

Implementation of Mobile Applications to Improve Adherence to Home Exercise Program Prescription: A Case Report

Marissa Callahan, SPT

Jacqueline van Duijn, PT, DPT, OCS; Ellen Donald, PT, PhD

Florida Gulf Coast University, Department of Rehabilitation Sciences, Fort Myers, FL, USA

Introduction

Adherence is the extent to which a person's behavior corresponds with agreed recommendations from a health care provider¹. Adherence regarding physical therapy includes attendance to scheduled appointments, following advice from the physical therapist, and prescribed home exercise programs (HEP).

Barriers to adherence include feelings of helplessness, poor social support, low self-efficacy, lack of comprehension of provided exercises, and a perceived lack of time or feeling overwhelmed.

The purpose of this case report is to examine whether the use of a mobile application, such as Physical Therapy InHand, can improve patient adherence to a prescribed HEP. The use of the mobile app, may increase the patient's social support and comprehension of the exercises, and may decrease their perception of being overwhelmed.

Patient History/Systems Review

- 73 year old female status-post 2 weeks from rotator cuff repair of the right shoulder
- Right shoulder pain with activity, limited mobility of the right shoulder
- Prior medical history unremarkable other than former smoker (>10 years) and appendectomy (>25 years)
- Use of NSAIDs and Percocet for pain control

Examination

- Completed Quick-DASH 34/100 indicating moderate disability
- Incision: Dry, clean, healing well
- Right shoulder pain rating on the numerical pain scale 4/10
- Limited passive range of motion of the right shoulder in flexion, external rotation and internal rotation in the scapular plane
- Manual muscle testing not completed secondary to protocol implemented by the physical therapist
- Functional limitations include unable to reach overhead into cupboards, prepare food, dress and groom tasks (e.g., blow drying and styling hair), and unable to play golf or ride a bike

Clinical Impression

- Diagnosis: Right rotator cuff tear, surgical repair
- Examination findings indicated limited mobility, stability and function of the right shoulder
- Precautions:
 - Weeks 1-4: No shoulder AROM, remain in sling except for exercise, no lifting
 - Week 4-10: No lifting, no excessive behind the back movement, no sudden jerking motions
- Prognosis of the patient was good due to unremarkable medical history and the patient being highly motivated to return to her prior level of function.
- Patient had knowledge of and demonstrated confidence with the proper use of mobile apps, was motivated to return to her PLOF, and had a typical presentation, making her an appropriate candidate for this case report.

Intervention

- Physical Therapy: 3 times per week, 8 weeks
 - Treatment Team: physical therapist and physical therapist assistant
 - Rotator Cuff Repair Protocol: Brigham & Women's Hospital¹⁹
 - Phase 1 Treatment Focus: Pain modulation, improve PROM, distal upper extremity and scapular strengthening
 - Phase 2 Treatment Focus: Continue tissue healing, rotator cuff strengthening and stabilizing
- Home Exercise Program: Initiated at 2nd visit with Physical Therapy InHand™ mobile app
 - Phase 1: AAROM with pulleys and a wand and passive stretching to improve ROM and shoulder mobility, and scapular retraction and shoulder isometrics for neuromuscular re-education
 - Phase 2: Light resistance and modified bodyweight exercises for rotator cuff strengthening and stabilization, scapular mobility exercises in prone and standing, and functional overhead reaching
 - Exercise Prescription Parameters for: neuromuscular re-education, stretching
 - Monitoring adherence, pain response, recovery via InHand™ app

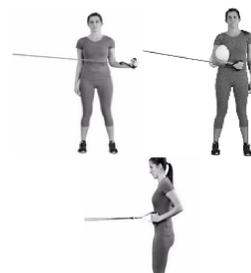
Sample HEP images from InHand™



Sleeper Stretch



Shoulder Isometrics (Flexion, Extension, ER, IR)

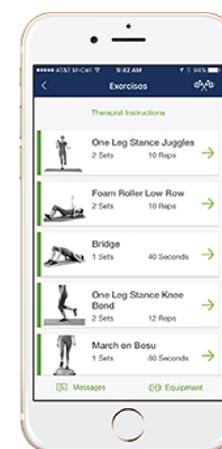


Resistance Exercise (ER, IR, Rowing)



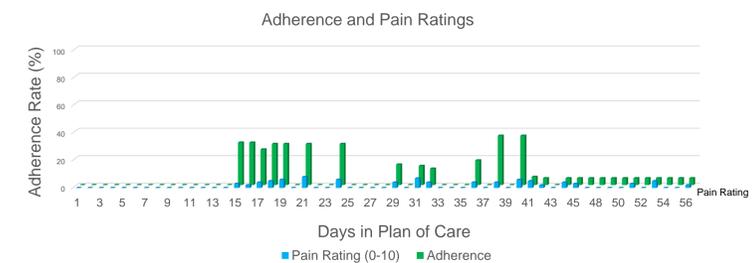
Wall Push-Up Plus

InHand™ App user screen



Outcomes

- Average adherence to exercise frequency = 60%
- Average adherence to exercise prescription (completion of all exercises prescribed) = 10%
- Progressive improvement in activity tolerance and management of pain
- Patient actively communicated with treatment team via InHand™ for clarification of exercises and strategies for addressing pain
 - Patient verbally confirmed completion of exercises on some days without tracking exercises with the app
- Patient reported she "loves the app to keep on track and do the exercises correctly" and is "gaining confidence in recovery"
- The treatment team provided encouragement and support via the direct messaging of the app



"I love the app to keep me on track and doing the exercises correctly"
- Patient

"Good job! Be sure to ice and take a day off"
- Physical Therapist

"Thanks for keeping me on track and motivating me to keep going and working through the entire program."
- Patient

Clinical Implications

- Current research demonstrates patient satisfaction, improved confidence in managing their condition, and usefulness of HEP apps, with overall improved satisfaction with healthcare services¹².
- This case reinforces existing literature on use of telehealth support of HEP adherence.
- Limitations:
 - Periodic technical issues with the InHand™ app
 - Reliance on self-reporting by patient
- Future research is needed to:
 - Improve the implementation of mobile apps for HEP adherence support
 - Examine reliability of technology among various apps