Cardiac rehabilitation in youth and young adults with heart disease utilizing in-person and virtual options during the COVID-19 Era

Elizabeth B. Aronoff, MD[a], Clifford Chin, MD[a,b]; Wayne A. Mays, MS, RCPT[b]; Sandra K. Knecht, MS[b]; Jennah Flairty, MS[b]; Malloree Rice, MS[b]; Alexander R. Opotowsky, MD, MMSc[a,b], Adam W. Powell, MD, MS[a,b]

[a]Department of Pediatrics, University of Cincinnati College of Medicine, Cincinnati, Ohio, United States of America

[b]The Heart Institute, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA

Introduction

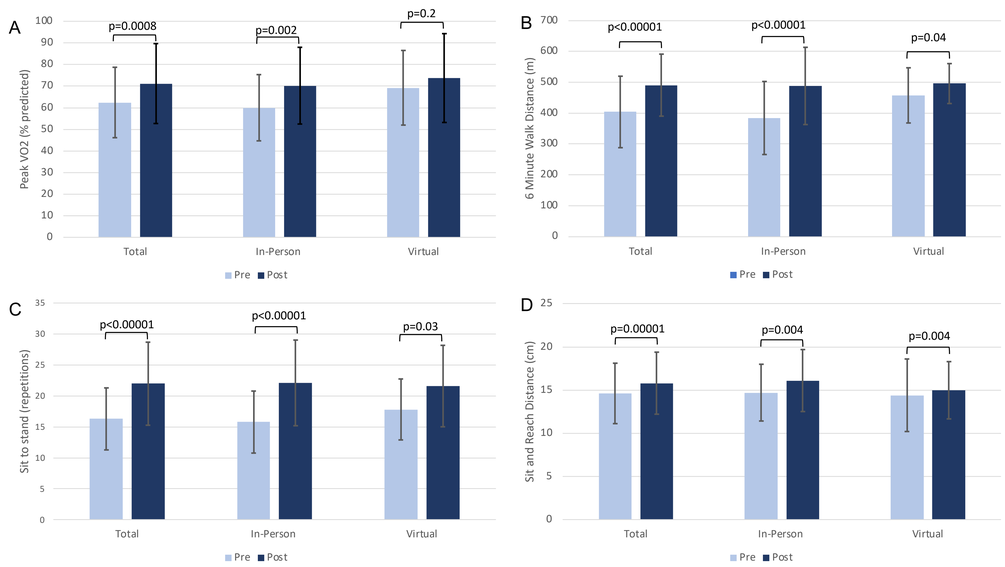
- Cardiac rehabilitation (CR) is a critical component of adult care and an emerging tool being used in pediatrics
- Few pediatric centers are using CR in the care of patients
- Despite life prolonging care for patients with congenial and acquired heart disease (HD), they tend to have poor fitness
- Their fitness has been shown to decline over time
- CR has the potential to increase physical fitness as well as overall quality of life in children and young adults with HD
- Most CR programs, especially based at pediatric facilities, are based in-person
- During the COVID-19 pandemic, there became a growing need to develop virtual CR programs

Objectives

- Primary aim was to assess for physical and psychosocial improvements in HD patients participating in CR for the first time
- Secondary aim was to assess for differences in outcomes between in-person and virtual CR program during the COVID-19 pandemic

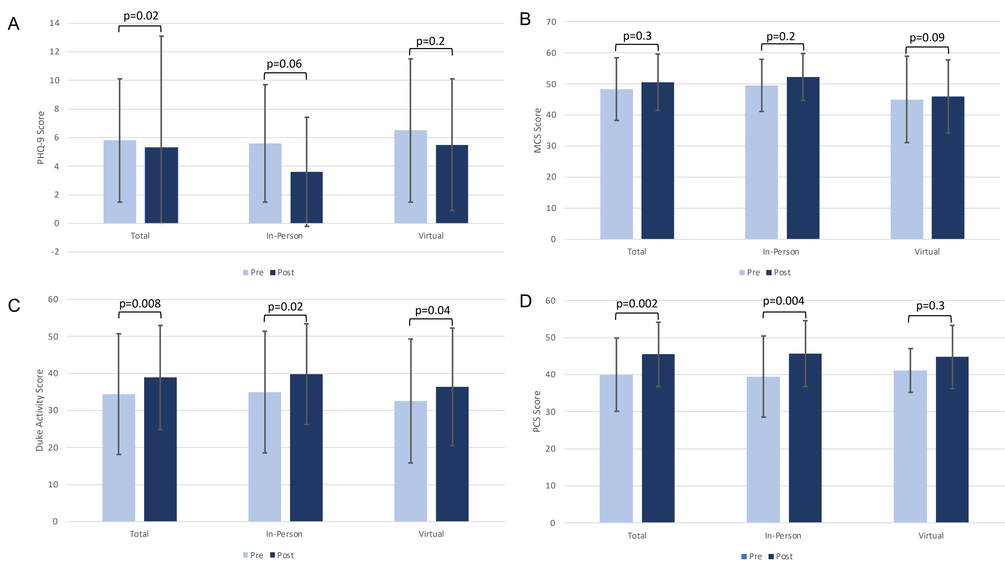
Methods

- Single-site
- Retrospective cohort study of all novel patients undergoing CR at our institution from 3/2020-7/2022
- Exclusion criteria: Prior enrolment in CR, failure to complete at least 12 weeks of the CR program
- Combination programs were included in the total cohort but removed from sub-group analysis
- Participants were to complete 2 to 3 sessions per week for at least 12 weeks
- Participants elected to complete sessions in-person or virtually
- Demographics, medical history, body composition, CPET, 6-minute walk test, strength and flexibility testing, and psychosocial questionnaires were recorded at day 0 and program completion
- Data presented as gross change pre and post CR
- Paired t-test used. Significant differences were a p<0.05



Abbreviations: VO_2 (oxygen consumption), m (meters), cm (centimeters)

Figure 1: Bar graph demonstrating the changes before and after cardiac rehabilitation in percent predicted peak VO_2 (1A), 6 minute walk distance (1B), sit to stand repetitions (1C), and sit and reach distance (1D) for the total cohort, in-person, and virtual groups. Analysis performed with a paired t test. A p<0.05 was consider significant.



Abbreviations: PHQ-9 (patient health questionnaire-9), MCS (mental component scoring), PCS (physical component scoring)

Figure 2: Bar graph demonstrating the changes before and after cardiac rehabilitation in PHQ-9 (2A), mental component (2B), Duke Activity (2C), and physical component scores (2D) in the total cohort, in-person , and virtual groups. Analysis performed with a paired t test. A p<0.05 was consider significant.

Results

- There were a total of 73 patients, 47 patients (64%) completed at least 12 weeks
- Patients enrolled in virtual CR had a higher completion rate compared in-person CR (80% v. 60%, p=0.005)
- The virtual cohort was older at the start of CR on average than the in-person cohort
- All participants had an increase in height and skeletal muscle mass that was more noticeable in the in-person CR group
- The whole cohort demonstrated increased muscular endurance
  - Percent predicted peak VO_2, +5.1%, p=0.02
  - 6-minute walk distance, +92.1m, p<0.0001
- The whole cohort demonstrated increased strength
  - Sit to stand repetitions, +4.9, p<0.0001
  - Arm curl repetitions, +4.4, p<0.0001
- The whole cohort demonstrated increased flexibility with sit and reach distance, +1.0in, p=0.01
- The whole cohort showed improvement in psychosocial outcomes
  - PHQ-9, -1.5, p =0.04
  - PCS, +4.2, p=0.03
  - Duke activity scale, +4.5, p=0.03
- Subgroup analysis (in-person; virtual)
  - In-person showed an increase in peak VO_2, +10.2 %, p=0.01; +3.8 mL/kg/min, p=0.0008
  - No statistically significant changes seen in CPET in virtual
  - Both walked a further distance in 6-minute walk, +103.7 m, p=<0.0001; +39 m, p=0.04
  - Both had increased strength following CR
    - Sit to stand repetitions, +6.3, p<0.0001; +3.8, p=0.03
    - Arm curl repetitions, +5.1, p<0.0001; +5.3, p=0.005
  - Both increased distance of sit and reach, +1.4 in., p=0.004; +0.6 in., p=0.004

Conclusion

- Completion of CR in a pediatric HD center resulted in improvements in both physical and psychosocial outcomes
- Improvements could be seen regardless of program type (in-person v. virtual)
- CR is underutilized but is a critical component of HD care
- Increased use of CR in treatment plans could provide significant improvements in this population
- Larger studies are necessary to confirm differences seen in this study, especially the virtual cohort

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