EFFECTIVENESS OF CARDIAC REHABILITATION PROGRAM FOR PATIENTS WITH CARDIOVASCULAR DISEASES: A COMPARISON BETWEEN NORMAL AND IMPAIRED LEFT VENTRICULAR EJECTION FRACTION

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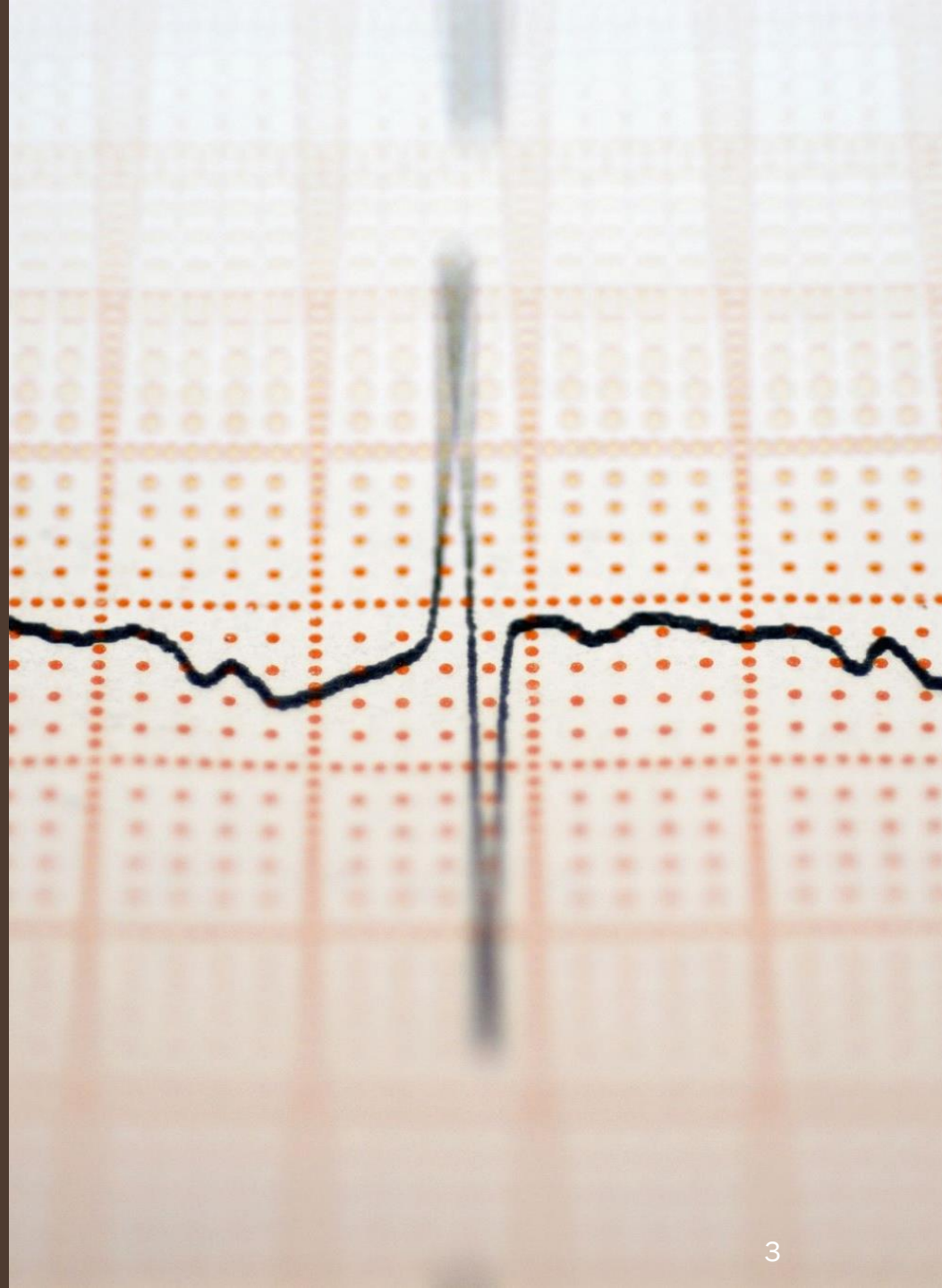
Background

- Multidisciplinary cardiac rehabilitation phase II (CRP2) service has been developed in the early 90s in PMH
- ***Cardiac rehabilitation*** service is an ***evidence-based*** treatment for cardiac patients to ***reduce cardiac mortality and recurrent myocardial infarction*** (American College of Sports Medicine, 2022)
- Cardiovascular disease (CVD) is the *third commonest* cause of deaths in Hong Kong and accounting for ***13.0%*** of all deaths in 2020 (Centre for Health Protection, 2020)
- Systolic function, as reflected by left ventricular ejection fraction (LVEF), may be normal or impaired in this target group of patients (Visseren et al., 2021)
- PMH CRP2 was expanded to provide service to patients from ***all KWC hospitals*** in Oct 2023

KWC PHASE II CARDIAC REHABILITATION DAY PROGRAM IN PMH



Patient selection

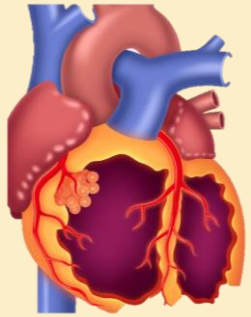
Inclusion criteria

- Post-acute myocardial infarction (AMI)
- Post-coronary artery bypass grafting (CABG)
- Post-percutaneous coronary intervention (PCI)
- Age 18 or above

Exclusion criteria

- Coronary arteries not revascularized
- Ongoing unstable angina
- Arrythmias without definitive treatment and not under optimal control
- Severe hypertension
- Significant musculoskeletal disorders

Program details

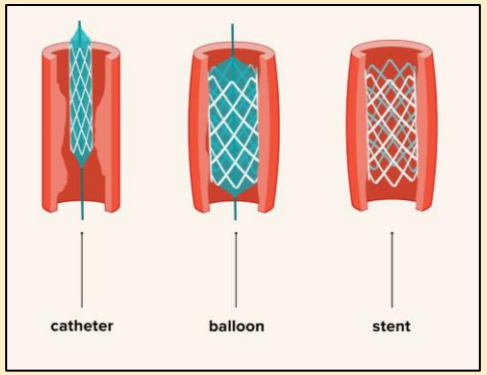


Patients referred from all KWC hospitals to PMH

Screening by PMH cardiac rehabilitation nurse

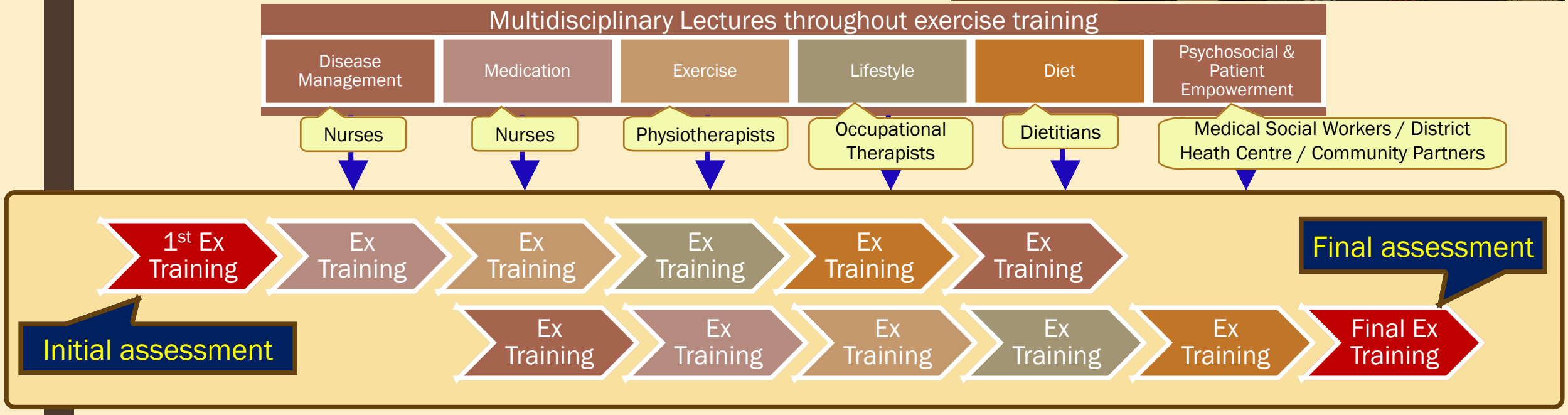
Echocardiogram +/- Treadmill test if poor LVEF

12 sessions of exercise training supervised by physiotherapists with monitoring by CR nurse & 6 sessions of multidisciplinary lectures



Program details

- Twelve sessions of group exercise training supervised by physiotherapists and supported by cardiac rehabilitation nurse
- 1-2 sessions per week
- Duration of each session: 45-60 minutes
- Six sessions of 30-minute multidisciplinary educational lectures arranged on the same days of exercise training



Exercise training

- Components of exercise training:
  - *Warm-up*
  - *Cardiopulmonary*
  - *Strengthening exercises*
  - *Cool-down*
  - *Relaxation*
- Telemetric ECG monitoring throughout training
- Training intensity
  - *Target heart rate: 40-80% Heart rate reserve*
  - *Rate of Perceived Exertion (RPE): 13-14 in 6-20 scale*

Rate of Perceived Exertion (RPE)	
6	No exertion
7	
8	
9	
10	
11	Light
12	
13	Somewhat hard
14	
15	Hard (heavy)
16	
17	Very hard
18	
19	
20	Maximal exertion

EXERCISE TRAINING

TELEMETRIC ECG MONITORING

MULTIDISCIPLINARY EDUCATION

- 6 sessions of multidisciplinary 30-minute education lectures
  - Disease Management & Medication by Nurses
  - Exercise by Physiotherapists
  - Lifestyle by Occupational Therapists
  - Diet by Dietitians
  - Psychosocial & Patient Empowerment by Medical Social Workers / District Health Centers / community partners

Objectives

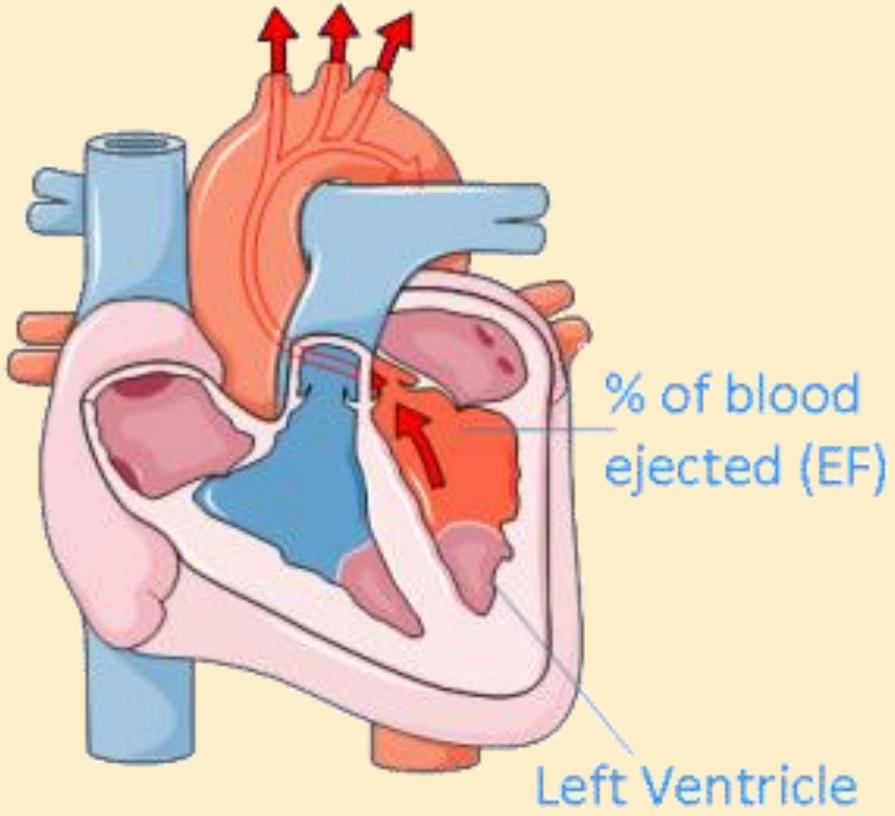
- To compare and evaluate the effects of CRP2 on exercise-related outcomes in CVD patients with normal (≥50%) and impaired (< 50%) LVEF.

Methodology

- Design: retrospective study
- Studying period: Oct 2023 to Sept 2025
- Time point of evaluation: at baseline and upon completion of the program at the end of the 12th session

Studying Groups Comparison

- Participants were divided into 2 studying groups
  - ***Group 1:*** *Normal LVEF (≥50%)*
  - ***Group 2:*** *Impaired LVEF (<50%)*



$$LVEF(\%) = \frac{\text{Stroke Volume (SV)}}{\text{End-Diastolic Volume (EDV)}} \times 100.$$

A fundamental measure of left ventricular systolic function, reflecting the percentage of blood ejected from the ventricle with each heartbeat

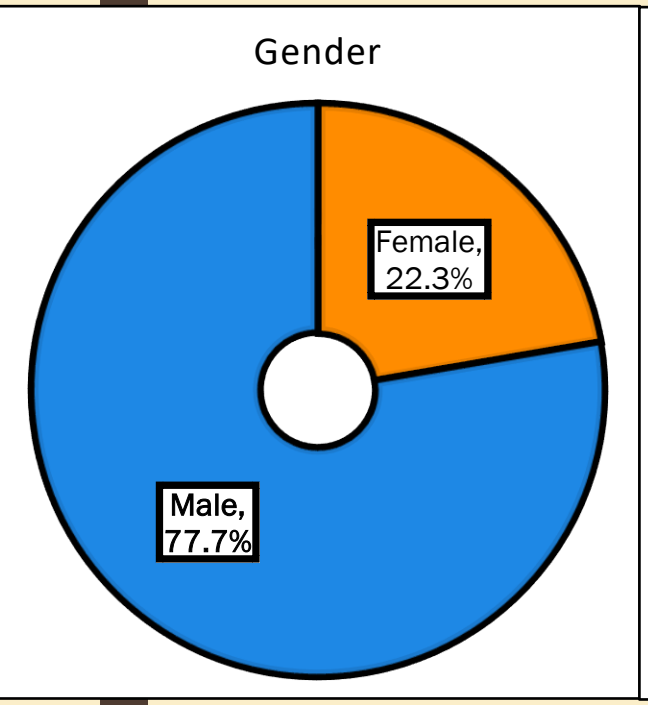
Physiotherapy Outcome Measures

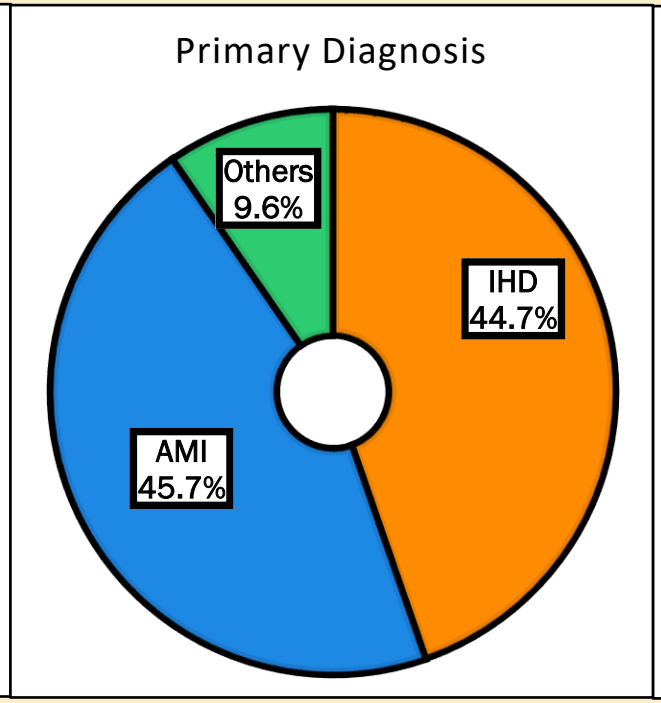
- Six-minute Walk Test (6MWT)
- Hand Grip Strength
- The Hong Kong Chinese version of the Cardiac Exercise Self-Efficacy Instrument (CESEI-C)

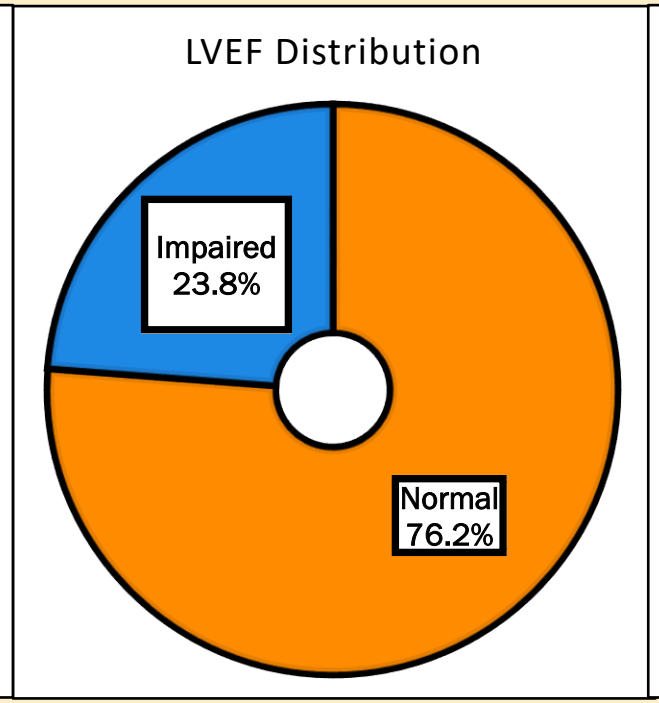
RESULTS

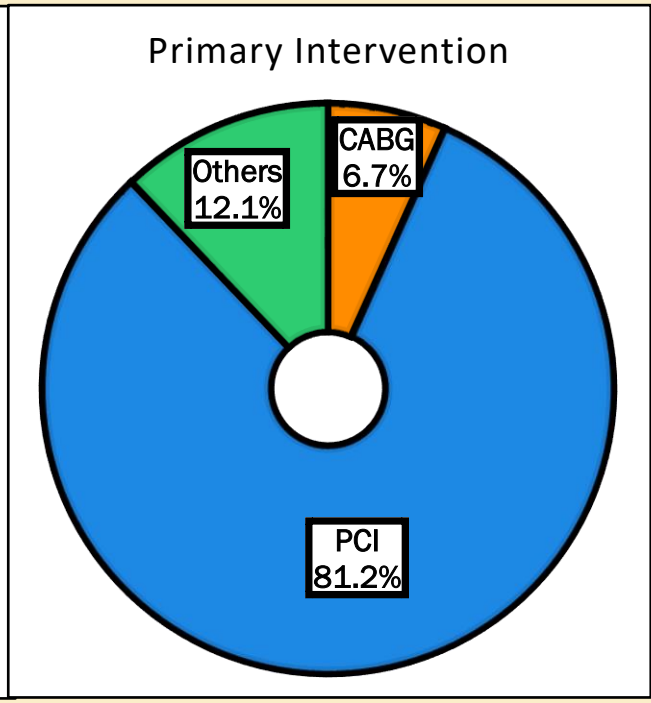
Patient demographics

- 282 patients completed the 12-session CRP2 in 10/2023 – 9/2025
- Mean age: 64.8±9.0 years



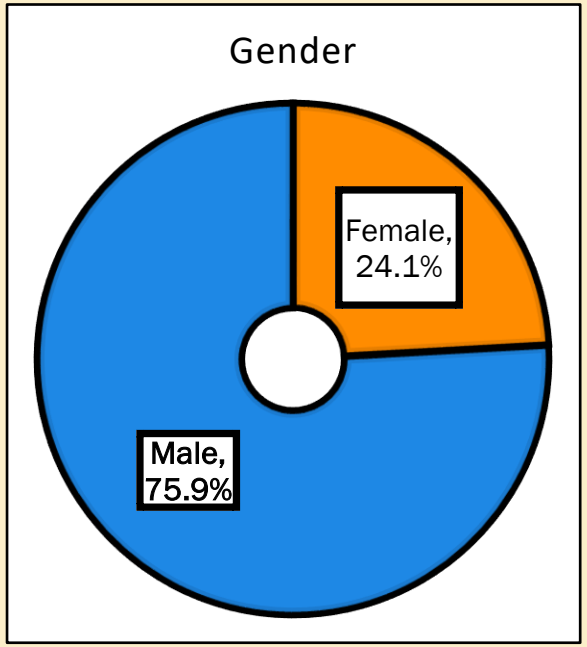


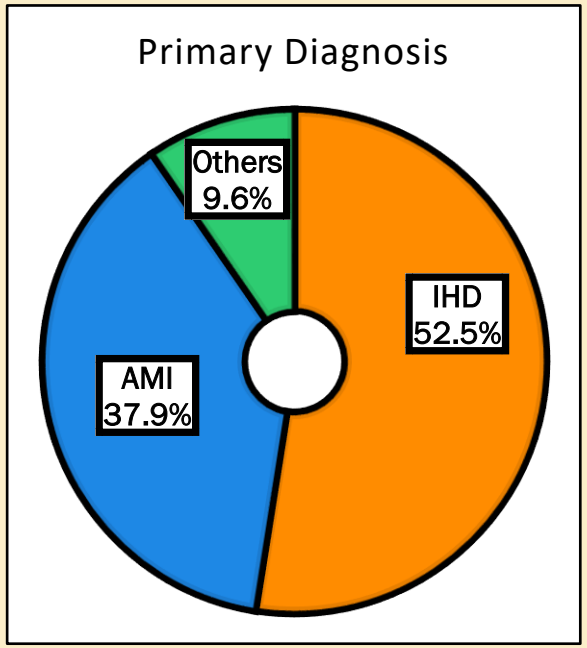


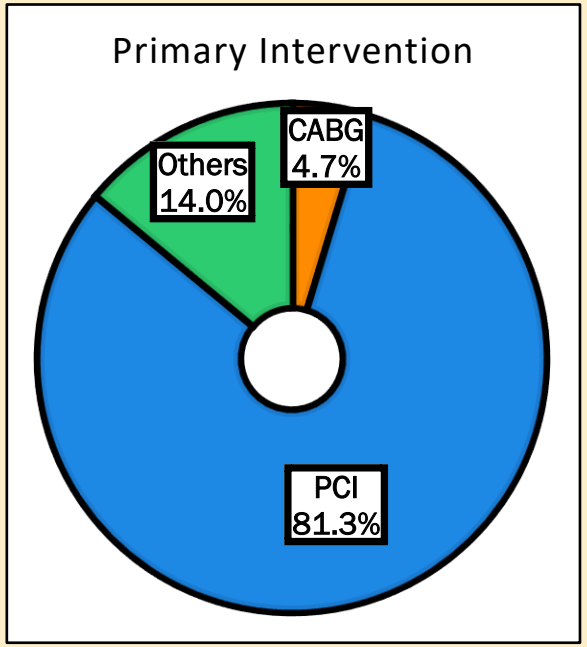


Normal LVEF

- N = 215
- Mean age 65.6±8.7

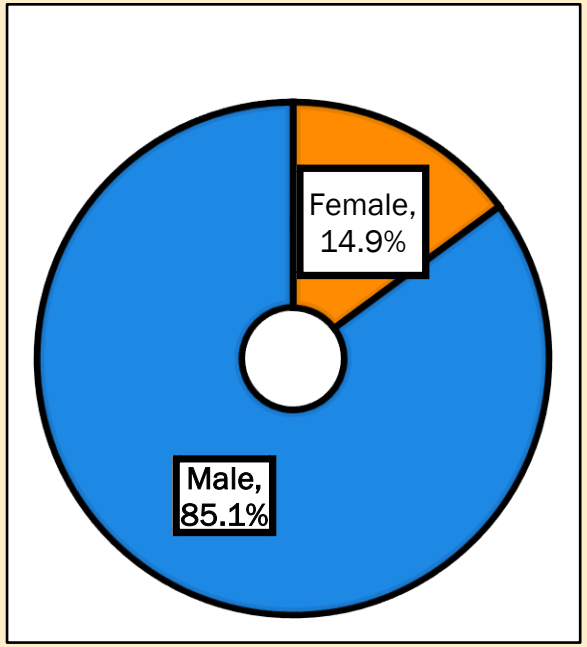


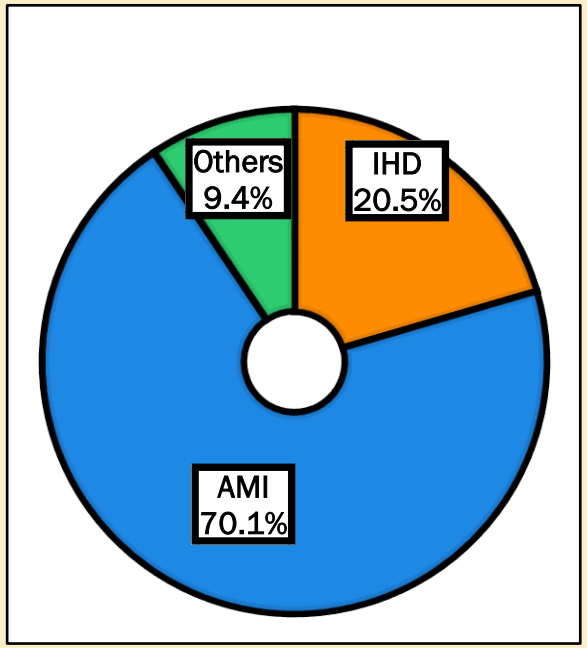


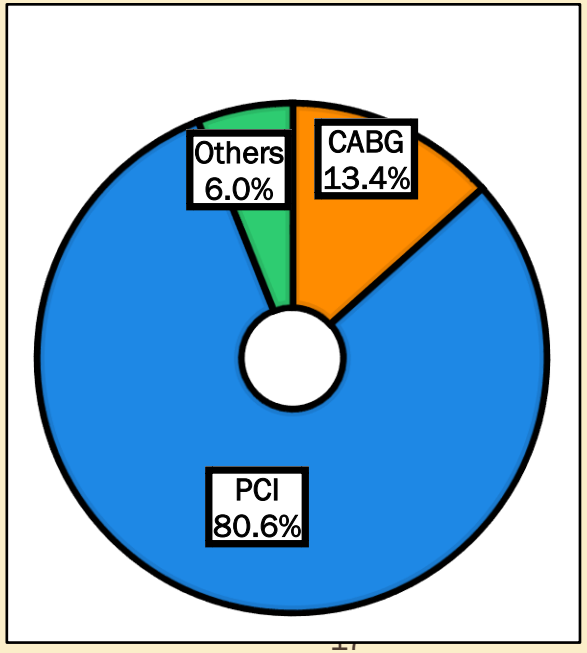


Impaired LVEF

- N = 67
- Mean age 62.4±9.7

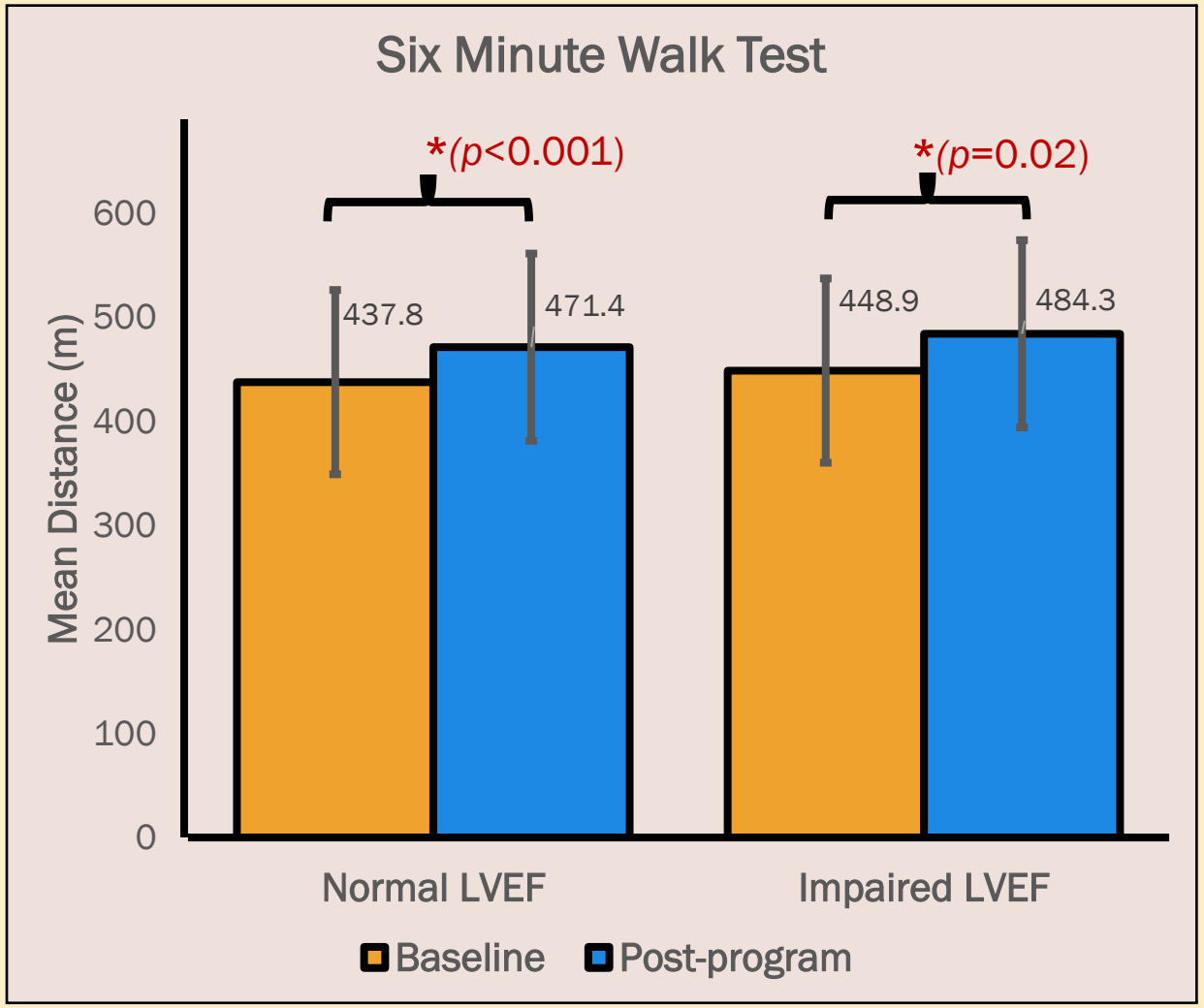






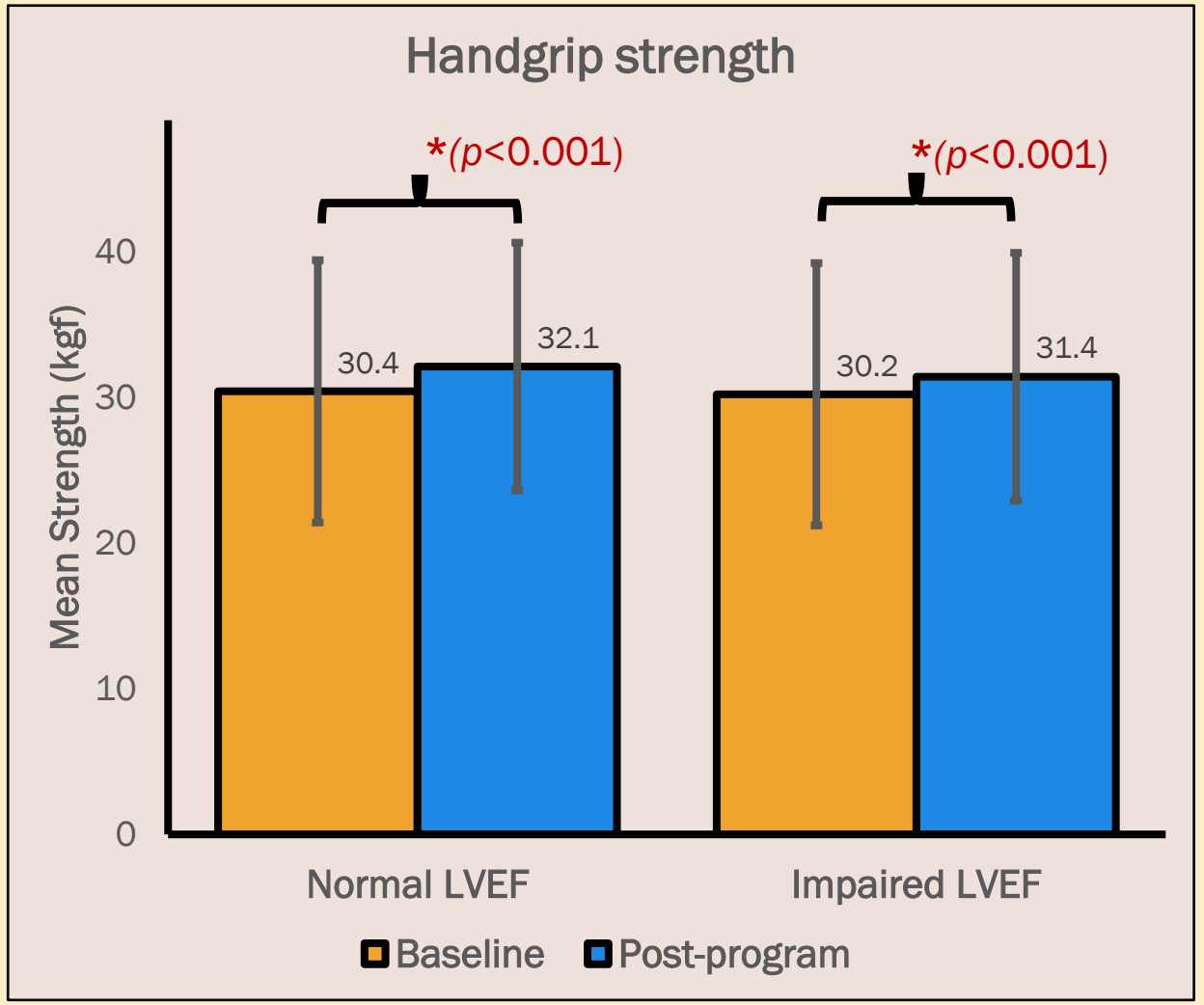
Six-minute Walk Test

- Sub-maximal exercise test used to assess aerobic capacity and endurance (American Association of Cardiovascular Pulmonary Rehabilitation, 2021)
- Outcome: Distance covered over 6 minutes
- Significant improvement in both normal & Impaired LVEF with no between group difference



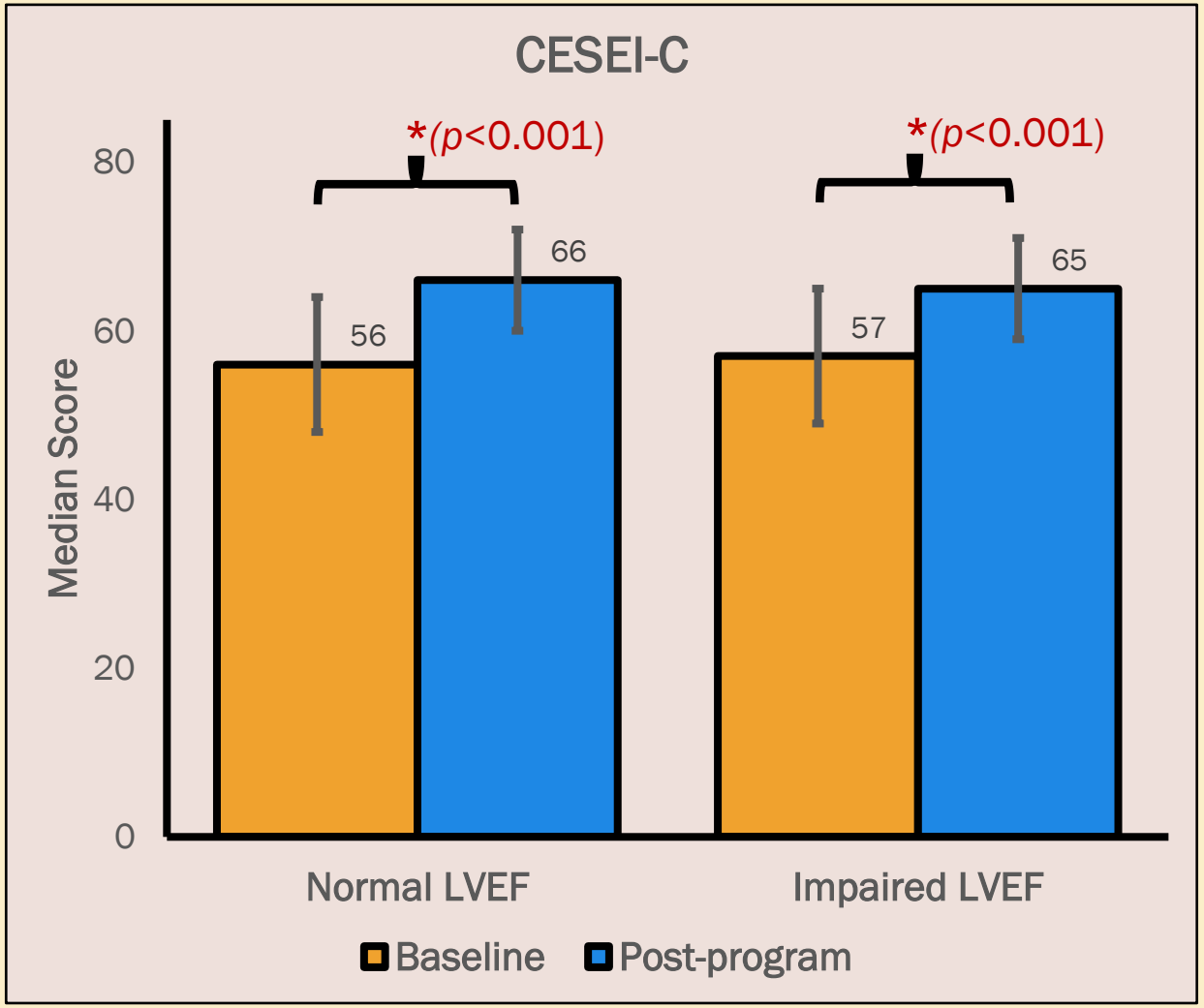
Handgrip strength

- Measure of dominant handgrip strength using Jamar dynamometer
- Reflects effects of exercise training on physical function (Mroszczyk-McDonald et al., 2007)
- Significant improvement in both normal & Impaired LVEF with no between group difference



The Hong Kong Chinese version of the Cardiac Exercise Self-Efficacy Instrument (CESEI-C)

- A 16-item instrument to measure exercise self-efficacy among Hong Kong Chinese (Cheng et al., 2019)
- High score associated with better exercise capability
- Significant improvement in both normal & Impaired LVEF with no between group difference



Cardiac Exercise Self-Efficacy Instrument Chinese Version (CESEI-C)

此問卷評估參加者對配合運動計劃的自信心。

請就以下各項圈出閣下認為自己能夠達成目標的信心。

	信心很弱		一般		信心很強
1. 於運動前進行熱身。	1	2	3	4	5
2. 運動時沒有出現胸口痛。	1	2	3	4	5
3. 知道自己何時運動過量並須要停止。	1	2	3	4	5
4. 於不方便時仍能堅持運動。	1	2	3	4	5
5. 知道自己運動前後應有的心跳率。	1	2	3	4	5
6. 於運動後進行舒緩運動。	1	2	3	4	5
7. 即使於繁忙的日子仍能安排運動。	1	2	3	4	5
8. 能夠忍耐劇烈的運動。	1	2	3	4	5
9. 知道哪一類運動對自己有益。	1	2	3	4	5
10. 知道自己何時可以增加運動量。	1	2	3	4	5
11. 能夠耐受適量的運動。	1	2	3	4	5
12. 運動前後檢查自己的心跳率。	1	2	3	4	5
13. 能夠回復入院前的活動量。	1	2	3	4	5
14. 能夠耐受輕量的運動。	1	2	3	4	5
15. 每星期三次，每次至少二十分鐘以上的運動。	1	2	3	4	5
16. 能夠自己在家中運動。	1	2	3	4	5

總分： /80

Conclusion

- *6MWT distance*, *handgrip strength* and *CESEI-C score* improved in patients with both normal and impaired LVEF after attending CRP2
- No between-group difference was observed
- CRP2 significantly enhanced exercise capacity, muscle strength, and exercise self-efficacy in CVD patients regardless of LVEF status
- Heart failure patients with impaired LVEF may benefit from future expansion of the program

Reference

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THANK YOU TO ALL TEAM MEMBERS