

**TITLE:** Cardiac Rehabilitation Significantly Improves Survival and Cardiorespiratory Fitness in Elderly Patients with Multimorbidity

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**BACKGROUND:** Cardiac rehabilitation (CR) improves prognosis and exercise capacity among patients with cardiovascular diseases (CVD). These phenomena have historically been reported in the context of a CVD diagnosis exclusively, without consideration of co-existing diagnoses (i.e., multimorbidity) and typically in younger cohorts.

**OBJECTIVE:** Characterize the impact of CR on survival and exercise capacity in elderly patients with multimorbidity.

**METHODS:** 3,115 patients  $\geq 65$  years old with CVD and  $\geq 1$  other chronic condition [i.e., diabetes, chronic obstructive pulmonary disease, liver disease, renal disease and malignancy] were referred to a 12-week exercise-based CR program. Patients who completed CR completed a symptom-limited treadmill test pre- and post-CR to determine peak metabolic equivalents (METs).

**RESULTS:** 1,718 patients ( $74 \pm 6$  years, 71% male) did not attend CR while 1,397 ( $72 \pm 5$  years, 81% male) completed CR. Those who completed were significantly younger and a higher percentage were male ( $p < 0.001$ ). Of 470 all-cause deaths during a tracking period of up to five years ( $48 \pm 17$  months) post-CR referral, there were 364 deaths in patients not attending CR, and 106 in CR-completers. Kaplan-Meier analysis revealed survival was greater among patients completing CR (92.4% vs. 78.8%, log-rank chi square = 115.1,  $p < 0.001$ ). By Cox regression analysis (forward stepwise method), CR completion was the strongest predictor of survival (Chi-square: 115.0,  $p < 0.001$ ). Age added significant predictive value (Residual Chi-square: 29.3,  $p < 0.001$ ) while sex did not (Residual Chi-square: .24,  $p = 0.62$ ). Peak METs increased ( $p < 0.001$ ) from baseline ( $6.0 \pm 1.8$  METs) to post-CR ( $6.8 \pm 1.9$  METs) in patients completing CR.

**CONCLUSION:** Elderly patients with CVD and multimorbidity significantly benefit from CR, from both a prognostic and functional perspective. Efforts should be made to ensure the advanced age-multimorbidity phenotype is not a barrier to CR participation.