PERSPECTIVE

Building a hybrid virtual cardiac rehabilitation program to promote health equity: Lessons learned

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Cardiac rehabilitation (CR) is a Class 1A recommendation by the American Heart Association (AHA) and American College of Cardiology[1] as a secondary prevention program for patients with cardiovascular disease (CVD) that includes exercise, risk factor modification, education, psychosocial counseling, and reinforcement of adherence to guideline-directed medical therapy (GDMT). CR participation improves functionality and quality of life and reduces hospital readmissions, secondary events, and mortality in patients with CVD.[2]

Despite the overwhelming evidence in support of CR, it has historically been underutilized. Vulnerable populations, including underserved minorities, women, veterans, and lower-socioeconomic-status individuals, have the lowest participation rates.[3] An innovative approach is needed to increase access to CR in an equitable and cost-effective manner.

Accordingly, the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) recommended a home-based CR option for low-to-moderate-risk patients to expand access opportunities.[4] Building on AACVPR recommendations, we created a combination of center- and home-based sessions called “hybrid CR.” Herein, we present lessons learned in developing and implementing our hybrid CR program at Johns Hopkins (Figure 1).

1. Assemble a multidisciplinary team and technology platform

A diverse team with insightful perspectives was key to the design of our hybrid CR program. Our team included the CR medical director, program director, exercise physiologists, nurses, researchers, preventive cardiologists, engineers, compliance/legal teams, and frontline clinicians.

Next, we identified the technology to deliver the virtual component of the CR program. We selected the Corrie Health digital platform (Corrie),[5] because it is a comprehensive, evidence-based, and health equity–focused[6] platform for patients with CVD.[7] Corrie is composed of a smartphone application (app) paired with a wireless blood pressure monitor and a smartwatch connected to a clinician dashboard that supports GDMT for CVD secondary prevention.[1,5]

Smartphone application

The app highlights 3 main pillars: (1) education on CVD risk factors, pathophysiology, and lifestyle modifications; (2) medication support with reminders and adherence tracking of GDMT; and (3) exercise and physical activity guidance designed to achieve individualized treatment plans. To promote app engagement, we provide motivational, weekly coaching check-ins where questions about educational content are addressed along with progress toward achieving healthy lifestyle goals. We also promote app engagement through an education feature where patients have the option to mark modules as completed once they have viewed the resources. Once all items are complete, patients are awarded a golden heart badge, acting as a gamification model for motivation.

Clinician dashboard

We developed a clinical dashboard that provides intuitive data visualization including heart rate, blood pressure, steps, medication adherence, education completion, and exercise duration with pre- and post-vitals. Patients are also able to view and share these data within the app.

2. Establish an equitable onboarding process

Patients are introduced to the app at the bedside, while inpatient, by a trained patient navigator. During an approximately

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KEY FINDINGS

- Despite the overwhelming evidence in support of cardiac rehabilitation (CR) from the American Heart Association and the American Association of Cardiovascular and Pulmonary Rehabilitation, it has historically been underutilized. An innovative approach is needed to increase access to CR in an equitable and cost-effective manner.
- To increase CR access, we created a combination of center- and home-based sessions. We present lessons learned in developing and implementing our Hybrid CR program at Johns Hopkins.
- Key steps to building a hybrid CR program to promote health equity are as follows: (1) assemble a team and technology platform; (2) establish an equitable onboarding process; (3) gather feedback; (4) implement feedback; (5) evaluate clinical efficacy.

30-minute session, the patient and navigator download the app and complete basic setup together. Patients are asked to perform teach-back to ensure understanding. Navigators also assist with pairing devices and the patient's first vital signs measurement.

Barriers to a hybrid CR model include socioeconomic status and technology and/or health literacy. We took steps to ensure equitable access through creating an iShare program,[8] which provides, at no cost, loaner devices to patients who do not own them. Health literacy was addressed with all educational materials being created at a sixth- or seventh-grade reading level. It was also supported at the start of the program and at in-center sessions, and reinforced virtually during weekly health coach check-ins. Patients were given access to technology tutorial videos, tailored to varying levels of digital literacy, that they could view at their own pace for supplementary support. Throughout the 12-week program, starting from discharge, patients were offered additional technical support via weekly coaching calls or by e-mail.

This flexible and dynamic approach (in-person instruction, instructional videos, and coaching check-ins) was designed to help patients get started quickly regardless of their technology or health literacy status. We learned this was crucial for increasing motivation and engagement.

3. Gather feedback

To optimize user experiences, we engaged a diverse group of CR-eligible patients, caregivers, and clinicians using purposeful sampling for recruitment in human-centered design (HCD) sessions. Our patient sample was 27% African American, 9% Asian, 18% Hispanic or Latino, 55% female, with a median (interquartile range) age of 63 (56–66) years. The cohort of patients met 3 times over the course of 6 weeks for a total of 270 minutes. Session 1 focused on defining challenges patients and their caregivers faced after experiencing cardiac events, including barriers to CR participation. Session 2 featured brainstorming solutions to these challenges. In session 3, participants designed prototypes of top solutions. Between sessions 2 and 3, participants were asked to test the Corrie app and provide feedback using a written survey following the Systems Usability Scale.[9]

To obtain clinician insights, we gathered 10 clinicians (nurse practitioners, cardiologists, exercise physiologists, and pharmacists) for a 90-minute roundtable discussion via Zoom on challenges encountered with engagement in CR. They addressed concerns about access, financial barriers, and limited patient education on the benefits of CR.

4. Implement feedback

HCD sessions provided structured feedback from patients that we implemented into our quality improvement (QI) program. We were successful in promoting equitable access within our QI program on hybrid CR, as demonstrated by the fact that the patients had a mean age of 59.2 (standard deviation: 10.4) years, 40% were female, 39% were of minority race/ethnicity, 58% were insured by Medicare/Medicaid, and 76% owned an Android. From these sessions many improvements were made, including creating a CR introductory video and digital instructional how-to videos as well as implementing weekly coaching check-ins. We are creating a patient-centered

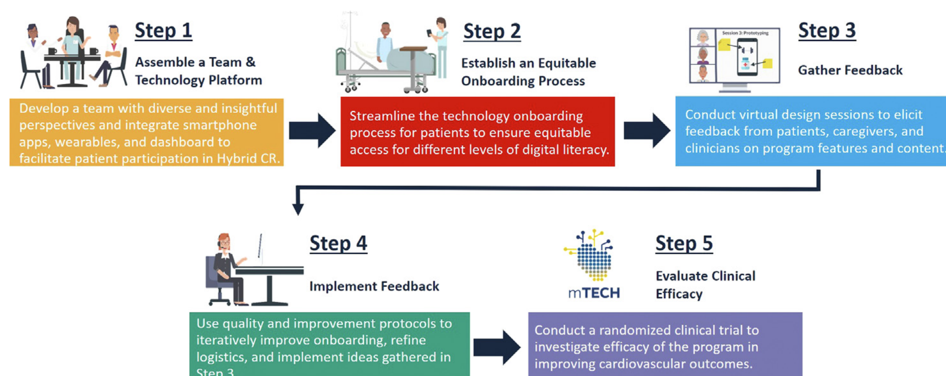

Figure 1 Key steps to building a hybrid cardiac rehabilitation (CR) program to promote health equity.

animation to visually share the benefits of CR that will be presented to patients to introduce the program and promote participation. Similarly, clinicians provided feedback on the importance of making it easy to refer to the program. This prompted our development of an electronic health record–based order set to refer patients to hybrid CR.

5. Evaluate clinical efficacy

With support from the AHA Strategically Focused Research Network, we will be conducting a randomized clinical trial (Impact of a mobile Technology Enabled Corrie Cardiac Rehabilitation Program on Cardiovascular Outcomes mTECH REHAB) to test the efficacy of the Corrie Health digital platform to deliver a hybrid CR model. We will enroll 300 CR-eligible patients with CVD, and evaluate the achievement of guideline-directed goals. Our primary outcome is to assess change in participants' functional capacity from discharge to 12 weeks postdischarge using the 6-minute walk test. At the completion of the program, both patients and clinicians will complete a survey to evaluate their satisfaction and perceived burden of the intervention.

Conclusion

We are addressing CR underutilization by combining guideline-directed cardiovascular care and innovative technology to enable equitable access to CR. Learning from HCD and QI, we have optimized onboarding, app usability, and delivery of coaching sessions to improve CR patient engagement. Adapting the program to scale requires a multidisciplinary team and easy-to-use/adaptable technology that delivers equitable and high-value care. These are key takeaways that have been important in creating a dynamic, patient-centered, and equitable hybrid CR program.

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Disclosures

Erin Spaulding serves as a consultant to Corrie Health. Under a license agreement between Corrie Health and the Johns Hopkins University, the University owns equity in Corrie Health and the University, Francoise Marvel, and Seth Martin are entitled to royalty distributions related to technology described in the study discussed in this publication. Additionally, Francoise Marvel and Seth Martin are founders of and hold equity in Corrie Health. This arrangement has been reviewed and approved by the Johns Hopkins University in accordance with its conflict-of-interest policies.

Authorship

All authors attest they meet the current ICMJE criteria for authorship.

Patient Consent

All patients provided written informed consent.

Ethics Statement

The authors designed the study and gathered and analyzed the data according to the Helsinki Declaration guidelines on human research. The research protocol used in this study was reviewed and approved by the institutional review board.

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