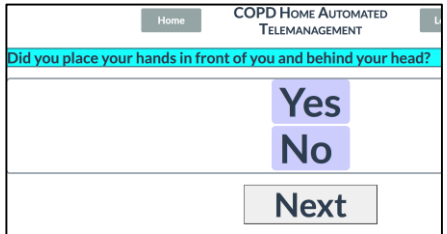
User Interface: Explanation, Start, Finish Report









The patient is able to select any of the prescribed exercises and complete all recommended sessions.

Methods: Recruitment

- Patients diagnosed with metastatic urogenital cancer and receiving outpatient oncology care at the Mount Sinai Health System were invited to participate.
  - 22/29 (76%) of patients tested the cancer telerehabilitation platform during an outpatient chemotherapy session
  - 7/29 (24%) of patients evaluated the platform after an office visit with their oncologist.

Methods: Data Collection

- Pre-Task Surveys
  - Sociodemographic Questionnaire
  - Rapid Estimate of Adult Literacy in Medicine (REALM)
- Cognitive Tasks
  1. Log into the HAT system
  2. Complete a symptom survey
  3. Select, review, and complete an exercise
- Participants were asked to rate their experience after completing each task.

Methods: Data Collection

- Post-Task Surveys
  - Heuristic Evaluation survey
  - System usability survey (SUS)
  - Semi-structured qualitative exit interview

Results: Pre-task Surveys

- Demographics
  - Mean Age: 64.8±11.6 (45 to 85 years old
  - 79% of the subjects were males
  - 17% of the participants were Blacks
  - 79% were Whites, a race of one person was not identified
- Rapid Estimate of Adult Literacy in Medicine (REALM)

Results: Analysis of post-task surveys

Task 1: Log into the HAT system	N	Mean	SD
Content Easy/Difficult	29	4.8	0.4
Questions Easy/Difficult	29	4.8	0.4
Satisfaction	29	4.7	0.7
Amount of Time	29	4.7	0.9
Visually Appealing	29	4.4	1
Easy to Navigate	29	4.5	0.9
Average	**29**	**4.7**	**0.7**

Results: Analysis of post-task surveys

Task 2: Complete a symptom survey	N	Mean	SD
Content Easy/Difficult	29	4.7	0.5
Questions Easy/Difficult	29	4.7	0.5
Satisfaction	29	4.7	0.7
Amount of Time	29	4.5	0.9
Visually Appealing	29	4.6	0.7
Easy to Navigate	29	4.7	0.6
Average	29.0	4.7	0.7

Results: Analysis of post-task surveys

Task 3: Select, review, and complete an exercise	N	Mean	SD
Content Easy/Difficult	29	4.7	0.5
Questions Easy/Difficult	29	4.7	0.5
Satisfaction	29	4.7	0.7
Amount of Time	29	4.5	0.9
Visually Appealing	29	4.6	0.7
Easy to Navigate	29	4.7	0.6
Average	29.0	4.7	0.7

Results: Post-Task Surveys

- Heuristic Evaluation
  - The highest mean score was 4.7 for 'Match (between system and real world)', 'Buttons to go back or move forward (control/ freedom)', and 'Consistency'.
  - The lowest mean score of 4.3 was ascribed to 'Error prevention'

Results: Post-Task Surveys

- Semi-Structured Qualitative Exit Interviews
  - Themes identified:
    - Individuality and setup
    - System and clarity
    - Accessibility
  - Recommended changes:
    - Adjustment of the volume of the system
    - Correcting misspellings
    - Requests for additional assistance with the touchscreen
    - SMS text message from the system to remind patients to exercise

Concept map of recommended changes

RECOMMENDED CHANGES					
CONTENT		INTERFACE		PROCESS	
Individuality	**Setup**	**System**	**Clarity**	**Accessibility**	**Overview**
Volume needs to be increased	Issues with entering answers into the surveys	Demonstration is required for touchscreen during the initial use	Issue using the touchscreen to re-size and scroll through the menu	Both audio and visual along with substitles are required for patients' with hearing problems	Interface design is primitive and not polished
Number of required sets to appear first, followed by number of completed sets (left to right to avoid confusion)	Misspellings	Assistance is required of how to use the system	Lack of comfort using the tablet and navigating the interface	Preference for both audio and visual exercise prompts and counts	Remove the word "Cancer"
Video, background, and instructor are distracting	Instructor's accent is difficult to understand	Minor assistance is needed	For questions requiring a numerical answer - have the numbers appear	An option is requested to exercise without the tablet to avoid additional steps navigating the sensitive touchscreen	Send reminder text messages to patients to complete the guided exercises

Discussion and Conclusion

- 29 patients with metastatic urogenital cancer were able to successfully complete all representative tasks when they used the cancer telerehabilitation system.
- Patients were very enthusiastic in using a cancer telerehabilitation system at their homes, according to the cognitive evaluation of the platform.
- Further improvement of the system based on the patient-centered design principles will facilitate the implementation of cancer telerehabilitation in routine clinical care.

Thank you for your time!

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