

Digital Technology-Enabled Hybrid Model for Equitable Delivery of Cardiac Rehabilitation

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BACKGROUND

- Cardiac rehabilitation (CR) is a comprehensive secondary prevention program consisting of supervised exercise and risk factor modification.
- Despite the well-established benefits, CR participation remains low due to limited availability and barriers to access that disproportionately impact underrepresented minorities.
- To expand the availability and accessibility of CR, we developed a hybrid CR program that combines traditional, center-based CR with technology-enabled, home-based CR.

OBJECTIVES

- To assess the characteristics and experience of patients who engaged with the **Corrie hybrid cardiac rehabilitation** program, with a focus on health equity.

METHODS

- From November 2022 to February 2023, we enrolled 16 patients with a clinical indication for CR at Johns Hopkins Hospital into our program.
- Our hybrid CR program combines center-based CR sessions with home-based CR sessions delivered through a digital health platform (Corrie Health) over 12 weeks. The Corrie Health platform integrates a smartphone app, smartwatch, and wireless blood pressure monitor and enables tracking of individual health data on a clinician dashboard, based on which data-driven health coaching is delivered on a weekly basis.
- We examined the demographic distribution, clinical characteristics, and financial burden of our participants to assess our hybrid CR program from a health equity perspective.

DISCLOSURES

- Francoise Marvel, MD & Seth Martin, MD, MHS:** founders of and hold equity in Corrie Health and entitled to royalty distributions related to technology described in the study and discussed in this presentation. This arrangement has been reviewed and approved by the Johns Hopkins University in accordance with its conflict of interest policies. Dr. Marvel & Dr. Martin have received material support from Apple and iHealth.
- Erin D. Michos, MD, MHS:** has served on advisory boards for AstraZeneca, Bayer, Boehringer Ingelheim, Esperion, Novartis, Novo Nordisk, and Pfizer.
- Erin Spaulding, PhD, RN:** serves as a consultant to Corrie Health.
- All other authors:** have nothing to disclose.

Corrie Health Platform for Hybrid Cardiac Rehabilitation

Patient App and Wearables



Corrie User



Corrie Coach



Guideline-based, personalized health coaching over 12 weeks

Clinician Dashboard



- UX designed with Apple
- Daily care plan
- Track vitals, medications, exercise
- Education (4th to 6th grade level)
- Care coordination



- At-a-glance actionable data
- Monitor blood pressure, heart rate, step count
- Review exercise frequency, timing, exertion level

Participant Characteristics of Hybrid CR Program

	Highly engaged (N=10)	Less engaged (N=6)
Age (mean ± SD)	60.5 ± 9.4	64.5 ± 7.5
Age range	41 to 74	57 to 74
Sex		
Male	7 (70%)	4 (67%)
Female	3 (30%)	2 (33%)
Race		
Caucasian	5 (50%)	5 (83%)
African American	2 (20%)	1 (17%)
Asian	1 (10%)	0 (0%)
Other	2 (20%)	0 (0%)
CR indication		
SIHD/CABG	6 (60%)	3 (50%)
ACS/PCI	3 (30%)	3 (50%)
SIHD/PCI	1 (10%)	

Highly engaged group (N=10)	
Medical comorbidities	
Coronary artery disease	10 (100%)
Hyperlipidemia	7 (70%)
Hypertension	2 (20%)
Diabetes	1 (10%)
Atrial fibrillation	3 (30%)
Tobacco use	2 (20%)
Obesity	5 (50%)
Coaching engagement	
Number of calls	7.5 ± 3.3
Minutes per call	31.8 ± 10.3
Cost to attend CR (n=4)	
Travel time	55 min (range: 45-90 min)
Travel cost	\$14 (range: \$11-\$20)
Copay	\$25

RESULTS

- 10 of 16 (62.5%) enrolled patients were highly engaged, defined as utilizing the Corrie Health platform >2x/week and completing >2 coaching sessions.
- For these 10 highly engaged patients, mean age was 60.5 ± 9.4 years (range: 41 to 74 years), 30% were female, and 50% were non-Caucasian (20% Black, 10% Asian, 10% other-Hispanic, 10% other-non-Hispanic), compared to 6 less engaged patients who were aged 64.5 ± 7.5 years (range: 57 to 74 years), 33% female, and 17% Black.
- Indications for CR included coronary artery bypass surgery (56%), acute coronary syndrome with percutaneous coronary intervention (38%), and stable ischemic heart disease with percutaneous coronary intervention (6%).
- For the highly engaged group, medical comorbidities included coronary artery disease (100%), hyperlipidemia (70%), hypertension (20%), diabetes (10%), atrial fibrillation (30%), tobacco use (20%), and obesity (50%; mean BMI 29.5 ± 4.4), and they received mean 7.5 ± 3.3 coaching calls with 31.8 ± 10.3 minutes per call.
- Among 4 patients willing to share financial information, the average out-of-pocket cost to complete a 1-hour session of center-based CR included \$14 (range: \$11-\$20) for travel with 55 minutes (range: 45-90 minutes) of travel time, and copay of \$25. For reference, the three CR centers within the Johns Hopkins system reported an average charge of \$177.73 (range: \$112.71-\$280.49) per session.

CONCLUSIONS

- A hybrid CR program can be successfully implemented at a large academic medical center for a diverse group of patients across a range of cardiovascular conditions, with greater engagement in individuals of underrepresented ethnic backgrounds.
- This pilot study demonstrates the potential for delivery of a digital technology-enabled hybrid CR model in an equitable manner.
- Hybrid CR may be considered as a practical option to increase participation in CR, especially for patients with significant financial or logistical barriers to care.