In Collaboration with

Middle East Forum on Quality & Safety in Healthcare **2023**

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DEVELOPING AND DELIVERING A HYBRID CARDIAC REHABILITATION PHASE 2 EXERCISE PROGRAM DURING THE COVID-19 PANDEMIC - A QUALITY IMPROVEMENT PROGRAM

Healthcare Resilience in Extraordinary Times

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Conflict of Interest

The speaker(s) or presenter(s) in this session has/have no conflict of interest or disclosure in relation to this presentation.

Learning Objectives

At the end of this session, participants will be able to:

1. Explain what Cardiac Rehabilitation is, and its associated clinical benefits
2. Describe results and benefits associated with Hybrid Cardiac Rehabilitation participation
3. Implement Hybrid Cardiac Rehabilitation through a Quality Improvement Program

DEVELOPING AND DELIVERING A HYBRID CARDIAC REHABILITATION PHASE 2 EXERCISE PROGRAM DURING THE COVID-19 PANDEMIC

A QUALITY IMPROVEMENT PROGRAM

In Collaboration with
Hamad Medical Corporation
Institute for Healthcare Improvement

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What is Cardiac Rehabilitation?

- Cardiac Rehabilitation (CR) is a coordinated multifaceted intervention designed to **optimize the cardiac patient's physical, psychological, and social functioning**, in addition to stabilizing, slowing or even reversing the progression of their underlying cardiac condition, thereby reducing morbidity and mortality. (1)
- CR is recommended after Acute Coronary Syndrome, Chronic Coronary Syndrome, Heart Failure, Percutaneous Coronary Intervention and Coronary Artery Bypass Graft surgery.(1–3)
- It involves a **Multidisciplinary Team (MDT)** (in our case comprised of cardiology, nursing, clinical exercise physiology, physiotherapy, pharmacy, dietetic, and occupational therapy specialties).

Benefits of CR (I)

- Benefits of CR are broad and include lower risk of cardiovascular mortality,(4) decrease in re-hospitalizations over 1 year, and an increase in physical function and quality of life.(2,3)
- Much of the clinical benefit of CR has been attributed to an **increase in peak exercise capacity from participation in a structured exercise programme** (5,6) and the associated physiological effects on coronary endothelial function, insulin resistance, blood pressure, inflammatory markers, and fibrinolytic state. (4-6)

Benefits of CR (II)

Cochrane reviews of cardiac rehabilitation vs no rehabilitation†	Number of trials (number of participants)	Effect estimate
2001*	36 (8,440)	
All-cause mortality		OR 0.73 (95% CI 0.54–0.98)
CV mortality		OR 0.69 (95% CI 0.51–0.94)
2011	47 (10,784)	
All-cause mortality		RR 0.87 (95% CI 0.75–0.99)
CV mortality		RR 0.74 (95% CI 0.63–0.87)
Hospitalization		RR 0.69 (95% CI 0.51–0.93)
2016	63 (14,486)	
All-cause mortality		RR 0.91 (95% CI 0.75–1.10)
CV mortality		RR 0.58 (95% CI 0.43–0.78)
Hospitalization		RR 0.65 (95% CI 0.46–0.92)
2021	85 (23,430)	
All-cause mortality		RR 0.91 (95% CI 0.75–1.10)
CV mortality		RR 0.58 (95% CI 0.43–0.78)
All-cause hospitalization		RR 0.58 (95% CI 0.43–0.77)

*hospitalization not assessed
† longest follow-up available reported for mortality, and shortest for hospitalization

- **2023 Cochrane SR and meta-analysis**
- 85 RCTs including CHD patients (n=23430) participating in exercise-based CR (7)
- Outcomes:
  - ↘ risk of CV mortality
  - ↘ recurrent cardiac events
  - ↘ hospitalizations
  - ↗improved HRQOL
  - cost effective.

COVID-19 & CR provision

- Approximately **75% of CR programs worldwide stopped services**, with others reducing components delivered, and/or changing mode of delivery with little opportunity for planning and training.(8,9).
- CR components most affected were supervised exercise training, inclusion of family and informal caregivers, end of program reassessment and peak exercise capacity testing. (9)

Hybrid Cardiac Rehabilitation

- Multiple studies have shown the safety, effectiveness, reduced cost of delivery, and improved participation with a Hybrid Cardiac Rehabilitation Phase 2 Exercise Program (HCRP2-EP), 2,10,11,12-17)

Aim

- To enroll 70% of eligible patient onto Hybrid Cardiac Rehabilitation by 30th September 2020

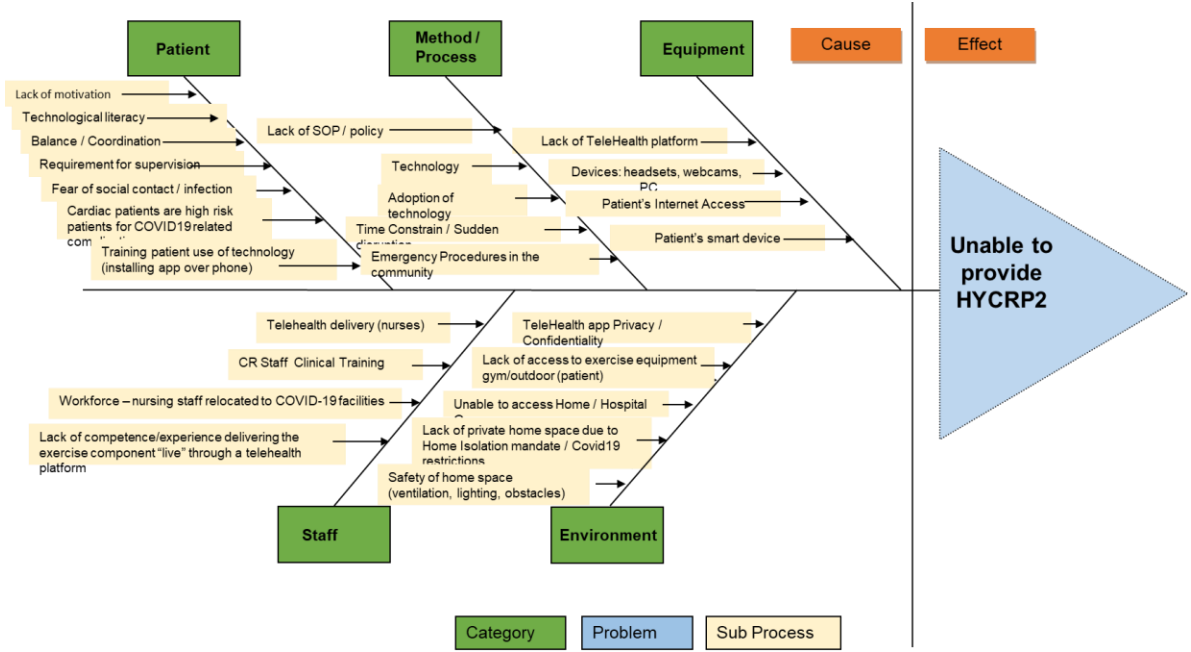
Objetives Hybrid CR QIP

1. To ensure uninterrupted provision of supervised CRP2 exercise sessions during the COVID-19 pandemic via Hybrid CR.
2. To implement a new Cardiac Rehabilitation Phase 2 delivery structure.
3. To achieve equal or more than 10% improvement in the peak exercise capacity after completion of the Hybrid CR exercise programme.

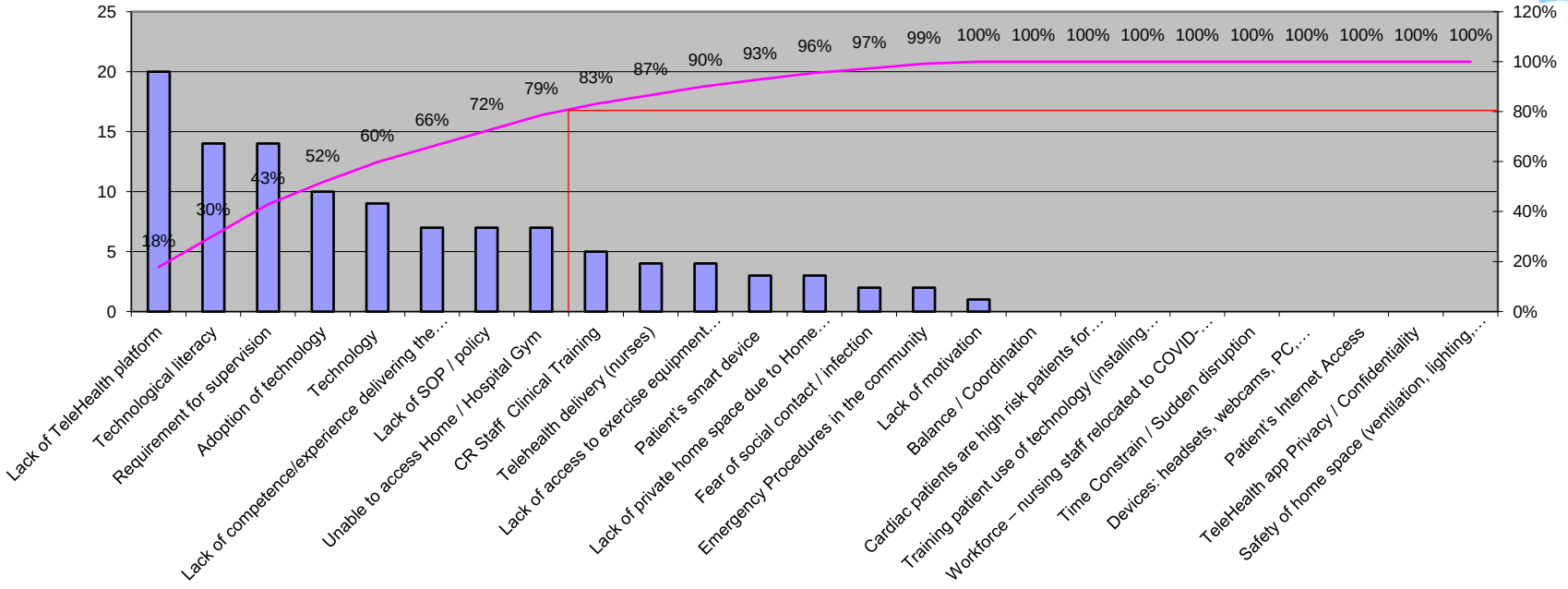
Methodology

- Institute for Health Care Improvement's (**IHI**) collaborative model for improvement was adopted.(18)
- Multiple Plan–Do–Study–Act (**PDSA**) cycles were used to test change ideas.
- The MDT together with a quality adviser reviewed various global models of alternative CRP2 delivery systems to identify an appropriate model:
  - The team decided to implement **Hybrid CR**
  - We identified barriers to implementation using a **Fishbone Diagram**
  - **Pareto Analysis** categorized the most significant barriers

Cause and Effect



Pareto Analysis - Barriers to implementation



Inclusion Criteria

- All male CVD patients with a diagnosis of Acute Coronary Syndrome (ST-elevation myocardial infarction, Non ST- elevation myocardial infarction, Unstable Angina), Chronic Coronary Syndrome (Coronary Artery Disease, Stable Angina), or Coronary intervention (Coronary Artery Bypass Grafting, Percutaneous Coronary Intervention), Heart Failure, Valve Disease/Valve Repair, Cardiomyopathy enrolled in CRP2.

Exclusion Criteria

- Not clinically stable
- History of cardiac arrest (not in the context of ACS), V-tach and/or other life-threatening arrhythmias
- Left Ventricle Ejection Fraction (LVEF) < 30%
- Significant ST depression or other significant ECG changes during the initial exercise test
- Identified risk of fall
- Patient did not complete the minimum number of hospital-based supervised exercise sessions
- Presence of technological barrier (poor computer literacy and/or lack of access to internet connection).
- Patient is not interested and or does not give consent for participation

QIP Measures

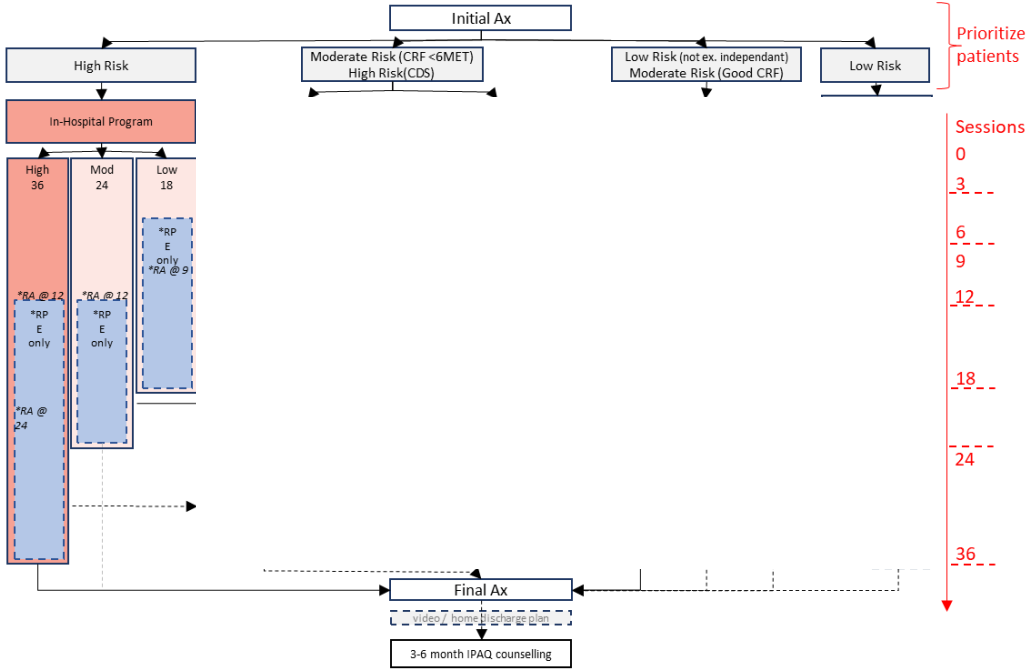
- Outcome measures:
- Enrolment in HCRP2-EP.
- Improvement of Peak Exercise Capacity.
- Process measures:
- Compliance with Hospital-based vs Home-based Exercise sessions.
- Timing of transfer to Home-based Exercise sessions.
- Reliability of Technology.
- Balance measures:
- Patient Satisfaction Score (PSS).
- Rate of exercise-related major and minor adverse events. (11)
- Estimated savings in the cost of clinical and non-clinical consumables.

PDSAs

- PDSA 1: Remote Physical Activity Counselling
- PDSA 2: Creation of Short video “Cardiac Rehab at home during COVID-19”
- PDSA 3: Implementing the Home-Based Exercise Component
  - PDSA 3a: Selection and Customization of the Telehealth platform
  - PDSA 3b: Designing the Exercise component of the Home-Based sessions
  - PDSA 3C: Optimization of Access to the Telehealth platform
- PDSA 4: Remote telemetric ECG monitoring during Home-based Exercise
- PDSA 5: Modification of CRP2 delivery structure (Criteria for transfer & timing)
- PDSA 6: Staff training:
- PDSA 7: Minimizing risk of COVID-19 infection during the hospital-based sessions
- PDSA 8: Video-support to promote long-term engagement in PA
- PDSA 9: Tracking Technical Issues:

The Intervention

Prioritizing patients

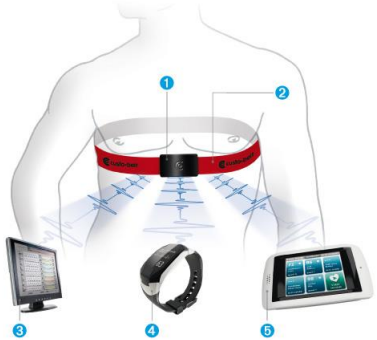


- Checklist developed to assess suitability

- Any transfer from one level to another needs to be approved by MDT.

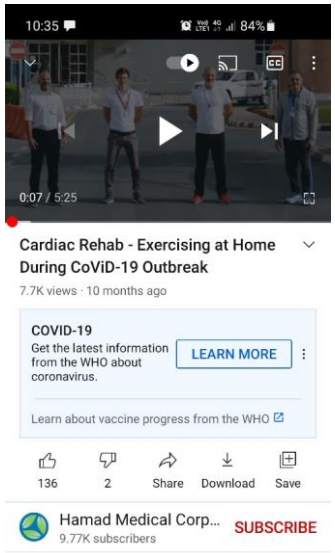
Online virtual exercise class

Remote ECG monitoring (I)



Remote ECG monitoring (II)

Online Video Support



1. 4 Levels of Intensity
2. Languages: Arabic and English
3. written legends

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Results

Hybrid CR was initiated in March 2020, and **96 patients enrolled between July 2020 and April 2021** of which at initial assessment 56 (58.3%) were eligible.

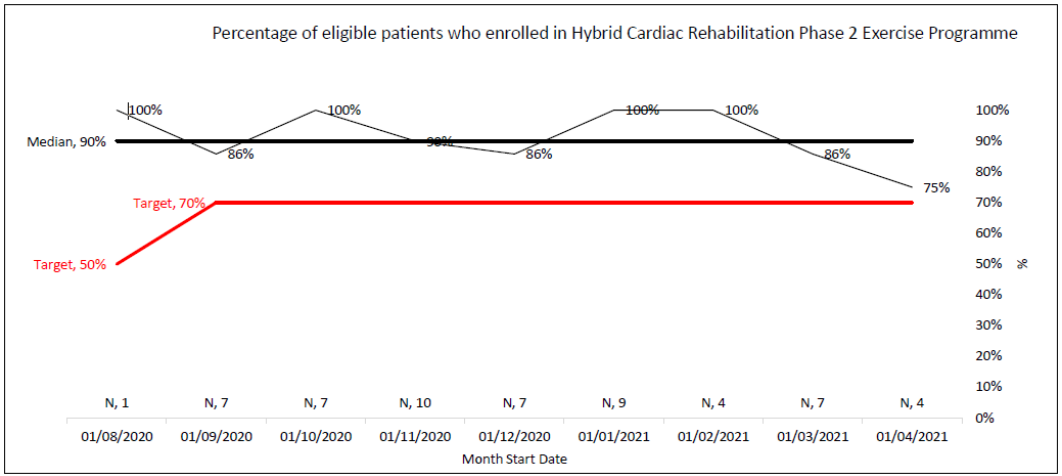
Program Outcomes

PATIENT FLOW	n	%
All patients enrolled into CRP2	n=96	
Non-Eligible for HCRP2-EP	n=40	41.7%
Eligible for HCRP2-EP	n=56	58.3%
- Enrolled in HCRP2-EP	n=51	91.1%
- Completed HCRP2-EP	n=43	84.3%
- Completed with final assessment	n=35	68.6%
- Completed with symptom limited test	n=33	64.7%
- Improved peak exercise capacity >10%	n=25	75.8%

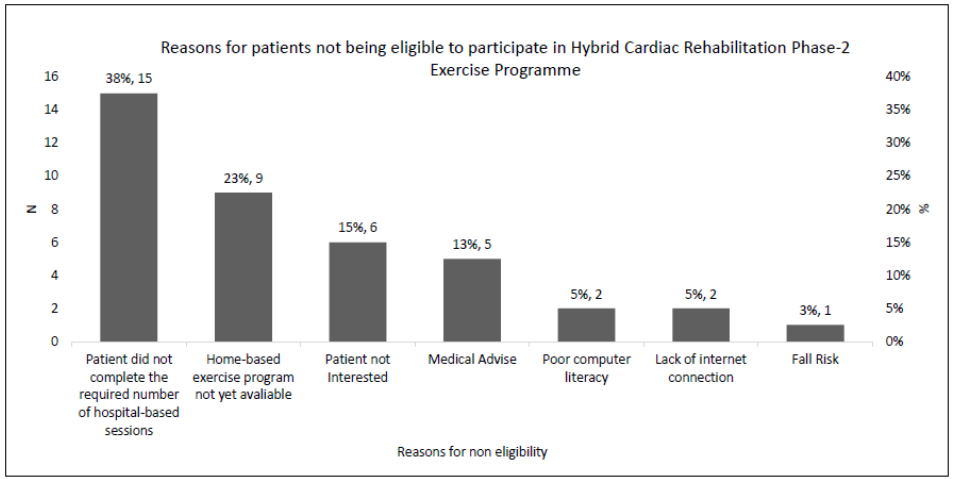
Patient Characteristics

Patient Characteristics	Improversn=25	Non-improversn=8
Age (years), Mean (SD)	57 ± 10	54 ± 7
Active Smoking, n (%)	2 (8%)	3 (38%)
Diabetes, n (%)	14 (56%)	7 (88%)
Hypertension, n (%)	15 60%)	6 (75%)
Dyslipidemia, n (%)	7 (28%)	1 (13%)
Baseline % age-predicted exercise capacity, Mean (SD)	79% ± 19%	80% ± 11%
Low Risk Category, n (%)	5 (20%)	4 (50%)
Intermediate Risk Category, n (%)	17 (68%)	3 (38%)
High Risk Category, n (%)	3 (12%)	1 (13%)
Baseline IPAQ, MET-min/week, Mean (SD)	793 ± 789	867 ± 684
Baseline IPAQ <600 MET-min/week (Sedentary/Minimally Active), n (%)	12 (48%)	3 (38%)
Baseline IPAQ 600-1500 MET-min/week (Active), n (%)	10 (40%)	3 (38%)
Baseline IPAQ >1500 MET-min/week (Highly Active), n (%)	(12%)	2 (25%)
CDS, Mean (SD)	68.6 ± 23.3	80.8 ± 15.5
CDS >90, n (%)	4 (16%)	3 (38%)
Language barrier (% of Arabic speaking only), n (%)	4 (16%)	1 (13%)
Number of completed sessions, Mean (SD)	25.6 ± 6.1	21.7 ± 5.4
Number of completed home-based exercise sessions, Mean (SD)	12.5 ± 4.0	11.3 ± 5.4
Number of completed hospital-based exercise sessions, Mean (SD)	13.1 ± 8.2	10.3 ± 7.6
Point of transfer to home-based exercise (percentage based on total number of sessions), Mean (SD)	46% ± 21%	46% ± 23%
Frequency of Exercise (number of sessions/week), Mean (SD)	1.7 ± 0.98	1.6 ± 0.28
Improvement in Peak Exercise Capacity, Mean (SD)	17% ± 6%	4% ± 5%
Compliance to home-based exercise sessions, Mean (SD)	91% ± 12%	92% ± 13%
Compliance to hospital-based exercise sessions, Mean (SD)	95% ± 8%	90% ± 14%

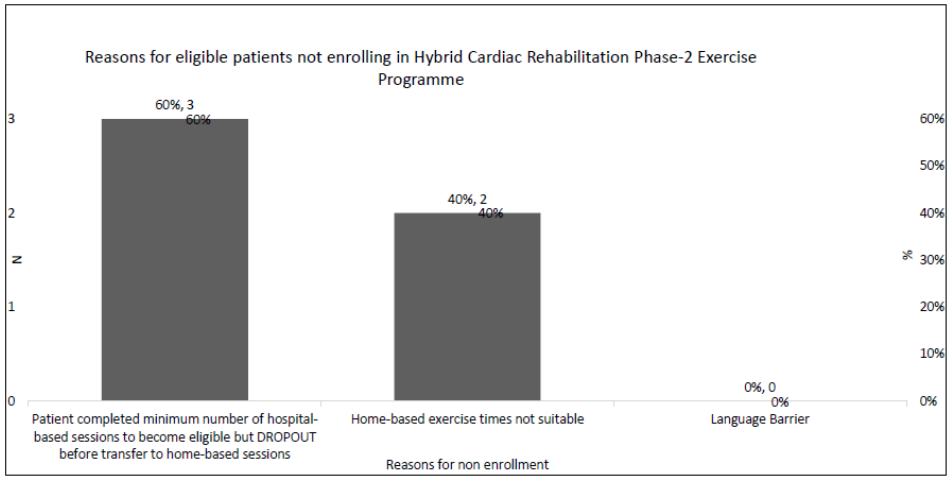
Primary Outcome: Enrollment



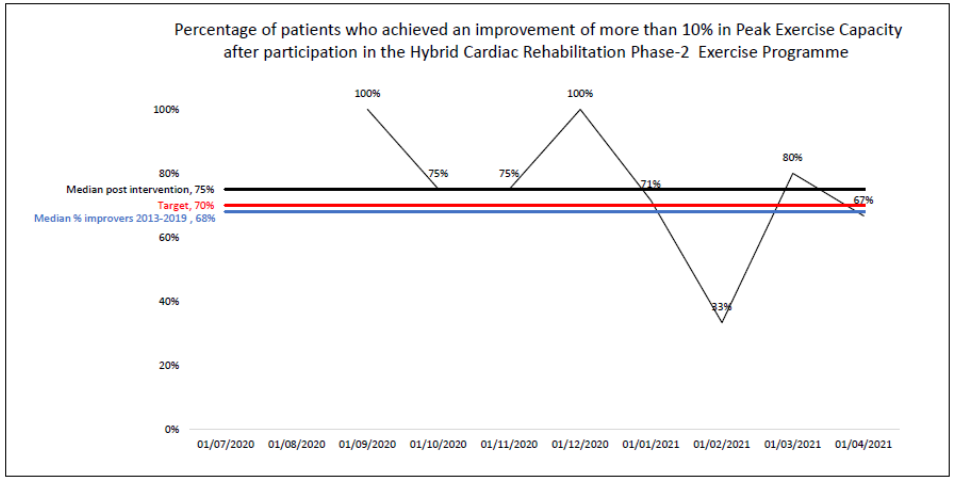
Reasons Not Eligible



Reasons Not Enrolled



2nd Outcome: Exercise Cap. Improvement



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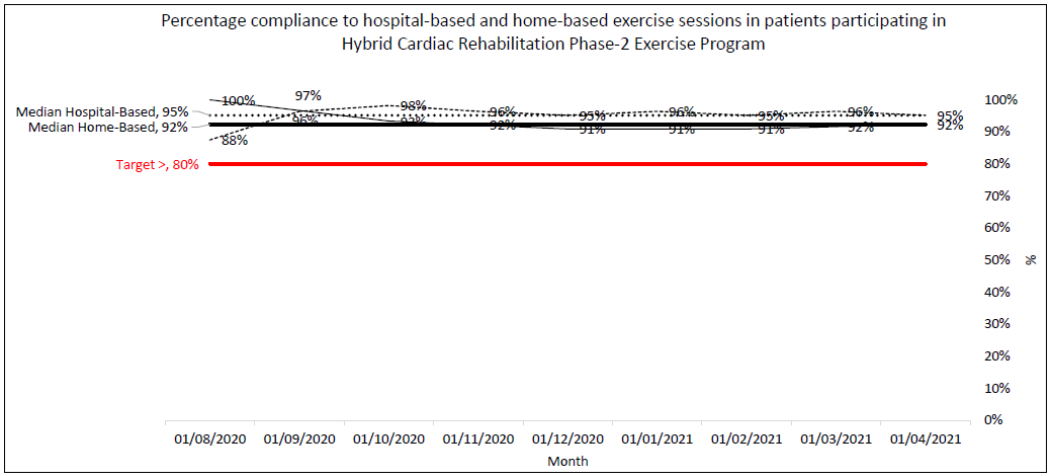
Process Measure: Compliance



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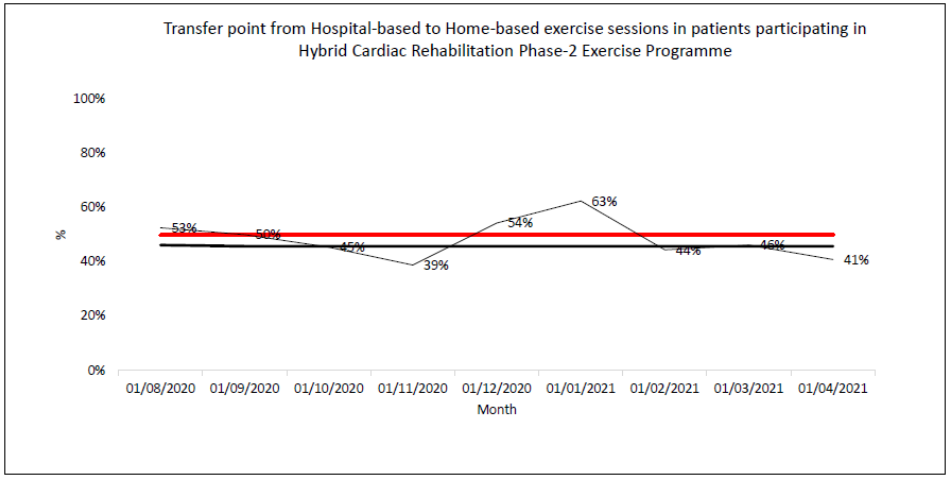
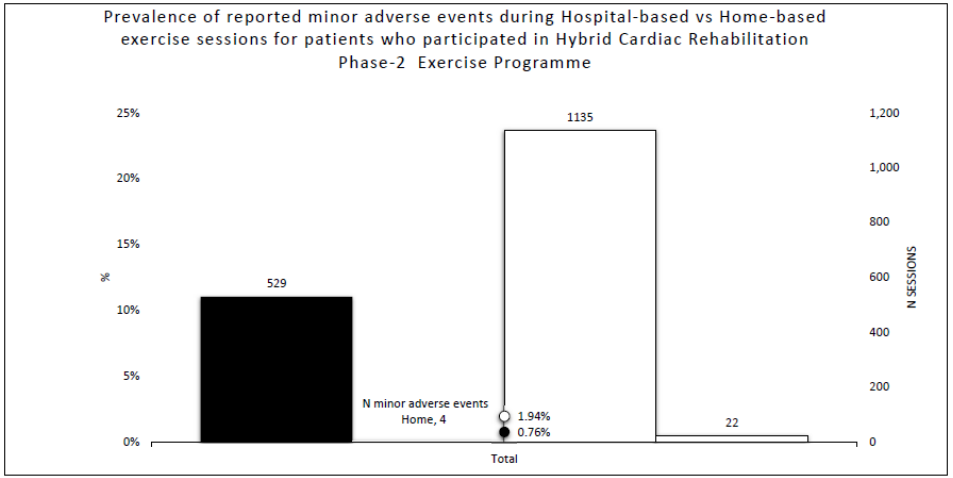
Process Measure: Timing of Transfer

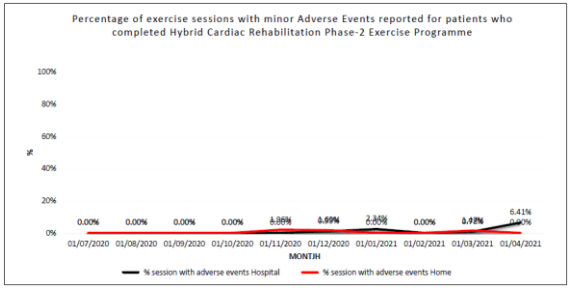


Process Measure: Reliability of Technology

- From January 2021 we monitored 217 sessions (41% of total).
- 32 (14.7%) sessions experienced non-critical issues,
- 21 (9.6%) had critical issues that prevented the planned treatment from being completed.
- Equipment at fault (either solely or various pieces of equipment simultaneously failing on the same session)
  - 57% Telehealth platform was at fault,
  - 33% Remote ECG telemetry device,
  - 14% internet connection on either the patient or the providers side.

Balance Measure: Adverse Events





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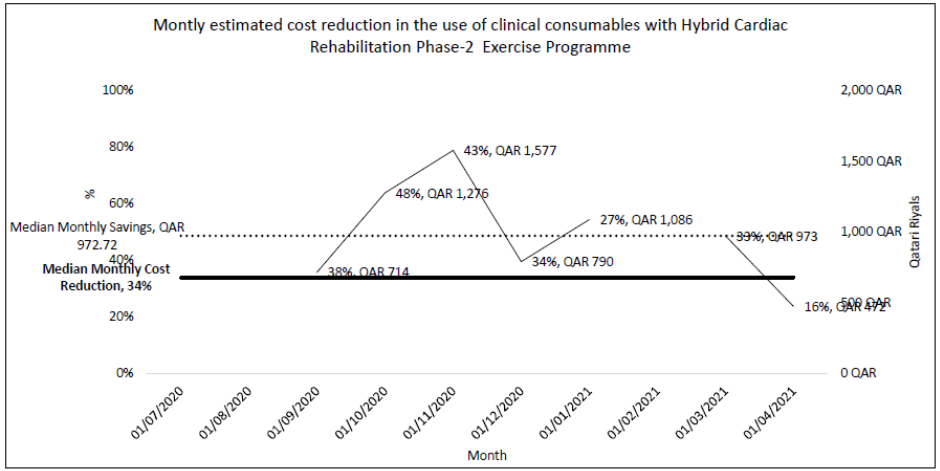
Balance Measure: Cost of Consumables



- (Total Net Estimated Saving = 6889QAR ≈ 135 QAR/per patient enrolled)

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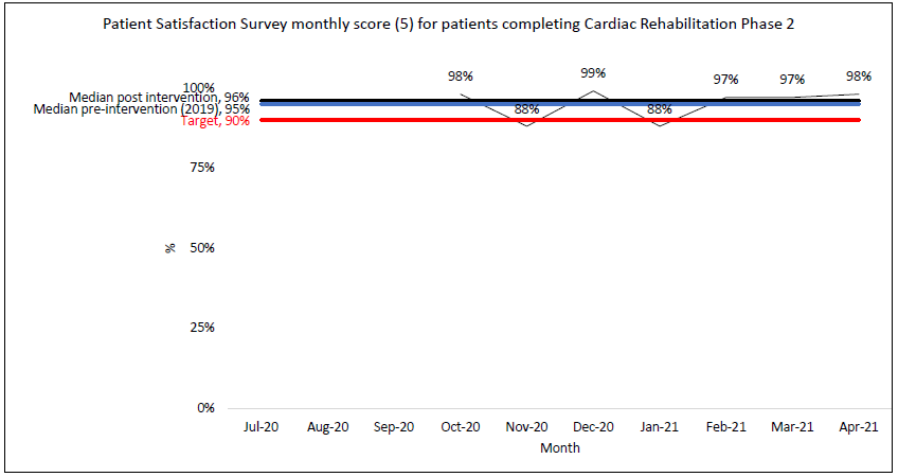
Balance Measure: Patient Satisfaction



Take Home Points

1. Multiple studies have shown safety, effectiveness, reduction in the cost of delivery, and improved participation with Hybrid CR.
2. **A well-designed QI program is a feasible and effective strategy for implementing a Hybrid CR** through the means of providing a guiding structure and outcome follow up.
3. **Hybrid CR may be adopted as a standard practice outside the context of COVID-19 pandemic** as a feasible, effective, safe, cost saving intervention which may lower barriers of access for patients. This practice should be incorporated into institutional policy.
4. **Hybrid CR is well-accepted by male patients and clinicians** as a feasible, cost-saving, effective, and safe intervention in eligible male CVD patients irrespective of their risk category.

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Thank you