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The role of digital health intervention in improving physical activity in cardiac rehabilitation center: a randomised controlled trial

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Background: Physical activity plays a crucial role in cardiac rehabilitation for secondary prevention. Despite its importance, participation rates in cardiac rehabilitation programs remain low. Telemedicine, particularly telerehabilitation, presents a viable solution by offering remote access to cardiac rehabilitation services. This innovative approach has the potential to significantly enhance patient outcomes.

Purpose: This study aimed to assess the effectiveness of digital health intervention in improving physical activity in cardiac rehabilitation center.

Methods: A prospective randomised controlled trial was conducted, enrolling 80 eligible cardiac rehabilitation patients. Participants were 1:1 randomised into two groups: a 12-week center-based cardiac rehabilitation program (control group), and a 12-week center-based cardiac rehabilitation program combined with a digital health intervention (intervention group). This digital health intervention consists of smartphone, web, and tablet applications to monitor physical activity outside of rehabilitation sessions and motivate patients to engage in more physical activities.

Results: Of the initial 80 patients, 70 completed the study, and the results are presented in Table 1. In the intervention group, there was a statistically significant improvement in peak rate of oxygen consumption (VO2 peak) ($p < 0.01$) and peak power output (W peak) ($p < 0.01$), as measured by cardiopulmonary exercise testing between the end and the beginning of the study at the significance level of 0.05. Similar improvements were also observed in the control group ($p = 0.0002$ for VO2 peak and $p < 0.01$ for W peak). After 12 weeks of intervention, significant between-group differences were found: We observe a greater improvement in VO2 peak, on average 1.39 (95% CI: 0.23-2.54) ml/kg, and in W peak, on average, 12.29 (95% CI: 4.12-20.45), higher in the intervention group compared to the control group. Regarding physical activity, the intervention group showed a significant improvement in step count ($P = 0.002$), measured by an accelerometer, whereas no significant improvement was observed in the control group ($P = 0.9714$). There is a statistically significant difference in the change of step count between the intervention and control group at the significance level of 0.05. We observe a greater improvement, on average 14 788 steps (95% CI: 4 246 – 25 331), in the intervention group compared to the control group.

Conclusion: This study shows that a combination of a digital health intervention based telerehabilitation with a center-based cardiac rehabilitation is more effective in increasing patient's exercise capacity and physical activity compared with a center-based cardiac rehabilitation.

	Intervention group		Control group		Between groups	
Outcomes	**Difference between T2 (12 weeks) and T0 (0 week) (average increase)**	**95% Confidence interval (P-value)**	**Difference between T2 (12 weeks) and T0 (0 week) (average increase)**	**95% Confidence interval (P-value)**	**Difference in change (T2-T0) between intervention and control**	**95% Confidence interval (P-value)**
VO2 peak	2.9325	2.1094-3.7556 (<.0001)	1.5474	0.7383-2.3566 (0.0002)	1.3851	0.2308-2.5393 (0.0190)
W peak	30.30	24.48 - 36.12 (<.0001)	18.02	12.29 - 23.74 (<.0001)	12.29	4.12 - 20.45 (0.0034)
Step count	1.95	1.36 - 2.54 (<.0001)	1.14	0.60 - 1.68 (<.0001)	0.81	0.01 - 1.61 (0.0467)

Table 1: results