Physical Telerehabilitation Using Virtual Reality in Patients with Metastatic Castration-Resistant Prostate Cancer

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Introduction

- Prostate cancer is the most common malignancy among men worldwide, with significant health impacts.
- Approximately 10-20% of cases progress to castration-resistant prostate cancer, characterized by disease progression despite standard therapies.
- For metastatic CRPC patients (mCRPC), traditional rehabilitation often proves inaccessible due to physical limitations.
- Virtual reality (VR)-based telerehabilitation offers a novel, engaging solution, leveraging interactive environments to enhance motivation and deliver care remotely.
- This study explores the potential of VR-based telerehabilitation systems to address the unique needs of mCRPC patients and improve their quality of life.

Methods

Recruitment
- Patients with mCRPC were identified through purposive sampling during follow-up visits at the Huntsman Cancer Institute.
- Recruitment continued until information saturation was reached or no novel or relevant information was discoverable from the available data and patients were consented upon enrollment.

Data Collection
- Consisted of one in-person visit where a trained researcher provided an initial demonstration and practice session of the VR app.

VR Tasks
- Patients were asked to use a VR system to complete 4 tasks
  - 1) Log into the system
  - 2) Complete the symptom survey
  - 3) Review instructions and perform a guided exercise
  - 4) Review instructions and perform a cycling exercise
- Afterwards, patients were asked to complete a semi-structured qualitative interview. Which consisted of open-ended questions about participants' experience across three domains of usability; the content, interface, and process of using a VR-based system to engage with a cancer rehabilitation program.
  - Emerging themes and patterns in the qualitative data were organized, analyzed, and interpreted using a thematic analysis approach.

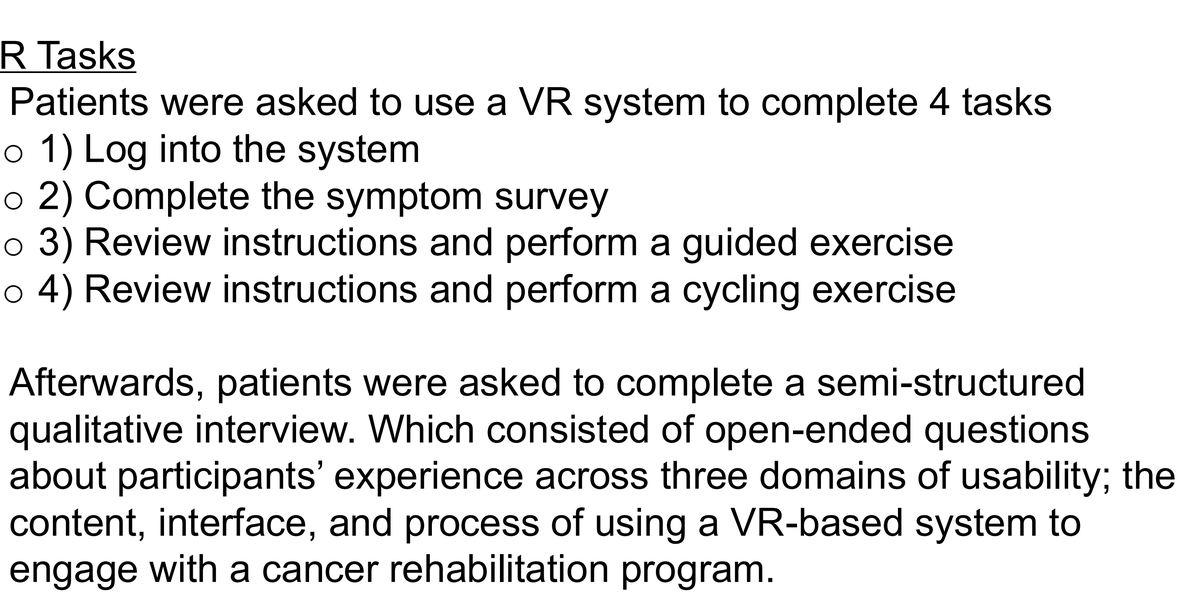


Figure 1. Start screen and Stop screen of VR guided exercise

Results

Study Participants
- A total of 20 mCRPC patients were enrolled in the study.
- One participant opted out due to a preference for non-technological exercise.

Thematic Analysis
- Findings from the thematic analysis revealed that the VR exercise app was well-received.
- Participants appreciated the visually engaging graphics, gamification, and personalization features, which enhanced motivation and focus.
- The interface was praised for its interactivity and simplicity, despite minor issues with navigation and initial instructions.
- Recommendations included navigation aids, music customization, and improved progress tracking.
- The system was deemed convenient and motivating for homebound users, though concerns about equipment cost and durability were noted.

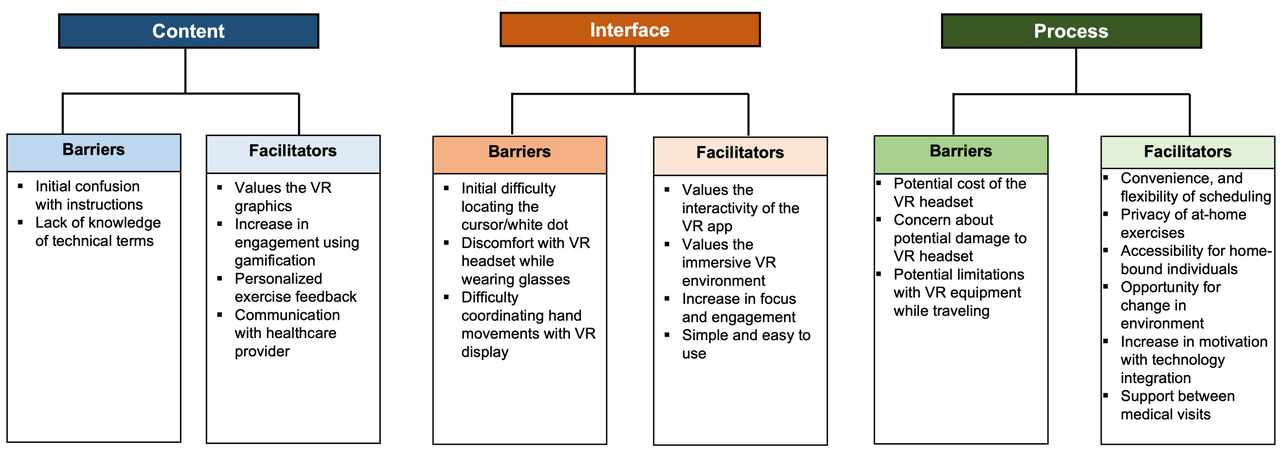


Figure 2. Concept map of the identified barriers and facilitators for the VR-based exercise application content, interface, and process.

Discussion

- This study demonstrates the potential of VR-based telerehabilitation for metastatic castration-resistant prostate cancer (mCRPC).
- Participants valued the visually engaging, gamified content and customization options, which enhanced motivation and focus during rehabilitation.
- Initial struggles with technical terminology and navigation highlight the need for improved user instructions and interface design.
- The convenience and flexibility of the VR system were viewed as beneficial, especially for homebound patients.
- VR-based telerehabilitation shows promise as an accessible, engaging solution, warranting further development and evaluation in mCRPC patients.

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