Evaluate the impact of Pulmonary Rehabilitation (PR) on static knee extensor muscle strength through a Handheld Dynamometer (HHD) in respiratory patients – a community approach.

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Background

PR is a comprehensive intervention based on a thorough patient assessment followed by patient-tailored therapies that include, but are not limited to exercise training, education, and behavioural change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence to health-enhancing behaviours [1].
A combination of aerobic and resistance exercises is usually prescribed, to increase overall exercise tolerance and lower limb strength, specifically knee extensors.
There are limited pieces of literature demonstrating the impact of PR on knee extensors, and the MCID of pre and post-intervention on those muscles.

Aim

To evaluate the impact of PR on static knee extensor muscle strength through a HHD in patients referred to CRT within the period July - December 2024.

Methods

An SOP was designed by PR team which was approved by the Trust Governance Committee.
Patients were triaged and consent was gained via phone call.
Suitable patients were enrolled on a 6-week programme of 12 sessions.
Knee extensors strength was measured through a HHD test performed before and after completion of programme.
Dyspnea outcome from CRQ-SR (Chronic respiratory questionnaire self-reported) was recorded before and after completion of programme.
Other QoL measures from the CRQ-SR were observed too - Emotion, Fatigue, Mastery, CAT.

Demographics

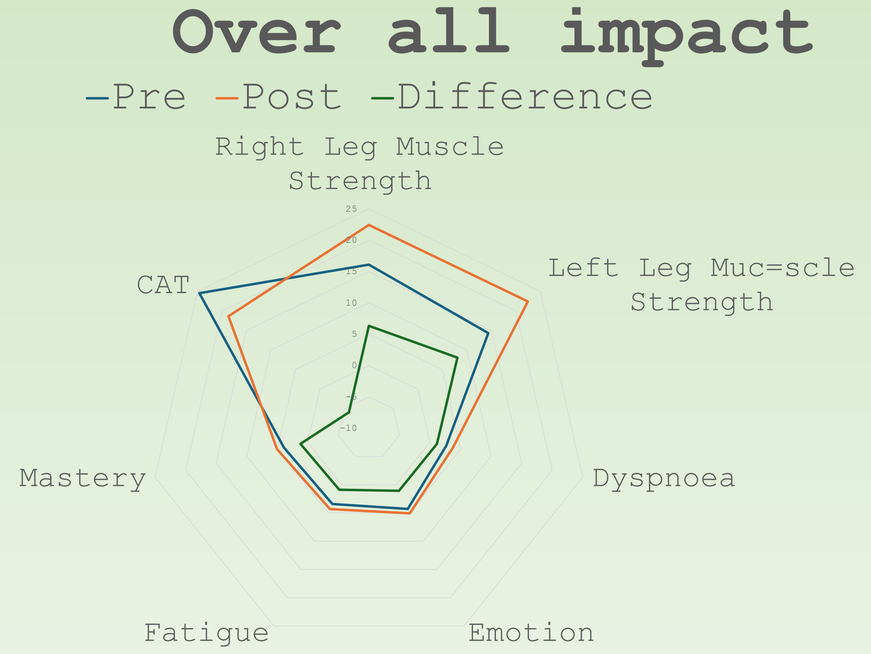
Gender		Ethnicity		Indications	
Male	15	White - British	12	COPD	14
Female	8	White - Any other White background	1	Asthma	6
Age		Asian or Asian British - Indian	3	ILD	2
<40 years old	1	Asian or Asian British - Pakistani	1	Lung Cancer	1
40-50 years old	1				
50-59 years old	4	Black or Black British - Any other Black background	3		
60-69 years old	5	Other Ethnic Groups - Any other ethnic group	1		
70-79 years old	7	Not stated	2		
80 years old >	5				

Results

A total of 258 referrals was received during the period Jul - Dec 24. Due to the drop-out rate, we had 23 completers.

The most striking result to emerge from the data is the improvement of left knee extensors compared to right knee extensors by a difference of 2 points. Both knee extensors strength improved (R = +6.33 kg; L = +8.07 kg).
Dyspnea improved of +1.14 points.
Other QoL outcomes improved too (Emotion = +1.07 points, Fatigue = + 0.89 points, Mastery = + 1.20 points, CAT = - 5.9 points).

QOL	Pre	Post	Difference
Right Leg Muscle Strength	16.09956522	22.43130435	6.335217391
Left Leg Muscle Strength	14.36130435	22.43304348	8.07173913
Dyspnoea	2.645652174	3.769565217	1.141304348
Emotion	4.285263158	5.071	1.071
Fatigue	3.407894737	4.302631579	0.894736842
Mastery	3.907894737	5.026315789	1.196842105
CAT	24.58333333	18.66666667	-5.916666667



Conclusions

The relevance of a HHD in PR is supported by the current findings of this study.
Although this pilot study is based on a small sample of participants, this lays the groundwork for future research into exploring HHD in PR services.

Recommendations

Using HHD can be a time-efficient way to assess static knee extensor muscle strength in general population, and more specifically in respiratory patients.
Due to the limited pieces of literature on the topic, further studies can contribute to identify a MCID.

Reference

[1] An official American Thoracic Society/European Respiratory Society statement: key concepts and advances in pulmonary rehabilitation. M.A Spruit et al, 2013

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