

CARDiac REhabilitation for Building Exertional heART Rate for Chronotropic Incompetence in Long COVID-19 (CAREBEAR): Update on Early Enrollment Phase of Clinical Trial

Christopher A. Hill, Danny Li, Marta Levkova, Veronica Schaffer, Shreya Swaminathan, Michael J. Peluso, Donald J. Grandis, Steven G. Deeks, Priscilla Y. Hsue, Matthew S. Durstenfeld

BACKGROUND

- Following SARS-CoV-2 infection, up to 30% of people experience persistent symptoms known as Long Covid (LC)
- Cardiopulmonary symptoms (chest pain, palpitations, shortness of breath) are common and are associated with significantly reduced exercise capacity
- An exercise prescription is emerging as a leading therapeutic option. However, a causal relationship between intervention and response has yet to be firmly established, and the optimal type and duration of exercise remain unknown.

METHODS

Inclusion Criteria

- Age ≥18 with confirmed SARS-CoV-2 infection at least 3 months prior
- ≥ 1 persistent COVID-attributed symptom
- Reduced exercise capacity (peak VO2 < 85% predicted)
- Chronotropic incompetence (Adjusted heart rate reserve < 80%)

Exclusion Criteria

- Pre-existing cardiac disease, chronic lung disease requiring home oxygen
- On beta-blockers, non-dihydropyridine calcium channel blockers or ivabradine, or implanted pacemaker
- Severe post-exertional malaise

BASELINE ASSESSMENT

- Cardiopulmonary exercise test (CPET)
- Blood draw
- Brachial artery flow mediated dilation (FMD)
- Symptom questionnaires

INTERVENTION

- 16-week cardiac rehabilitation (CR) program at UCSF Parnassus

CONTROL (Non-Randomized)

- No cardiac rehabilitation

FOLLOW UP ASSESSMENT

- Repeat baseline tests

Update on a clinical trial of cardiac rehabilitation in Long COVID as first participants enter intervention phase.

Figure 1: Challenges and study modifications during the early recruitment phase

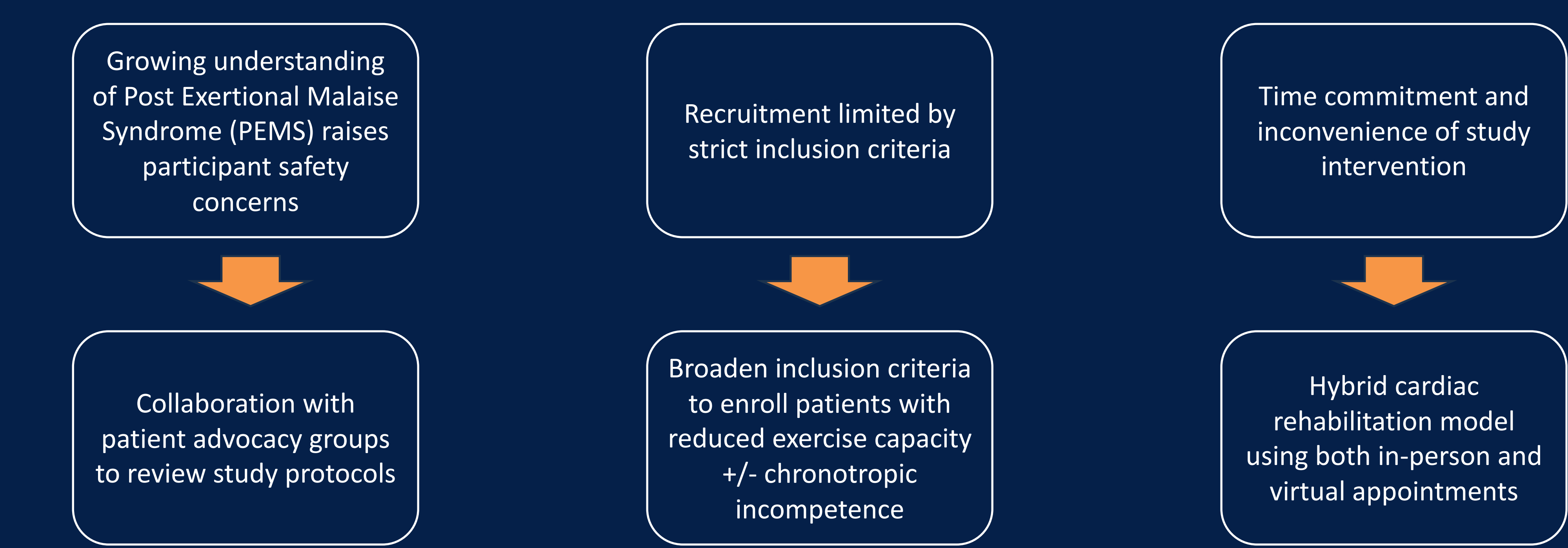
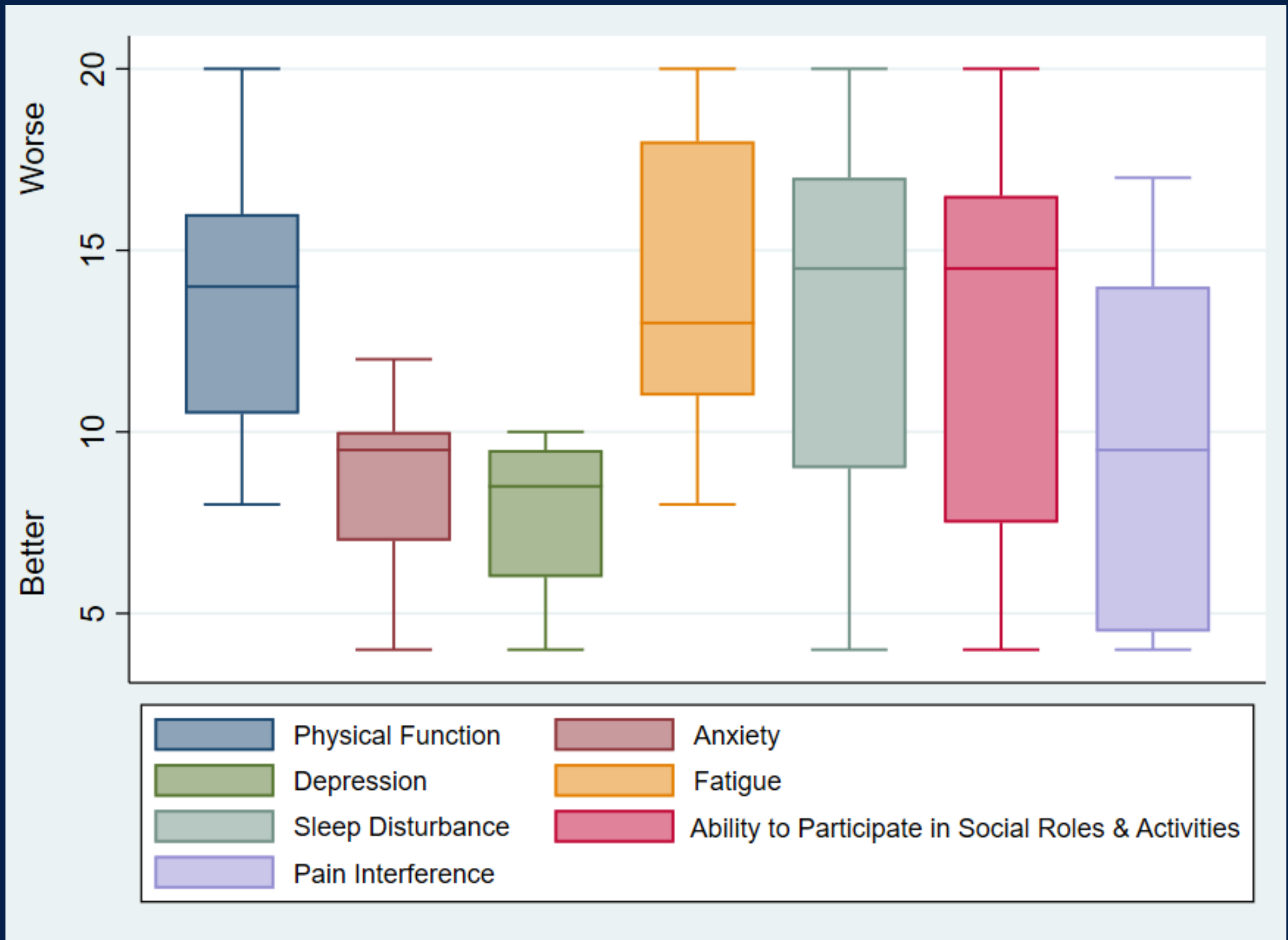


Figure 2: Baseline PROMIS-29 Scores



University of California San Francisco

RESULTS

- 7 participants have completed baseline assessments, and 2 participants are currently enrolled in the CR intervention. 1 participant in the non-randomized control group has completed both baseline and follow up assessments.
- All participants demonstrated reduced exercise capacity and chronotropic incompetence (Table 2).
- PROMIS-29 Scores reflecting self-reported symptoms were highest in the domains of physical function and fatigue (Figure 2).

Table 1: Demographics of participants who have completed baseline assessments

Characteristic	Mean ± SD or n (%)
Age	49 ± 8.81
Female sex assigned at birth	3 (42.9%)
Race / Ethnicity	
White	2 (28.6%)
Black / African American	1 (14.3%)
Asian	1 (14.3%)
Native Hawaiian or Pacific Islander	0 (0%)
Other / Don't know	0 (0%)
Hispanic Ethnicity	3 (42.9%)
# of COVID Infections per participant	1.7 ± 0.49
# of Participants admitted for COVID	2 (28.6%)
Received ≥ 1 COVID vaccine	6 (85.7%)
Hypertension	0 (0%)
Diabetes	1 (14.3%)
Smoking (ever)	5 (71.4%)
Asthma	2 (28.6%)
HIV	3 (42.9%)

Table 2: Baseline results from cardiopulmonary exercise tests

Measurement	Mean ± SD
Peak VO2 (ml/kg/min)	16.8 ± 4.1
Peak VO2 (% predicted)	62 ± 6.9
Adjusted Heart Rate Reserve (%)	47.7 ± 9.0

Discussion

- To investigate the novel, poorly understood, and rapidly evolving phenomenon of Long COVID, this study has had to adapt and overcome numerous challenges.
- The growing study population is diverse in sex assigned at birth, gender identity, and race/ethnicity.
- Among a population with baseline deficits in peak VO2 and chronotropy, symptoms of limited physical function and fatigue were common.
- Next steps include increasing the rate of enrollment and performing follow up assessments of current participants.