



# Connected mobile-Health for Rehabilitation at Mayo Clinic-Arizona

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## ABSTRACT

Connected Health (CH) is a model of healthcare delivery supported by technology to deliver services remotely. The adoption of CH can increase access to care, improve the patient experience and lower healthcare cost. Prior to COVID-19, Mayo Clinic-Arizona (MCA) cardiology was authorized by the institution's security and technology oversight group to pilot a mobile-Health (m-Health) application (app) in clinical practice. Preventive cardiology utilized the app to support all onsite exercise consultations with a home-based intervention that was delivered to the patient's mobile device. Cardiac rehabilitation (CR) offered the app to a self-selected sample of volunteer patients to better understand the process. In mid-March 2020, the institution decided to temporarily stop onsite CR due to the risk of COVID-19. Instead, over a 9-week period, all patients received weekly telephone support from an exercise physiologist, supplemented with the added benefit of the m-Health app. Staff reductions and infection control measures limited the size and number of classes on the resumption of a phased return to onsite CR. Consequently, a hybrid CR model was employed where patients attended supervised CR on 1-2 days/week and continued to independently track their home exercise and receive a home exercise prescription sent to their mobile device via the app.

## LEARNER OBJECTIVES

- 1 Identify three CH communication platforms to deliver exercise therapy services remotely to the patient's home.
- 2 Describe how MCA cardiology is using m-Health to enhance the patient experience.
- 3 Understand how m-Health enables remote access to a prescribed exercise plan, progress tracking and clinician feedback.

## BACKGROUND

### Why Connected Health?

Traditional center-based CR programs can significantly improve quality of life and reduce morbidity and mortality in cardiac patients. However, CR is underutilized with participation rates <30% in eligible patients. CH utilizes technology to deliver services remotely with the potential to increase access to care, lower cost and improve the patient experience by delivering CR to the home while maintaining communication with staff.

### What is Connected Health?

CH consists of various communication platforms to connect the clinic with the home. Patients may use one or more platforms in this process (defined below) with the potential to enhance clinical care and the self-management of healthful behaviors between clinical encounters:

- e-Health: using computer to connect with the clinic (i.e. electronic patient portal) and internet based video-conferencing (i.e. virtual visits)
- telehealth: telephone contact and interactive voice response systems
- m-Health: interactive mobile/smartphone-based applications

### Alternatives to Traditional Practice: Hybrid and Home-Based CR

A hybrid CR model offers a reduced number of center-based visits supplemented with CH home-based exercise and education with indirect supervision from clinic staff. Remote access to CR expands the reach to patients with socioeconomic barriers to adherence. The COVID-19 pandemic expedited the need for MCA cardiology to pilot-test the hybrid model on a significant scale. Patients were restricted to 1-2 on-site CR visits/week, with additional exercise sessions performed at home via the 24life Connected mHealth (CmH) for Rehabilitation™ mobile app.

## PURPOSE

To describe how MCA cardiology implemented an exercise-based m-Health hybrid model as an alternative to traditional CR.

## METHODS

Since mid-March 2020, MCA has used a hybrid CR model, where limited onsite supervised CR is supplemented with a home-based exercise program that is delivered with the CmH mobile app. The process for this pilot program is described below:

- Patients receive in-person onsite instruction and a brief tutorial video is sent to the home via the Mayo Clinic enterprise-wide electronic patient portal account with guidance on how to download and register a shared m-Health account that is linked to CR staff (Figure 1).
- The clinician prescribes a progressive therapeutic exercise plan with access to demonstration videos and instruction via the app. Patients are guided through an assigned plan with objective exercise performance metrics tracked, including the option of real-time heart rate (HR) monitoring when paired with a commercial Bluetooth sensor. A recent update to the app allows patients to independently track self-assigned workouts via the "plus" button (Figure 2-3).
- A recent update to the app allows patients to independently track self-assigned workouts via the "plus" button Patients report comments and symptoms on the app to be viewed by the clinician onsite (Figure 4-5).
- Patients can continue to send messages to the clinic from home via patient portal, which remains the primary CH communication platform with the added benefit of the CmH mobile app. Workout programs are modified based on patient feedback.

## FIGURES 1- 5



Patients are introduced to the app by the clinician.



Home exercise plans are designed by the clinician and sent to the patient's smartphone app.



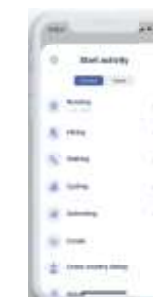
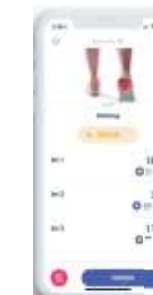
Patients are instructed on the use of a wearable HR monitor.



The mobile app provides real-time feedback and tracking during the exercise session.



The "plus" button allows patients multiple options to log independent exercise.



## LESSONS LEARNED

- CH offers an effective application of technology to deliver CR services remotely.
- The COVID-19 pandemic expedited the need for alternative models of CR to comply infection and control guidelines. MCA has successfully applied a hybrid CR model, where patients exercise onsite 1-2 times/week and perform additional workouts at home using the app. The clinic staff can review recent exercise data with patients during onsite visits.
- MCA uses the CmH mobile app to remotely prescribe and monitor exercise plans.
- Patients are guided through the app setup process and prescribed a customized exercise plan. Prescribed workouts can be completed on the assigned date at a time that suits the patient and/or the patient can add an independent workout by using the "plus" button feature. The app can pair with a HR monitor to provide another objective metric relayed to the clinician.
- The Mayo Clinic enterprise-wide electronic patient portal remains the primary CH communication platform with the added benefit of the CmH mobile app.
- MCA continues to pilot this CR hybrid model and closely monitor patient outcomes. More research is needed to determine optimal app design and develop procedures to identify ideal candidates for this model of CR delivery.

## CONCLUSION

The COVID-19 pandemic has challenged CR professionals to explore the application of innovative and technology to clinical practice.

CH is a model of healthcare delivery supported by technology to deliver services remotely.

The adoption of CH can increase access to care, lower cost and improve the patient experience.

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